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ਮਨੁੱਖੀ ਕਦਰਾਂ ਦਾ ਰਚਨਾਤਮਕ ਸਫ਼ਰ

# ਆਖਰ

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# ਰਵਿੰਦਰ ਰਵੀ ਦੇ ਕਾਵਿ-ਨਾਟਕਾਂ ਦਾ ਸਮਾਜ ਸੱਭਿਆਚਾਰਕ ਅਧਿਐਨ

— ਪ੍ਰੋ. ਇੰਦਰਜੀਤ ਕੌਰ —

ਰਵਿੰਦਰ ਰਵੀ ਨੂੰ ਇੱਕ ਕਵੀ ਅਤੇ ਕਹਾਣੀਕਾਰ ਦੇ ਨਾਲ-ਨਾਲ ਇੱਕ ਕਾਵਿ-ਨਾਟਕਕਾਰ ਦੇ ਤੌਰ 'ਤੇ ਵੀ ਪ੍ਰਸਿੱਧੀ ਮਿਲੀ ਹੈ। ਪੰਜਾਬੀ ਥੀਏਟਰ ਦੇ ਮੰਚ ਉੱਤੇ ਰਵਿੰਦਰ ਰਵੀ ਦੇ ਆਗਮਨ ਨਾਲ ਇੱਕ ਨਵੇਂ ਦੌਰ ਦਾ ਆਰੰਭ ਹੁੰਦਾ ਹੈ। ਕਾਵਿ-ਨਾਟਕ ਲਿਖਕੇ ਰਵਿੰਦਰ ਰਵੀ ਨੇ ਪੰਜਾਬੀ ਸਾਹਿਤ ਵਿੱਚ ਇੱਕ ਨਵੀਂ ਪਿਰਤ ਪਾਈ ਹੈ। ਰਵੀ ਦਾ ਵੱਖ-ਵੱਖ ਦੇਸ਼ਾਂ ਵਿੱਚ ਪਰਵਾਸ ਕਰਨ ਨਾਲ, ਵੱਖ-ਵੱਖ ਦੇਸ਼ਾਂ ਦੇ ਸੱਭਿਆਚਾਰ ਅਤੇ ਸਮਾਜ ਬਾਰੇ ਜੋ ਅਨੁਭਵ ਪ੍ਰਾਪਤ ਕੀਤਾ ਹੈ, ਉਹ ਅਨੁਭਵ ਉਸਨੇ ਆਪਣੇ ਕਾਵਿ-ਨਾਟਕਾਂ ਵਿੱਚ ਵਿਅਕਤ ਕੀਤੇ ਹਨ।

ਰਵਿੰਦਰ ਰਵੀ ਨੇ ਪਹਿਲੇ ਤਿੰਨ ਕਾਵਿ-ਨਾਟਕ 'ਬੀਮਾਰ ਸਦੀ', 'ਦਰ ਦੀਵਾਰਾਂ', 'ਅੱਧੀ ਰਾਤ ਦੁਪਹਿਰ' ਇਹ ਤਿੰਨੇ ਰਚਨਾਵਾਂ ਵੱਖ-ਵੱਖ ਸਮਿਆਂ ਵਿੱਚ ਲਿਖੀਆਂ ਗਈਆਂ ਹਨ ਪਰ ਇਨ੍ਹਾਂ ਕਾਵਿ-ਨਾਟਕਾਂ ਨੂੰ ਇੱਕ ਲੜੀ ਵਿੱਚ ਇਕੱਠਿਆਂ ਕਰਕੇ ਛਪਵਾ ਕੇ 'ਸੂਰਜ ਨਾਟਕ' ਸਿਰਲੇਖ ਹੇਠ ਪ੍ਰਕਾਸ਼ਿਤ ਕੀਤਾ ਹੈ। ਇਹ ਤਿੰਨੇ ਨਾਟਕ, ਵੱਖ-ਵੱਖ ਹੁੰਦੇ ਹੋਏ ਵੀ, ਇੱਕ ਸਮਾਨ ਇਹ ਤਿੰਨੇ ਨਾਟਕ, ਵੱਖ-ਵੱਖ ਹੁੰਦੇ ਹੋਏ ਹਨ। ਅਸਲ ਵਿੱਚ ਇਹ ਤਿੰਨੇ ਨਾਟਕ 'ਬੀਮਕ ਤਿੱਕੜੀ' ਦੇ ਰੂਪ ਵਿੱਚ, ਇੱਕ ਨਾਟਕ ਹਨ ਜੋ ਆਧੁਨਿਕ ਮਨੁੱਖ ਦੇ ਵਿਅਕਤਿਤੱਵ 'ਤੇ ਆਧਾਰਿਤ ਹੈ ਅਤੇ ਜੋ ਭਾਈਚਾਰਕ, ਰਾਸ਼ਟਰੀ ਤੇ ਅੰਤਰ-ਰਾਸ਼ਟਰੀ ਦ੍ਰਿਸ਼ਟੀ ਤੋਂ ਵਾਚਿਆ, ਵਿਖੰਡਿਤ ਪ੍ਰਤੀਤ ਹੁੰਦਾ ਹੈ। ਇਸ ਕਾਵਿ-ਨਾਟਕ ਵਿੱਚ ਲੇਖਕ ਨੇ ਕਈ ਮਸਲਿਆਂ ਨੂੰ ਸਾਹਮਣੇ ਰੱਖਿਆ ਹੈ ਜਿਵੇਂ ਕਿ ਮਨੁੱਖ ਨੇ ਵਿਗਿਆਨ ਅਤੇ ਉਦਯੋਗ ਦਾ ਵਿਕਾਸ ਆਪਣੀਆਂ ਸੁੱਖ-ਸੁਹੂਲਤਾਂ ਲਈ ਕੀਤਾ ਪਰ ਸਥਿਤੀ ਦੀ ਵਿਡੰਬਨਾ ਇਹ ਹੈ ਕਿ ਹੁਣ ਇਹ ਵਿਕਾਸ, ਮਨੁੱਖੀ ਹੋਂਦ ਲਈ ਖ਼ਤਰਨਾਕ ਬਣ ਗਿਆ ਹੈ। ਅਜਿਹੀ ਸਥਿਤੀ ਮਨੁੱਖ ਦੀ ਸੁਤੰਤਰਤਾ ਲਈ ਚੁਣੌਤੀ ਬਣ ਜਾਂਦੀ ਹੈ ਅਤੇ ਰਵੀ ਨੂੰ ਇਨ੍ਹਾਂ ਕਾਰਨਾਂ ਕਰਕੇ ਵਿਅਕਤੀਗਤ, ਸਮਾਜਿਕ, ਰਾਸ਼ਟਰੀ, ਅੰਤਰ-ਰਾਸ਼ਟਰੀ ਬ੍ਰਹਿਮੰਡਕ ਆਯਾਮਾਂ ਵਿੱਚ ਤਰੇੜਾਂ ਪੈ ਗਈਆਂ ਮਹਿਸੂਸ ਹੁੰਦੀਆਂ ਹਨ। ਇਸ ਦੌੜ-ਭੱਜ ਵਿੱਚ ਮਨੁੱਖ ਦਾ ਅੰਦਰਲਾ ਤੇ ਬਾਹਰਲਾ ਯਥਾਰਥ, ਟਕਰਾਅ ਦੀ ਸਥਿਤੀ ਵਿੱਚ ਗ੍ਰਸਿਆ ਪ੍ਰਤੀਤ ਹੁੰਦਾ ਹੈ। ਇਸ ਨਾਟਕ ਦੀ ਭੂਮਿਕਾ ਵਿੱਚ ਨਾਟਕਕਾਰ ਲਿਖਦਾ ਹੈ :

"ਇੱਕ ਪਾਸੇ ਜੇ ਮਨੁੱਖ ਨੂੰ ਅੱਜ ਚੰਦਰ ਭੂਮੀ 'ਤੇ ਪੈਰ ਧਰਨ ਦਾ ਗੌਰਵ ਪ੍ਰਾਪਤ ਹੈ ਤਾਂ ਦੂਜੇ ਪਾਸੇ ਰੋਬਟ, ਕੰਪਿਊਟਰ, ਇਲੈਕਟ੍ਰੋਨਿਕ ਦਿਮਾਗ, ਮਸਨੂਈ ਵੀਰਜ-ਸਿੰਜਣ ਯੰਤਰ ਆਦਿ ਕਾਢਾਂ ਨੇ, ਉਸਦੇ ਮਨ ਅੰਦਰ ਕਈ ਜਟਿਲ ਗੁੰਝੀਆਂ ਤੇ ਪ੍ਰਸ਼ਨਾਂ ਨੂੰ ਜਨਮ ਦਿੱਤਾ ਹੈ ਕਿ ਇਨ੍ਹਾਂ ਯੰਤਰਾਂ ਦਾ ਸਿਰਜਕ ਮਨੁੱਖ, ਅਵਸਰ ਆਉਣ 'ਤੇ ਆਪ ਹੀ ਇਨ੍ਹਾਂ ਮਸ਼ੀਨਾਂ ਤੇ ਯੰਤਰਾਂ ਦਾ ਘਟੀਆ ਬਦਲ ਸਿਧ ਹੋਵੇਗਾ।"[1]

ਰਵੀ ਇਨ੍ਹਾਂ ਸਮੱਸਿਆਵਾਂ ਪ੍ਰਤੀ ਚਿੰਤਤ ਹੁੰਦਾ ਹੈ ਅਤੇ 'ਬੀਮਾਰ ਸਦੀ' ਨਾਟਕ ਦਾ ਸਿਰਜਕ ਬਣਦਾ ਹੈ। ਪਦਾਰਥਕ,

ਸ਼ੈਤਾਨੀ ਤੇ ਵਿਗਿਆਨਕ-ਸ਼ਕਤੀਆਂ ਕਾਰਨ, ਮਨੁੱਖੀ-ਅਸਤਿੱਤਵ ਦਾ ਮਸ਼ੀਨੀਕਰਨ ਹੋ ਗਿਆ ਹੈ। ਇਨ੍ਹਾਂ ਸਵੈ-ਸਿਰਜਿਤ ਨਵੀਨਤਮ ਕਾਢਾ ਕਰਕੇ, ਮਨੁੱਖ ਦੇ ਮਨ ਅੰਦਰ ਕਈ ਜਟਿਲ ਪ੍ਰਸ਼ਨਾਂ ਨੇ ਜਨਮ ਲੈ ਲਿਆ ਹੈ ਇਨ੍ਹਾਂ ਪ੍ਰਸ਼ਨਾਂ ਪ੍ਰਤੀ ਸੁਚੇਤ ਕਰਵਾਉਣਾ ਰਵੀ ਦਾ ਮੂਲ ਉਦੇਸ਼ ਹੈ :

"ਮੇਰੇ ਵਿਚਾਰ ਵਿੱਚ ਇਨ੍ਹਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਜਾਂ ਇਨ੍ਹਾਂ ਦਾ ਕੋਈ ਨਿਸ਼ਚਿਤ ਹੱਲ ਢੂੰਡਣਾ, ਇਸ ਨਾਟਕ ਦੇ ਪਾਤਰ ਦਾ ਕਰਤੱਵ ਨਹੀਂ, ਸਗੋਂ ਇਨ੍ਹਾਂ ਪ੍ਰਸਥਿਤੀਆਂ ਵਿੱਚੋਂ ਖੁਦ ਲੰਘਕੇ, ਤੁਹਾਨੂੰ ਇਨ੍ਹਾਂ ਪ੍ਰਤੀ ਸੁਚੇਤ ਗਰੁੱਪ ਵਿੱਚ ਸੋਚਦੇ ਛੱਡ ਜਾਣ ਵਿੱਚ ਹੀ ਉਨ੍ਹਾਂ ਦੀ ਮੁਕਤੀ ਅਤੇ ਉਨ੍ਹਾਂ ਦੀ ਸਫਲਤਾ ਹੈ। ਇਹ ਗੱਲ ਵੱਖਰੀ ਹੈ ਕਿ ਇਸ ਨਾਟਕ ਦੇ ਪ੍ਰਤੀਕ-ਪਾਤਰ, ਔਰਤ, ਮਰਦ ਅਤੇ ਮਸਮਹਰਾ, ਸਦਿਸ ਅਤੇ ਅਦਿਸ ਸ਼ਕਤੀਆਂ ਦੇ ਸੰਦਰਭ ਵਿੱਚ ਕੁਝ ਅਧੂਰੇ-ਪੂਰੇ ਸੁਝਾਵਾਂ ਜਾਂ ਆਪੇ ਆਪਣੇ ਦ੍ਰਿਸ਼ਟੀਕੋਣ, ਸੰਕੇਤਕ ਗਰੁੱਪ ਵਿੱਚ ਪਾਠਕਾਂ ਤੇ ਦਰਸ਼ਕਾਂ ਦੇ ਦ੍ਰਿਸ਼ਟੀਗੋਚਰ ਵੀ ਕਰ ਜਾਣ, ਜੋ ਉਨ੍ਹਾਂ ਨੂੰ ਅਜੋਕੀ ਸਥਿਤੀ ਨਾਲ ਦੋ-ਚਾਰ ਹੋਣ ਦੀ ਪ੍ਰੇਰਨਾ ਦੇਣ।"[2]

'ਬੀਮਾਰ ਸਦੀ' ਵਿੱਚ ਰਵੀ ਨੇ ਇਹ 'ਦੱਸਣ ਦਾ ਸਫਲ ਯਤਨ ਕੀਤਾ ਹੈ ਕਿ ਪੂਰਨ ਸੱਭਿਅਕ ਮਨੁੱਖ ਬਣਨ ਦਾ ਯਤਨ ਕਰਦਾ ਹੋਇਆ ਅਮਨੁੱਖ ਬਣ ਗਿਆ ਹੈ। ਭੋਗ, ਭੋਗ ਐਸਾ ਭੋਗ ਬਣ ਗਿਆ ਹੈ ਕਿ ਉਸ ਪਿੱਛੇ ਸਭ ਰਿਸ਼ਤੇ ਭੁੱਲ ਜਾਂਦੇ ਹਨ ਤੇ ਉਹ ਮਰਦ ਆਪਣੀ ਮਾਂ, ਧੀ, ਭੈਣ ਸਭ ਨੂੰ ਭੋਗ ਸਕਦਾ ਹੈ। ਉਹ ਤੀਵੀਂ ਪੁੱਤਰ, ਭਰਾ ਅਤੇ ਪਿਉ ਨੂੰ ਹੰਢਾ ਸਕਦੀ ਹੈ। ਅਸਲ ਵਿੱਚ ਰਵੀ ਨੇ ਮਨੁੱਖ ਨੂੰ ਆਪਣੇ ਅੰਦਰ ਵੱਲ ਖੁੱਲ੍ਹਦੇ ਅੰਦਰਲੇ ਸੱਚ ਨੂੰ ਵੇਖਣ ਲਈ ਪ੍ਰੇਰਿਤ ਕੀਤਾ ਹੈ। "ਮਨ ਤੂੰ ਜੋਤ ਸਰੂਪ ਹੈ ਆਪਣਾ ਮੂਲ ਪਛਾਣ" ਤੁਕ ਰਾਹੀਂ ਮਨੁੱਖ ਨੂੰ ਆਪਣੇ ਮੂਲ ਨੂੰ ਸਮਝਣ 'ਤੇ ਜ਼ੋਰ ਦਿੱਤਾ ਹੈ ਅਤੇ ਇਸੇ ਵਿੱਚ ਹੀ ਮਾਨਵ-ਜਾਤੀ ਦਾ ਕਲਿਆਣ ਹੈ। ਨਾਟਕ 'ਬੀਮਾਰ ਸਦੀ' ਉਸਨੂੰ ਵੀਹਵੀਂ ਸਦੀ ਬੀਮਾਰ ਲੱਗਦੀ ਹੈ। ਵੀਹਵੀਂ ਸਦੀ ਵਿੱਚ ਜਿਹੜੀਆਂ ਸਮੱਸਿਆਵਾਂ ਦਾ ਸਾਹਮਣਾ ਕਰਨਾ ਪੈ ਰਿਹਾ ਹੈ, ਉਹ ਸਮੱਸਿਆਵਾਂ ਅੱਜ ਦੇ ਸਮੇਂ ਵਿੱਚ ਵੀ ਹਨ। 'ਦਰ ਦੀਵਾਰਾਂ' ਨਾਟਕ ਦੇ ਵਿੱਚ ਹਨੇਰਾ ਦਿਸ਼ਾਹੀਣ ਸਥਿਤੀ ਦਾ ਪ੍ਰਤੀਕ ਹੈ। ਮਨੁੱਖ ਦੀ ਇਸ ਸਥਿਤੀ ਨੂੰ ਹਨੇਰੇ ਵਿੱਚ ਮਨੁੱਖ ਦੀਆਂ ਬਹੁਤ ਦੂਰ ਤੋਂ ਆ ਰਹੀਆਂ ਪੈੜ-ਚਾਲਾਂ ਰਾਹੀਂ ਪੇਸ਼ ਕੀਤਾ ਗਿਆ ਹੈ। ਕੈਨੇਡਾ ਦੀ ਸਮਾਜਿਕ ਵਿਵਸਥਾ ਵਿੱਚ ਪੂੰਜੀ ਦਾ ਬੋਲ ਬਾਲਾ ਹੈ ਅਤੇ ਮਾਨਵੀ ਸੰਬੰਧ ਫਿੱਕੇ ਪੈ ਚੁੱਕੇ ਹਨ, ਪੈਸਾ ਪ੍ਰਧਾਨ ਹੈ ਅਤੇ ਨੈਤਿਕ ਮੁੱਲ ਦੇ ਅਰਥ ਗੁਆਚ ਗਏ ਹਨ। ਨਾਟਕਕਾਰ ਇਸ ਸਥਿਤੀ 'ਤੇ ਚਿੰਤਾ ਪ੍ਰਗਟ ਕਰਦਾ ਕਵੀ ਪਾਤਰ ਤੋਂ ਅਖਵਾਉਂਦਾ ਹੈ :

ਏਥੇ ਘਰ ਹਨ, ਪਰ ਦਰਵਾਜੇ ਨਹੀਂ। ਇੱਥੇ ਚਿਹਰੇ ਹਨ, ਪਹਿਚਾਣ ਨਹੀਂ

ਤੇ ਅਵਾਜ਼ਾਂ ਵਿੱਚ ਮਾਣ ਨਹੀਂ ਵਿਸ਼ਵਾਸ ਨਹੀਂ, ਪਰਵਾਸ ਨਹੀਂ।

ਮਨੁੱਖ ਦੇ ਗੋਰਖਧੰਦੇ ਬਣਨ ਦਾ ਕਾਰਨ ਨਾਟਕਕਾਰ ਨੂੰ ਉਸ ਉੱਨਤੀ ਵਿੱਚ ਪਿਆ ਵਿਖਾਈ ਦਿੰਦਾ ਹੈ, ਜਿਹੜੀ ਮਨੁੱਖ ਨੇ ਆਪਣੀਆਂ ਸੁੱਖ ਸਹੂਲਤਾਂ ਲਈ ਕੀਤੀ ਹੈ। ਅਜੋਕੇ ਵਿਕਸਿਤ ਵਿਗਿਆਨਿਕ ਮਸ਼ੀਨੀ-ਯੁੱਗ ਵਿੱਚ ਮਨੁੱਖੀ ਰਿਸ਼ਤਿਆਂ ਦਾ ਵੀ ਮਸ਼ੀਨੀਕਰਨ ਹੋ ਗਿਆ ਹੈ। ਮਨੁੱਖ ਦੇ ਪਿਆਰ ਤੇ ਵਫ਼ਾ ਦੇ ਖ਼ੂਨੀ ਰਿਸ਼ਤੇ ਵੀ ਇਸ ਅਧੀਨ ਤਿੜਕ ਗਏ ਹਨ ਕਿਉਂਕਿ ਪਦਾਰਥਵਾਦੀ ਯੁੱਗ ਨੇ ਮਨੁੱਖ ਨੂੰ ਸਵੈ-ਕੇਂਦਰਿਤ ਕਰ ਦਿੱਤਾ ਹੈ। ਹੁਣ ਸਵੈ-ਕੇਂਦਰਿਤ ਹੋਇਆ ਮਨੁੱਖ ਪਰਿਵਾਰ ਅਤੇ ਸਮਾਜ ਦੀ ਵੀ ਪ੍ਰਵਾਹ ਨਹੀਂ ਕਰ ਰਿਹਾ। ਮਰਦ ਅਤੇ ਔਰਤ ਦੀ ਨਿਰੰਤਰ ਵਿਕਾਸ ਦੀ ਪ੍ਰਕਿਰਿਆ ਨੇ ਸਮਾਜ ਦੇ ਸੰਗਠਨ ਵਿੱਚ ਅਹਿਮ ਭੂਮਿਕਾ ਨਿਭਾਈ ਸੀ, ਪਰ ਹੁਣ ਪਦਾਰਥਕ ਰੁਚੀਆਂ ਦੇ ਪ੍ਰਭਾਵ ਅਧੀਨ ਮਰਦ ਅਤੇ ਔਰਤ ਵੀ ਆਪਣਿਆਂ ਰਿਸ਼ਤਿਆਂ ਦੇ ਅਰਥ ਗੁਆ ਰਹੇ ਹਨ। ਰਵਿੰਦਰ ਰਵੀ ਨੇ ਕੈਨੇਡਾ ਵਿੱਚ ਰਹਿੰਦਿਆਂ ਵੇਖਿਆ ਕਿ ਉੱਥੇ ਔਰਤ ਅਤੇ ਮਰਦ ਬਿਨਾਂ ਵਿਆਹ ਕਰਵਾਏ ਇਕੱਲੇ ਰਹਿ ਸਕਦੇ ਹਨ ਅਤੇ ਇਸ ਤਰ੍ਹਾਂ ਦੇ ਸੰਬੰਧਾਂ ਵਿੱਚੋਂ ਬੱਚੇ ਵੀ ਹੋ ਜਾਂਦੇ ਹਨ। ਨਾਟਕਕਾਰ ਇਹ ਦੱਸਦਾ ਹੈ ਕਿ ਭਾਰਤ ਵਿੱਚ ਅਜਿਹੀ ਸਥਿਤੀ ਨਹੀਂ ਹੈ ਕਿਉਂਕਿ ਭਾਰਤੀ ਪਰੰਪਰਾਗਤ ਕਦਰਾਂ-ਕੀਮਤਾਂ ਅਜਿਹੇ ਸੰਬੰਧ ਸਥਾਪਿਤ ਕਰਨ ਦੀ ਆਗਿਆ ਨਹੀਂ ਦਿੰਦੀਆਂ। ਭਾਰਤ ਵਿੱਚ ਤਾਂ ਵਿਆਹ ਸੰਬੰਧ ਉਮਰਾਂ ਦੇ ਰਿਸ਼ਤੇ ਬਣ ਜਾਂਦੇ ਹਨ, ਪਰ ਇਸਦੇ ਉਲਟ ਕੈਨੇਡਾ ਵਿੱਚ ਅਜਿਹੇ ਵਿਆਹ ਬਿਨਾਂ ਸੰਬੰਧ ਬਣਾਉਣਾ ਕੰਮ ਚਲਾਊ ਹੈ। ਅਜਿਹੇ ਸੰਬੰਧ ਮਰਦ-ਔਰਤ ਇੱਕ ਦੂਜੇ ਨੂੰ ਭੋਗਣ ਤੱਕ ਸੀਮਤ ਹਨ :

ਨੈਣ ਜਗਾ, ਤੈਨੂੰ ਵੇਖਾਂਗੀ! ਜਿਸਮ ਜਗਾ, ਤੈਨੂੰ ਭੋਗਾਂਗੀ!

ਨਾਟਕਕਾਰ ਰਵਿੰਦਰ ਰਵੀ ਅਜਿਹੇ ਰਿਸ਼ਤਿਆਂ ਵਿੱਚ ਗ੍ਰਸਤ ਲੋਕਾਂ ਦੀਆਂ ਹੋਰ ਪਰਤਾਂ ਨੂੰ ਵੀ ਫਰੋਲਦਾ ਹੈ। ਸਮੇਂ ਦੇ ਪ੍ਰਵਾਹ ਨਾਲ ਜਿਹੜੀ ਸਥਿਤੀ ਨਾਲ ਮਨੁੱਖ ਜੂਝ ਰਿਹਾ ਹੈ, ਇਹ ਵੀ ਇਸ ਦੇ ਵੱਸ ਤੋਂ ਬਾਹਰ ਹੋ ਗਈ ਹੈ। ਸੰਸਾਰ ਪੱਧਰ 'ਤੇ ਥਾਂ-ਥਾਂ ਜੰਗ ਛਿੜੀ ਹੋਈ ਹੈ ਅਤੇ ਮਨੁੱਖ ਉੱਤੇ ਮਹਾਂਸ਼ਕਤੀਆਂ ਦਾ ਡਰ ਵੀ ਹੈ। ਇਸ ਡਰ ਤੋਂ ਮੁਕਤ ਹੋਣ ਲਈ, ਮਨੁੱਖ ਦੀ ਜੋ ਦੁਬਿਧਾ ਬਣੀ ਹੋਈ ਹੈ ਉਸ ਤੋਂ ਬਚਣ ਲਈ ਨਾਟਕਕਾਰ ਨੇ ਲਿਖਿਆ ਹੈ :

ਕਾਮ ਨਿਰੀ ਨਾ ਸੀਨਾ ਝੋਰੀਨਾ ਹੀ ਇਹ ਕੋਈ ਕਮਜ਼ੋਰੀ!
ਕਾਮ-ਦੇਵਤਾ ਬਲੀ ਮਹਾਨ! ਇਸ ਨਾਲ ਕਾਦਰ, ਇਸ ਨਾਲ ਕੁਦਰਤ,
ਇਸ ਨਾਲ ਜੀਵਨ, ਜਗਤ, ਜਹਾਨ।

ਇਸ ਤਰ੍ਹਾਂ ਨੌਜਵਾਨ ਮੁੰਡੇ-ਕੁੜੀਆਂ ਦੀ ਕਾਮ ਦੇ ਵੇਗ ਅਧੀਨ ਜੋ ਦੁਰਦਸ਼ਾ ਹੋ ਰਹੀ ਹੈ, ਉਸ ਦੁਰਦਸ਼ਾ ਪ੍ਰਤੀ ਨਾਟਕਕਾਰ ਨੇ ਚਿੰਤਾ ਪ੍ਰਗਟ ਕੀਤੀ ਹੈ। ਨਾਟਕਕਾਰ ਨੇ ਨਾਟਕ ਵਿੱਚ ਮੁੰਡੇ-ਕੁੜੀਆਂ ਦੇ ਗਰੁੱਪ ਸੰਭੋਗ ਅਤੇ ਨਸ਼ਿਆਂ ਦੇ ਸੇਵਨ ਦੇ ਵਾਤਾਵਰਣ ਦੇ ਯਥਾਰਥ ਨੂੰ ਵੀ ਚਿਤਰਿਆ ਹੈ। ਪੂੰਜੀਵਾਦੀ ਵਿਵਸਥਾ ਅਧੀਨ ਅਜਿਹੇ ਹੱਕਾਂ ਦਾ ਕੋਈ ਮੁੱਲ ਨਹੀਂ ਰਹਿ ਜਾਂਦਾ ਕਿਉਂਕਿ ਪਦਾਰਥਕ ਰੁਚੀਆਂ ਅਧੀਨ ਵਿਆਹ ਦੀ ਵੀ ਕੋਈ ਸਦੀਵੀ ਨੈਤਿਕ ਜ਼ਿੰਮੇਦਾਰੀ ਨਹੀਂ ਰਹਿ ਜਾਂਦੀ। ਇਨ੍ਹਾਂ ਲੋਕਾਂ ਦੇ ਬੱਚੇ ਮਾਪਿਆਂ ਦੇ ਮੋਹ-ਘੇਰੇ ਰਿਸ਼ਤਿਆਂ ਤੋਂ ਵੰਚਿਤ ਰਹਿ ਜਾਂਦੇ ਹਨ। ਇਹ ਬੱਚੇ ਮੁੱਢ ਤੋਂ ਨਸ਼ਿਆਂ ਦੇ ਆਦੀ ਹੋ ਜਾਂਦੇ ਹਨ ਅਤੇ ਇਨ੍ਹਾਂ ਨੂੰ ਵਿਰਸੇ ਵਿੱਚ

ਜੁਰਮ ਅਤੇ ਹਿੰਸਾ ਮਿਲੀ ਹੁੰਦੀ ਹੈ। ਨਾਟਕਕਾਰ ਰਵਿੰਦਰ ਨੇ ਇਸ ਆਵੇਸਲੇ ਪੱਛਮੀ ਸੱਭਿਆਚਾਰ ਦੇ ਮਾਨਵੀ ਰਿਸ਼ਤਿਆਂ ਐਥੇ ਹੀ ਇਸ ਵਿਸ਼ੇ ਦੀ ਇੱਕ ਹੋਰ ਪਰਤ ਖੋਲ੍ਹਦਾ ਹੈ। ਨਾਟਕ ਇਖਲਾਕ ਵੀ ਸੁੰਗੜ ਕੇ ਰਹਿ ਗਿਆ ਹੈ। ਇਹ ਨਾਟਕ ਪੱਛਮੀ ਸੱਭਿਆਚਾਰ ਵਿੱਚ ਵਿਚਰਦੇ ਲੋਕਾਂ ਦੀ ਗੱਲ ਕਰਦਾ ਹੈ ਜਿਹੜੇ ਪਦਾਰਥਕ ਰੁਚੀਆਂ ਕਾਰਨ ਮਾਨਵੀ ਰਿਸ਼ਤਿਆਂ ਤੋਂ ਕੀ, ਆਪਣੇ ਆਪ ਤੋਂ ਵੀ ਟੁੱਟ ਗਏ ਹਨ।

'ਅੱਧੀ ਰਾਤ ਦੁਪਹਿਰ' ਨਾਟਕ 'ਬੀਮਾਰ ਸਦੀ' ਤੇ ਦੀਵਾਰਾਂ' ਆਦਿ ਕਾਵਿ-ਨਾਟਕਾਂ ਦੀ ਸਿਰਜਨਾ ਤੋਂ ਅਗਲਾ ਪੜਾਅ ਹੈ। ਇਹ ਨਾਟਕ ਮਨੁੱਖ ਦੀ ਭਟਕਣਾ ਬਾਰੇ ਦੱਸਦਾ ਹੈ ਜਿਸ ਨਾ ਕੋਈ ਰਾਹ ਹੈ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਿਸ਼ਾ। ਮਨੁੱਖ ਨੇ ਤਨ ਸ਼ਾਂਤੀ ਤਾਂ ਪ੍ਰਾਪਤ ਕਰ ਲਈ ਹੈ, ਪਰ ਉਸ ਨੂੰ ਮਨ ਦੀ ਸ਼ਾਂਤੀ ਪ੍ਰਾਪਤ ਨਹੀਂ ਹੋਈ। ਹੋਂਦ ਤੋਂ ਉਣੇ ਮਨੁੱਖ ਦੀ ਪੀੜਾ ਦੀ ਸਥਿਤੀ ਨੂੰ ਨਾਟਕਕਾਰ ਸ਼ਬਦਾਂ ਰਾਹੀਂ ਇਸ ਤਰ੍ਹਾਂ ਵਿਅਕਤ ਕਰਦਾ ਹੈ :

ਮਨ ਚਾਹੇ ਅੱਖਾਂ 'ਚੋਂ ਵਗਦਾ ਜ਼ਿਹਨ ਜਿਵੇਂ ਤੇੜਾਬ ਭਿੱਜਾ
ਅੱਜ ਫਿਰ ਪੀੜ ਅਸਹਿ ਹੋ ਚੱਲੀ ਅੱਖਾਂ ਵਿੱਚ ਅੱਥਰੂ ਆਵੇ ।

ਨਾਟਕਕਾਰ ਜਿੱਥੇ ਮਨੁੱਖ ਨੂੰ ਭਟਕਣਾਂ ਵਿੱਚੋਂ ਬਾਹਰ ਨਿਕਲਣ ਲਈ ਉਤਸ਼ਾਹਿਤ ਕਰਦਾ ਹੈ, ਉੱਥੇ ਨਾਲੋ-ਨਾਲ ਮਨੁੱਖ ਨੂੰ ਆਪਣੀ ਸ਼ਕਤੀ ਪਛਾਨਣ ਦੀ ਵੀ ਪ੍ਰੇਰਨਾ ਦਿੰਦਾ ਹੈ। ਨਾਟਕਕਾਰ ਇਹ ਦਰਸਾਉਂਦਾ ਹੈ ਕਿ ਅਜੋਕੀ ਜ਼ਿੰਦਗੀ ਕਸ਼ਮਕਸ਼ ਵਿੱਚ ਵਿਚਰ ਰਹੀ ਹੈ। ਇਸ ਕਸ਼ਮਕਸ਼ ਦਾ ਕਾਰਨ ਪੈਸਾ ਇਕੱਠਾ ਕਰਨ ਦੀ ਦੌੜ ਹੈ ਇਸ ਦੌੜ-ਭੱਜ ਦੀ ਪ੍ਰਕਿਰਿਆ ਨੇ ਭ੍ਰਿਸ਼ਟਤਾ ਨੂੰ ਆਪਣੇ ਵਿੱਚ ਲੈ ਲਿਆ ਹੈ, ਜਿਸ ਨੇ ਮਾਨਵੀ ਕਦਰਾਂ-ਕੀਮਤਾਂ ਲਗਾ ਦਿੱਤਾ ਹੈ। ਖ਼ੁਦਗਰਜ਼ੀ ਨੇ ਮਨੁੱਖ ਨੂੰ ਸਵੈ-ਕੇਂਦਰਿਤ ਦਿੱਤਾ ਹੈ, ਖ਼ੁਦਗਰਜ਼ੀ ਦੇ ਪ੍ਰਭਾਵ ਅਧੀਨ ਮਨੁੱਖ ਨੂੰ ਮਾਤਾ-ਪਿਤਾ ਬਾਲ-ਬੱਚੇ ਆਦਿ ਬੇ-ਮਤਲਬ ਜਿਹਾ ਬੋਝ ਲੱਗ ਰਹੇ ਹਨ। ਅਜਿਹੀ ਸਥਿਤੀ ਦੇ ਕਾਰਨ ਰਿਸ਼ਤਿਆਂ ਵਿੱਚ ਖ਼ਾਲੀਪਣ ਆ ਗਿਆ ਅਜੋਕਾ ਮਨੁੱਖ ਪਦਾਰਥਵਾਦੀ ਲਾਲਸਾਵਾਂ ਅਧੀਨ ਮਾਨਵੀ ਰਿਸ਼ਤਿਆਂ ਤੋਂ ਬਾਗ਼ੀ ਹੋ ਰਿਹਾ ਹੈ ਜਦੋਂ ਕਿ ਇਨ੍ਹਾਂ ਰਿਸ਼ਤਿਆਂ ਪਾਲਣਾ ਕਰਨਾ ਉਸਦੀ ਨੈਤਿਕ ਜ਼ਿੰਮੇਵਾਰੀ ਬਣਦੀ ਹੈ। ਨਾਟਕਕਾਰ ਦੀ ਇਹ ਇੱਛਾ ਹੈ ਕਿ ਸਮੁੱਚੀ ਮਾਨਵਤਾ ਇੱਕ ਹੋ ਜਾਵੇ ਜਿੱਥੇ ਧਰਮ, ਜਾਤ, ਨਸਲ ਖ਼ਤਮ ਹੋ ਕੇ ਇਕਰੂਪਤਾ ਅਖ਼ਤਿਆਰ ਲੈਣ।

'ਸਿਫ਼ਰ ਨਾਟਕ' ਆਕਾਰ ਵਿੱਚ ਛੋਟਾ ਪਰ ਪ੍ਰਭਾਵ ਵਿੱਚ ਵੱਡਾ ਨਾਟਕ ਹੈ। ਰਵਿੰਦਰ ਰਵੀ 'ਸਿਫ਼ਰ ਨਾਟਕ' ਵਿੱਚ ਪ੍ਰਤੀਕਾਤਮਕ ਰੂਪ ਵਿੱਚ ਜ਼ਿੰਦਗੀ ਵਿੱਚ ਵਿਚਰਨ ਦੀ ਸਥਿਤੀ ਨੂੰ ਉਸ ਦੀਆਂ ਸਥਿਤੀਆਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿੱਚ ਵਿਚਰਨ ਦਾ ਯਤਨ ਕਰਦਾ ਹੈ। ਮਨੁੱਖੀ ਹੋਂਦ ਦੀ ਸਥਿਤੀ ਬਾਰੇ, ਢਾਡੀ ਰਾਹੀਂ ਜਾਣੂ ਕਰਵਾਇਆ ਗਿਆ ਹੈ। ਮਨੁੱਖ ਜਿਹੜਾ ਜੀਵਨ ਬਤੀਤ ਕਰ ਰਿਹਾ ਹੈ, ਉਹ ਬੇ-ਕਾਬੂ ਅਤੇ ਬੇ-ਤਰਤੀਬ ਕੋਲ ਜਿਹੜਾ ਰਾਹ ਹੈ ਉਹ ਵੀ ਉਸਨੂੰ ਉਸਦੀ ਮੰਜ਼ਿਲ ਵੱਲ ਤਰੱਕਣ ਲਿਜਾਂਦਾ। ਉਸਦੇ ਜੀਵਨ ਵਿੱਚ ਖਾਲੀਪਣ ਤੇ ਤਰਛਣ ਮਨੁੱਖ ਇੱਕ ਸਮਾਜਿਕ ਪ੍ਰਾਣੀ ਹੈ ਪਰ ਮਨੁੱਖ ਦਾ ਦੁਖਾਂਤਕ ਇਹ ਵੀ ਹੈ ਕਿ ਉਹ ਆਪਣੇ-ਆਪ ਵਿੱਚ ਵੀ ਇਕੱਲਾ ਹੈ

ਆਪ ਤੋਂ ਬਾਹਰ ਵੀ ਇਕੱਲਾ ਹੈ ਅਤੇ ਉਸਦੀ ਸਥਿਤੀ ਵਿੱਚ ਭਟਕਦੇ ਮਨੁੱਖ ਵਰਗੀ ਹੋ ਗਈ ਹੈ, ਨਾ ਹੀ ਉਸਨੂੰ ਮਦਦਗਾਰ ਦਿਖਾਈ ਦੇ ਰਿਹਾ ਹੈ। ਇਸ ਤਰ੍ਹਾਂ ਦੀ ਜ਼ਿੰਦਗੀ ਜੀਊ ਰਹੇ ਮਨੁੱਖ ਦੇ ਬੁੱਲ੍ਹਾਂ ਉੱਤੇ ਨਾ ਕੋਈ ਮੁਸਕਾਨ ਹੈ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਉਸ ਦੇ ਮਨ ਵਿੱਚ ਕੋਈ ਚਾਅ-ਉਮੰਗ ਉਠ ਰਹੇ ਹਨ। ਉਹ ਇਸ ਧਰਤੀ ਉੱਤੇ ਜਿਵੇਂ ਆਇਆ ਸੀ, ਉਸੇ ਤਰ੍ਹਾਂ ਹੀ ਬਿਨਾ ਕਿਸੇ ਹੋਂਦ-ਜਿਤਾਇਆ ਵਾਪਸ ਜਾ ਰਿਹਾ ਹੈ। ਭਾਵ ਉਸਨੂੰ ਜਨਮ ਦੀ ਕੋਈ ਖ਼ੁਸ਼ੀ ਨਹੀਂ ਜਾਪ ਰਹੀ ਅਤੇ ਉਸਨੂੰ ਮੌਤ ਉੱਤੇ ਕੋਈ ਦੁੱਖ ਨਹੀਂ। ਅਜਿਹੇ ਮਨੁੱਖ ਸਿਫ਼ਰ ਰੂਪੀ ਜ਼ਿੰਦਗੀ ਬਤੀਤ ਕਰਕੇ ਧਰਤੀ ਉੱਪਰ ਆਉਂਦੇ ਤੇ ਜਾਂਦੇ ਹਨ। ਨਾਟਕਕਾਰ ਦੱਸਦਾ ਹੈ ਕਿ ਅਜਿਹੇ ਵਿਅਕਤੀਆਂ ਦੀ ਜ਼ਿੰਦਗੀ ਤਾਂ ਬੁੱਤ ਵਰਗੀ ਹੀ ਹੈ। ਨਾਟਕਕਾਰ ਅਜਿਹੇ ਜ਼ਿੰਦਗੀ ਬਾਰੇ ਲਿਖਦਾ ਹੈ :

ਬੁੱਤ ਦੀ ਵਿਥਿਆ ਉੱਕ ਗਈ ਕਿਵੇਂ ਕਹਾਣੀ ਰੁਕ ਗਈ ਕੀਕੁੰ ਜ਼ਿੰਦਗੀ ਬੀਤ ਰਹੀ ਠੰਡਾ ਸੂਰਜ ਸੇਕ ਰਹੀ ਰੌਸ਼ਨ ਛਾਇਆਂ ਵੇਖ ਰਹੀ।'

ਨਾਟਕਕਾਰ ਮਨੁੱਖ ਦੀ ਸਥਿਤੀ ਨੂੰ ਕਿਸੇ ਇੱਕ ਭੂਗੋਲਿਕ ਖੇਤਰ ਦੇ ਪ੍ਰਸੰਗ ਵਿੱਚ ਵੇਖਣ ਦੀ ਬਾਂ ਗਲੋਬਲ ਪ੍ਰਸੰਗ ਵਿੱਚ ਵੇਖਦਾ ਹੈ। ਨਾਟਕਕਾਰ ਮਨੁੱਖ ਦੀ ਸਥਿਤੀ ਦੀ ਤੁਲਨਾ ਪ੍ਰਕ੍ਰਿਤਿਕ ਬਨਸਪਤੀ ਨਾਲ ਕਰਦਾ ਹੈ ਜਿਵੇਂ ਬਾਗ ਵਿੱਚ ਬੂਟੇ ਉੱਗਦੇ ਹਨ, ਉਸ ਨੂੰ ਫੁੱਲ, ਫਲ ਲੱਗਦੇ ਹਨ, ਮਹਿਕ ਉੱਠਦੀ ਹੈ ਅਤੇ ਉਸ ਮਹਿਕ ਵਿੱਚੋਂ ਸੁਫ਼ਨੇ ਲਏ ਜਾਂਦੇ ਹਨ। ਇਸੇ ਤਰ੍ਹਾਂ ਹੀ ਮਨੁੱਖ ਦੀ ਸਥਿਤੀ ਹੈ। ਮਨੁੱਖ ਪੈਦਾ ਹੁੰਦਾ ਹੈ, ਵਿਕਾਸ ਕਰਦਾ ਹੈ, ਸੁਫ਼ਨੇ ਲੈਂਦਾ ਹੈ ਪਰ ਸੁਫ਼ਨਿਆਂ ਤੋਂ ਬਾਅਦ ਮਨੁੱਖ ਦੀ ਸਥਿਤੀ ਵੱਖਰੀ ਹੋ ਜਾਂਦੀ ਹੈ। ਉਹ ਘਰ ਬਣਾਉਂਦਾ ਹੈ ਪਰ ਉਸ ਨੂੰ ਘਰ ਵਿੱਚੋਂ ਘਰ ਦੇ ਅਰਥ ਨਹੀਂ ਲੱਭਦੇ। ਕੀ ਮਨੁੱਖ ਘਰ ਤੋਂ ਸੰਤ੍ਰਸ਼ਟ ਹੋ ਜਾਂਦਾ ਹੈ? ਜੇ ਸੰਤ੍ਰਸ਼ਟ ਹੈ ਤਾਂ ਇਹ ਸਥਿਤੀ ਕਿਉਂ ਪੈਦਾ ਹੁੰਦੀ ਹੈ? ਸਾਰੀ ਮਨੁੱਖਤਾ ਉਸ ਘਰ ਦੀ ਤਲਾਸ਼ ਵਿੱਚ ਹੈ, ਜਿੱਥੇ ਉਸਨੂੰ ਸੰਤੁਸ਼ਟੀ ਮਿਲ ਸਕੇ।

ਕੰਕਰੀਟ, ਲੱਕੜ, ਪਲਾਸਟਿਕ, ਫਾਈਬਰ-ਗਲਾਸ ਦੀਆਂ ਛੱਤਾਂ ਦਾ ਕੋਈ ਅਰਥ ਨਹੀਂ ਇਸ ਤਰ੍ਹਾਂ ਦੀਆਂ ਛੱਤਾਂ ਨੂੰ ਫ਼ਰਸ਼ ਵੀ ਆਖ ਸਕਦੇ ਹਾਂ ਸੜਕ ਵੀ।'

ਅਸਲ ਵਿੱਚ ਮਨੁੱਖ ਨੇ ਘਰ ਨੂੰ ਘਰ ਦੇ ਅਰਥ ਦੇਣੇ ਕਿਉਂਕਿ :

ਛੱਤ ਨੂੰ, ਛੱਤ ਦੇ ਅਰਥ ਕੇਵਲ ਬੁੱਧੀ ਸਾਡੀ ਸੋਚ ਦਿੰਦੀ ਹੈ।'

ਮਨੁੱਖ ਦੀ ਜ਼ਿੰਦਗੀ ਕੰਕਰੀਟ ਦੀ ਵਲਗਣ ਵਿੱਚ ਘਿਰੀ ਹੋਈ ਹੈ। ਮਨੁੱਖ, ਮਨੁੱਖ ਕੋਲ ਬੈਠਾ ਹੋਇਆ ਵੀ ਉਸ ਤੋਂ ਦੂਰ ਹੈ ਅਤੇ ਹਾਜ਼ਰ ਹੁੰਦਾ ਹੋਇਆ ਵੀ ਗੈਰ-ਹਾਜ਼ਰ ਹੈ। ਇਨ੍ਹਾਂ ਮਨੁੱਖਾਂ ਦੀ ਜ਼ਿੰਦਗੀ ਉਹਨਾਂ ਦਰਵਾਜ਼ਿਆਂ ਵਰਗੀ ਜਾਪਦੀ ਹੈ ਜਿਹੜੇ ਬੰਦ ਹਨ, ਉਨ੍ਹਾਂ ਖਿੜਕੀਆਂ ਵਰਗੀ ਹੈ, ਜਿਹੜੀਆਂ ਕਦੇ ਨਹੀਂ ਖੁੱਲਦੀਆਂ ਅਤੇ ਉਹਨਾਂ ਗੁੰਬਦਾਂ ਵਰਗੀ ਹੈ, ਜਿਹੜੇ ਗੂੰਜਦੇ ਹੀ ਨਹੀਂ।

ਨਾਟਕਕਾਰ ਨੂੰ ਜਾਪਦਾ ਹੈ ਕਿ ਇਨ੍ਹਾਂ ਲੋਕਾਂ ਦੀ ਜ਼ਿੰਦਗੀ ਰੋਲੇ-ਗੋਲੇ ਵਾਲੀ ਹੈ, ਜਿਸ ਦੇ ਕੋਈ ਅਰਥ ਨਹੀਂ ਅਤੇ ਜ਼ਿੰਦਗੀ ਸਿਫ਼ਰ ਹੀ ਸਿਫ਼ਰ ਹੈ। ਇਸਦੇ ਅਰਥ ਤਲਾਸ਼ਣੇ ਚਾਹੀਦੇ ਹਨ। ਇਹ ਅਰਥ ਵੀ ਮਨੁੱਖ ਦੇ ਮਨ-ਮੰਥਨ ਰਾਹੀਂ ਲੱਭਣੇ ਹਨ। ਰਵਿੰਦਰ ਰਵੀ

'ਸਿਫ਼ਰ ਨਾਟਕ' ਵਿੱਚ ਮਨੁੱਖ ਨੂੰ ਸਿਫ਼ਰ ਰੂਪੀ ਜੀਵਨ ਜੀਊਣ ਦੀ ਥਾਂ ਇਸ ਦੇ ਅਰਥ ਦੇਣ ਲਈ ਪ੍ਰੇਰਿਤ ਕਰਦਾ ਹੈ।

ਨਾਟਕਕਾਰ ਨੇ ਨਵੀਂ ਤਕਨਾਲੋਜੀ ਅਤੇ ਭਟਕਦੀ ਚੇਤਨਾ ਮਨੁੱਖ ਅਤੇ ਸਮਾਜ ਦੀ ਹਸਤੀ ਲਈ ਵੰਗਾਰ ਬਣ ਗਏ ਹਨ। ਨਵੀਂ ਤਕਨਾਲੋਜੀ ਨੇ ਮਨੁੱਖ ਨੂੰ ਮਸ਼ੀਨ ਬਣਾ ਕੇ ਉਸ ਅੰਦਰੋਂ ਨੈਤਿਕ ਕਦਰਾਂ-ਕੀਮਤਾਂ ਨੂੰ ਖ਼ਤਮ ਕਰ ਦਿੱਤਾ ਹੈ। ਨਾਟਕਕਾਰ ਵਿਸ਼ਵ ਪੱਧਰ 'ਤੇ ਵਿਆਹ ਸੰਸਥਾ ਵਿੱਚ ਆ ਰਹੇ ਬਦਲਾਵਾਂ ਪ੍ਰਤੀ ਵੀ ਚਿੰਤਾ ਪ੍ਰਗਟ ਕਰਦਾ ਹੈ। ਪਿਆਰ ਦਾ ਸੰਬੰਧ ਅੱਜ ਸਿਰਫ਼ ਵਕਤੀ ਹੋ ਗਿਆ ਹੈ, ਪਰੰਪਰਾਗਤ ਰਿਸ਼ਤਿਆਂ ਦੀ ਨੁਹਾਰ ਬਦਲ ਰਹੀ ਹੈ। ਸਮਾਜ ਵਿੱਚ ਨਵੀਆਂ ਸੱਭਿਆਚਾਰਕ ਕੀਮਤਾਂ ਪੈਦਾ ਹੋ ਰਹੀਆਂ ਹਨ ਜੋ ਸਮਾਜ ਲਈ ਚਿੰਤਾ ਦਾ ਵਿਸ਼ਾ ਹਨ। ਵਿਸ਼ਵ ਪੱਧਰ 'ਤੇ ਪੈਦਾ ਹੋ ਰਹੇ ਨਵ-ਸਾਮਰਾਜਵਾਦ ਦੇ ਤਬਾਹਕੁੰਨ ਪ੍ਰਭਾਵ ਵੀ ਰਵੀ ਦੀ ਨਾਟ-ਸੰਵੇਦਨਾ ਨੂੰ ਹਲੂਣਦੇ ਹਨ। ਵਿਸ਼ਵ ਸਟਾਕ ਮਾਰਕਿਟ ਵਿੱਚ ਤਬਦੀਲੀਆਂ ਕਾਰਨ ਆਰਥਿਕ, ਰਾਜਨੀਤਕ, ਵਿਅਕਤੀਗਤ, ਧਾਰਮਿਕ ਅਤੇ ਸਮਾਜਿਕ ਬਦਲਾਅ ਉਸ ਲਈ ਚਿੰਤਾ ਦਾ ਵਿਸ਼ਾ ਹਨ। ਵਿਸ਼ਵ ਪੱਧਰ 'ਤੇ ਹੋ ਰਹੀ ਹਿੰਸਾ, ਯੁੱਧ, ਆਤੰਕ, ਨਸ਼ੇ ਦਾ ਵਪਾਰ, ਭ੍ਰਿਸ਼ਟ ਸਿਸਟਮ ਕਾਰਨ ਭੁੱਖਮਰੀ, ਬੇਕਾਰੀ ਅਤੇ ਦੇਹ-ਵਪਾਰ ਦੀਆਂ ਸਮੱਸਿਆਵਾਂ ਵੀ ਵੱਧ ਰਹੀਆਂ ਹਨ।

ਰਵਿੰਦਰ ਰਵੀ ਦੇ ਕਾਵਿ-ਨਾਟਕਾਂ ਦਾ ਸਮਾਜ ਸੱਭਿਆਚਾਰਕ ਅਧਿਐਨ ਕਰਨ ਉਪਰੰਤ ਇਹ ਜਾਣਕਾਰੀ ਪ੍ਰਾਪਤ ਹੁੰਦੀ ਹੈ ਕਿ ਉਹ ਵਿਸ਼ਵ ਅਨੁਭਵ ਅਤੇ ਚੇਤਨਾ ਦਾ ਧਾਰਨੀ, ਸੁਹਿਰਦ ਨਾਟਕਕਾਰ ਹੈ। ਉਸਦੇ ਕਾਵਿ-ਨਾਟਕ ਸਮੁੱਚੀ ਮਨੁੱਖਤਾ ਨੂੰ ਇੱਕ ਇਕਾਈ ਵਜੋਂ ਦੇਖਦੇ ਹਨ। ਇਹੋ ਕਾਰਨ ਹੈ ਕਿ ਉਸਦੇ ਕਾਵਿ-ਨਾਟਕਾਂ ਦੀ ਪ੍ਰਕਿਰਤੀ ਗਲੋਬਲੀ ਹੈ, ਉਸਨੇ ਸਮੁੱਚੀ ਮਾਨਵ ਜਾਤੀ ਨੂੰ ਮਸ਼ੀਨੀ ਸੱਭਿਅਤਾ ਦੇ ਮਾਰੂ ਖ਼ਤਰਿਆਂ ਤੋਂ ਸੁਚੇਤ ਕਰਵਾਇਆ ਹੈ। ਮਨੁੱਖ ਮਸ਼ੀਨਾਂ ਨਾਲ ਕੰਮ ਕਰਦਾ ਹੋਇਆ ਮਸ਼ੀਨ ਬਣ ਗਿਆ ਹੈ ਜਿਸ ਕਾਰਨ ਉਸਦੇ ਰਿਸ਼ਤੇ ਟੁੱਟ ਰਹੇ ਹਨ। ਉਸਨੇ ਅਜੋਕੇ ਅਤਿ ਵਿਕਸਿਤ ਤੇਜ਼ ਰਫ਼ਤਾਰ ਯੁੱਗ ਵਿੱਚ ਵਿਚਰ ਰਹੇ ਮਨੁੱਖ ਦੀ ਬਿਮਾਰ ਦਸ਼ਾ ਦਾ ਬਹੁਪੱਖੀ ਵਿਸ਼ਲੇਸ਼ਣ ਕੀਤਾ ਹੈ। ਰਵੀ ਨੇ ਮਨੁੱਖ ਨੂੰ ਭਟਕਣਾ ਵਿੱਚੋਂ ਕੱਢਣ, ਸੁਚੇਤ ਕਰਨ ਤੇ ਉਸਾਰੂ ਸੋਚ ਦੇਣ ਹਿੱਤ ਆਪਣੇ ਮੂਲ ਨੂੰ ਪਛਾਨਣ ਲਈ ਕਾਵਿ-ਨਾਟਕਾਂ ਵਿੱਚ ਯਥਾਰਥਕ ਤਸਵੀਰ ਨੂੰ ਪੇਸ਼ ਕਰਦਾ ਹੈ।

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ਮੋਬਾ. 9417085785

ਸਿੱਖ ਪੰਥ ਦੇ ਚਿਰੰਕਾਲੀ ਰੱਖ ਨੂੰ ਪੂਰਾ ਕਰਦਿਆਂ ਸ਼੍ਰੋਮਣੀ ਗੁਰਦੁਆਰਾ ਪ੍ਰਬੰਧ ਕਮੇਟੀ, ਸ੍ਰੀ ਅੰਮ੍ਰਿਤਸਰ ਵੱਲੋਂ ਪੰਜਾਬ ਰਾਜ ਦੇ ਐਕਟ 20/2008 ਦੇ ਤਹਿਤ ਫਤਿਹਗੜ੍ਹ ਸਾਹਿਬ, ਪੰਜਾਬ (ਭਾਰਤ) ਵਿਖੇ ਸ੍ਰੀ ਗੁਰੂ ਗ੍ਰੰਥ ਸਾਹਿਬ ਵਰਲਡ ਯੂਨੀਵਰਸਿਟੀ ਦੀ ਸਥਾਪਨਾ ਕੀਤੀ ਗਈ। ਧਾਰਮਿਕ, ਮਨੁੱਖਵਾਦੀ ਅਤੇ ਲੋਕ ਉਪਕਾਰੀ ਸੰਸਥਾ ਸ਼੍ਰੋ.ਗੁ.ਪ੍ਰ. ਕਮੇਟੀ ਨੇ ਗੁਰਦੁਆਰਾ ਸਾਹਿਬਾਨ ਦੀ ਸੇਵਾ-ਸੰਭਾਲ ਦੇ ਨਾਲ-ਨਾਲ ਪੰਜਾਬ ਅਤੇ ਦੇਸ਼ ਦੇ ਨੇੜਲੇ ਰਾਜਾਂ ਅੰਦਰ ਕਈ ਵਿਦਿਅਕ ਵਿਚ ਸਕੂਲ ਅਤੇ ਉੱਚੇਰੀ ਸਿੱਖਿਆ ਦੇ ਮੈਡੀਕਲ, ਇੰਜੀਨੀਅਰਿੰਗ ਅਤੇ ਕਿੱਤਾਮੁਖੀ ਅਦਾਰੇ ਸਥਾਪਤ ਕੀਤੇ ਹਨ।

ਇਸ ਯੂਨੀਵਰਸਿਟੀ ਦਾ ਮੰਤਵ ਸ੍ਰੀ ਗੁਰੂ ਗ੍ਰੰਥ ਸਾਹਿਬ ਅਤੇ ਸਿੱਖ ਧਰਮ; ਵਿਸ਼ਵ ਧਰਮ: ਕਲਾਵੇ ਸਮਾਜ-ਵਿਗਿਆਨ, ਬੈਸਿਕ ਤੇ ਅਪਲਾਇਡ ਵਿਗਿਆਨ ਦੇ ਨਾਲ-ਨਾਲ ਉਭਰ ਰਹੀਆਂ ਅਤਿ-ਆਧੁਨਿਕ ਤਕਨੀਕਾਂ ਅਤੇ ਵਾਤਾਵਰਣ; ਮਨੁੱਖੀ ਅਧਿਕਾਰ, ਇਸਤਰੀ ਤੇ ਦੱਬੇ ਸਮਾਜਿਕਾਂ ਆਦਿ ਲਈ ਵਿਸ਼ਿਆਂ ਦੇ ਅਧਿਐਨ ਅਤੇ ਖੋਜ ਨੂੰ ਮਿਥਿਆ ਗਿਆ ਹੈ। ਯੂਨੀਵਰਸਿਟੀ ਵੱਲੋਂ ਪਾਠਕ੍ਰਮ ਨੂੰ ਆਪਣੇ ਵੱਖ ਨਾਲ ਵਿਚਾਰ ਕੀਤਾ ਗਿਆ ਹੈ ਕਿ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਮਨੁੱਖੀ ਤੇ ਨੈਤਿਕ ਕੀਮਤਾਂ ਅਤੇ ਵਿਸ਼ਵ ਭਾਈਚਾਰੇ ਦੇ ਭਾਵਨਾ ਪੈਦਾ ਹੋਵੇ ਤਾਂ ਕਿ ਨੌਜਵਾਨ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਜ਼ਰੂਰ ਮਨੁੱਖ ਅਤੇ ਜ਼ਿੰਮੇਵਾਰ ਨਾਗਰਿਕ ਵਜੋਂ ਤਬਦੀਲ ਕੀਤਾ ਜਾ ਸਕੇ।

Long awaited aspirations of the Sikh Panth culminated into the establishment of Sri Guru Granth Sahib World University (S.G.G.S.W.U) at Fatehgarh Sahib near Chandigarh (India) in 2008 through Punjab State Act 20/2008 by Shiromani Gurdwara Parbandhak Committee (S.G.P.C), Sri Amritsar Sahib. S.G.P.C is a religious, humanitarian and charitable organization of the Sikhs, which apart from managing the Gurudwaras (holy Shrines) of the Sikhs, has set up number of schools and institutions of higher learning including a Medical college and University, Engineering Institutes and scores of Professional Institutes in Punjab & other states of India.

S.G.G.S.W.U. has a mandate to focus on intensive studies, research and training in the areas of world religions; Sri Guru Granth Sahib Ji and Sikhism; arts & humanities, social sciences, basic and applied sciences, while simultaneously focusing on Emerging Technologies; Environment, Human rights, Empowerment of Women and the Downtrodden. The University develops curricula to imbibe human, moral and ethical Values along with the sense of Universal Brotherhood amongst the young students, in order to transform them into enlightened human beings and responsible citizens.

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ਫਰੀਦਾ ਬਾਰਿ ਪਰਾਇਐ ਬੈਸਣਾ ਸਾਂਈ ਮੁਝੈ ਨ ਦੇਹਿ

ਵਿਸ਼ੇਸ਼ ਅੰਕ:
ਬਸਤੀਵਾਦੀ ਬਰਤਾਨਵੀ ਹਕੂਮਤ ਦੌਰਾਨ ਸਿੱਖ ਪੰਥ - II

Special Issue:
THE SIKHS UNDER BRITISH COLONIAL RULE – II

## SRI GURU GRANTH SAHIB WORLD UNIVERSITY
### FATEHGARH SAHIB

# FEMALE EDUCATION IN COLONIAL PUNJAB
## A CASE STUDY [1849-1947]

Hardeep Kaur

**Abstract:** In this paper an attempt has been made to study the development of female education in Colonial Punjab. We know that education was one of the instruments by which colonial power sought to maintain and strengthen their domination over colonies. After the annexation of Punjab to the British Empire in 1849, Britishers established many schools and colleges to promote female education in Punjab. The moral and financial support of the colonial authorities was considered essential to the spread of female education. But reformers of Punjab were not happy with the idea of Christian instructions in the schools and colleges. Punjab was lagging behind other presidencies in the field of education. However, it was the untiring efforts of the socio-religious movements like Arya Samaj, Dev Samaj, and Singh Sabha etc. in the late 19th century and 20th century that made female schooling available even to the remote areas of Punjab. Female education was considered the best medium for the women empowerment and emancipation. Thus, an education movement was started for the development of female education in Punjab which gave birth to new class of educated people.

**Key Words:** Female Education, Colonial Punjab, Colonial authorities, Socio-religious movements, women empowerment and emancipation

The Punjab was annexed to the British Empire in 1849. Before its annexation, the education system prevalent in Punjab was indigenous. The education imparted in the schools was more religious than secular in character and there was no institution in Punjab for higher learning. Pathsalas, Quran and Gurumukhi schools were the centers of instructions for Hindus, Muslims and Sikhs respectively. In these schools, only religious education was given. There were different types of education for different purposes. For example, instructions in Persian were for government services, instructions in Arabic, Sanskrit and Gurumukhi were for religious purposes etc. Persian schools were called Maktabs, Arabic schools were

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called Madrasas, Hindus schools were called Pathshalas and Gurumukhi scho
were called Gurdwaras and Dharamsalas. Female education was very lc
limited to the wealthy families. It was informal, practical and religious. It v
limited to domestic knowledge. There were no separate buildings for gii
Social evils like child marriage, Purdah system and conservatism of the peoj
were some of the causes for the low education among females. Befi
annexation, the British East India Company did not pay much attention to i
cause of women education. Although in 1835, emphasis was given to fem
education but not a single pie out of the educational grant of 1835 was spent
girl's education. According to Leitner, there were 17 indigenous schools
Punjab.[1]

**After annexation:** After annexation, female education received concern by i
Britishers, Christian missionaries and socio-religious movements but the effc
of the socio-religious movements is considered indispensable in the field
female education. Almost all socio-religious movements tried to emancipate z
empower women. The issues relating to women were the main concern for the
movements. These socio -religious movements led a crusade against the soc
evils persisting in the society. They underlined the necessity for the spread
education among females. Female education was considered the best medium
women emancipation and empowerment. Of course girl's schools were opei
by the colonial government in Punjab but these were unable to attract girls
high castes. Socio-religious movements made schooling available even in i
remote areas of the Punjab. They also established some sound institution
higher education. It is true that English education in India has its foundations
19 century. It was due to the efforts of Britishers, missionaries and soc
religious movement that female education received impetus. The following tai
shows the literacy rate in different provinces in the year 1901.[2]

| | Literacy rate | Male % | Female% |
|---|---|---|---|
| 1 | Madras | 11.9 | 0.9 |
| 2 | Bombay | 11.6 | 0.9 |
| 3 | Bengal | 10.4 | 0.5 |
| 4 | Berar | 8.5 | 0.3 |
| 5 | Assam | 6.7 | 0.4 |
| 6 | Punjab | 6.4 | 0.3 |
| 7 | United Provinces | 5.7 | 0.2 |

**Christian missionaries:** After the Punjab had been annexed; a flood of Christian missionaries, with the blessings of the British Govt. established their centers at Amritsar, Lahore and Peshawar. The Christian missionaries were the first non- govt. agency in the field of education. The role of missionaries in the spread of female education cannot be ignored. Modern education among women in initial stages was promoted by missionaries. American Presbyterians, The Church of England, The Church of Scotland, and Baptists Catholics were the missionaries. Missionaries made huge investment in education along with the government grant- in -aid scheme. American Presbyterians established an elementary school for girls at Ludhiana in 1836, Jalandhar in 1852.The Christian Mission society opened girls schools in Amritsar, Kangra, Jandiala and Narowal. They established the Alexandria High school for Girls and also a middle school for girls in Amritsar in 1878. A mid-Wifery school was opened in Amritsar in 1866.In 1879, Kinnaird high school was started in Lahore. Thus, role of female missionaries for the spread of female education cannot be neglected.[3]

|   | Name of various Mission Societies | Men | Women |
|---|---|---|---|
| 1 | Society for propagating Gospel | 82 | 72 |
| 2 | Church Missionary Society | 130 | 146 |
| 3 | Church of England Zenana Missionary Society |  | 152 |
| 4 | Society with smaller no's of missionaries | 43 | 100 |
|   | Total | 255 | 470 |

They made special efforts to reach upper caste women through Zenana visiting house to house. Although spreading Christinity was their main motive, they started first girl's schools in Punjab. The names of some prominent female missionaries were: Mrs. Fitzpatrick, Mrs. Emslie, Mrs. Mullens and Miss Clay. Less than 15 years after its annexation, there were more than 30 Europeans women educating the 'natives' in Punjab. In 1900, there were 349 girls schools of which Kinnaird school, Alexandria school [Amritsar], Dufferin School [Lahore], Queen Mary School were opened for girls. In 1913-14, college classes were started in Kinnaird High school and in 1914-15, Queen Mary School was given the status of Degree College. In 1916, an alternative scheme leading up to school examination was issued by the education department. Physiology, Hygiene and Domestic economy were included as optional subject for girls. Liberal concessions were given to the girls' students- Scholarships and Free Boarding. The Punjabis responded to the Christian missionaries by launching; their own educational programme in the Province.[4]

**Indigenous efforts of Hindu Reformers Brahmo Samaj:** Raja Ram Mohan Roy established Brahmo Samaj in 1828 in Bengal. A branch of Brahmo Samaj was opened at Lahore in 1864 and 1872.Brahmo Samajist stood for western education and freedom of press. They worked for the upliftment of women and were in favour of female education. They opened Anglo-Vernacular Girls School at Lahore in 1885.Besides reading and writing girls were taught the useful art of sewing and knitting.

**Arya Samaj:** Arya Samaj was founded by Swami Dayanand Saraswati in 1875 in Bombay. A branch of Arya Samaj was opened in 1877 at Lahore. Arya Samajis played an important role for the spread of female education in Punjab. They opened many Schools and colleges in the province. They opened many Girls schools in Amritsar, Jalandhar and Lahore by 1885.The Ferozepur Samaj had organized a successful girl's school by 1889.The Arya Samajis of Gujarat and Jalandhar districts quickly followed the Ferozepur model. Arya Putri Pathsalas was opened in Abohar in 1903-04; Arya girls' middle school was opened in Moga in 1921.In the field of higher education for women, an advocator of the education of girls, Lala Dev Raj announced in 1892 that the Jalandhar Samaj intended to establish a girl's high school, a Kanya Mahavidhayala. The Kanya Mahavidyalaya became the source of inspiration for new teachers. By 1906, it enrolled 203 students, in all grades and ashram housed 105 students, a mixture of unmarried, married and widow women. The girls who graduated from Kanya mahavidyalaya later on began their own schools. It was due to the efforts of Arya Samaj, a respectable profession for women grew up in the nineteenth century. In the twentieth Century, Arya Samaj started many other schools for the spread of women education. Ludhiana Samaj started an Ashram for the Widows and a female Vedic school. The Ferozepur Samaj had organized a successful girl's school. Other Girl's schools started by the various Arya Samajis were Arya Putri pathsalas, Abohar[1903-04], Arya girls middle school, Moga[1921], G.M. Arya Girls 'primary school, Patti, Amritsar[1933], Sain Dass A.S. Girls' High school, Jalandhar [1942], Shri Banwarilal Vedic middle Kanya pathsala, Abohar [1944]. Various Arya samajis founded girl's schools all over the Punjab but Jalandhar Doab led all other areas. Lala Sunder das, Lala Kushi Ram, Lala Ralla Ram were some Arya samajis who were strong advocators of female education.[5]

**Dev Samaj:** Dev Atma, a great reformer of Hindu society, founded Dev Samaj in the year 1887. Like other social reformers Dev Samaj opposed social evils of

he society. Dev atma, like other reformers saw that the future of the women lay in education. He made women education chief plank of his society's contribution to social reformers. The Dev Samaj institutions not only provided high standard of education, but also inculcated moral culture of the highest quality. It encouraged women education and opened co-education school in Moga on 29 Oct.1899.The contribution of Dev Samaj in the field of women education is clearly indicated by the fact that the first High school for Girls in Punjab was opened by Dev samaj in Ferozepur. This school later on developed into a Post Graduate College and Training Institute. This School produced the First M.B.B.S, in the Punjab, Who later on became the Principal of the Lady Hardinge Medical College, Delhi. It established 2 colleges for women, one in Lahore and one in Ferozepur. At the close of 1920. Dev samaj was running 27 education institutions. Most of these institutes were for girls and established in villages. The society also opened 2 Nari ashrams for education and training of elderly women.[6]

**Santana Dharma:** Sanatanists were the first among Hindus who established Sanskrit and Vedic Institutes and promoted Hindi as the language of education and administration. Sanatam Dharamis established Sanatam Dharma Pratinidhi Sabha Punjab at Lahore in 1917. Its aim was to set up local Sabhas, high schools and Pathsalas. It established an Education department. It established a number of Putri Pathsalas for girls. Putri Pathsalas were up to the Primary level and laid emphasis on religious instructions. Majority of Putri Pathsalas were in Shahpur, Gujarat, Jhelum, Multan, Attock and Ferozepur. In 1928, there were 83 Putri pathsalas in the Punjab. Santanamis also established widow homes to make widows financially independent by teaching them sewing and stitching.[7]

**Radha Soamis:** Radha Soami Satsang was founded by Shiv Dayal alias Soami Ji, a saint of Agra in 1861. The Radha soami leaders of different centres preached the concept of equality. The most praise worthy effort towards the improvement of women was of the Radha Soami Satsang Sabha Dayal Bagh at Agra. It took steps towards the education of the girl child. It opened Prem Vidyalya in the year 1924 and the subjects taught in the institution were Arts, Science, Home Science and Music Education. Women's Training College was established in 1947. In this college, Vocational courses were taught. Another institute called Silai Vibagh was established in 1939 where needle work was taught to the girls.[8]

**Indigenous efforts of Sikh Reformers**

**Singh Sabhas:** Singh Sabha movement played a vital role in promoting female education. The pioneers of female education in the Singh Sabha movement were Sardar Sunder Singh Majithia, Baba Khem Singh Bedi, Sardar Harbans Singh, and Bhai Takht Singh. However, the greatest advocator and promoter of female education was Bhai Takht Singh and Bhai Nihal Singh. They emphasised the importance of female education to improve the condition of their community. For this purpose, in 1892, a Sikh Kanya Pathsala was started at Ferozepur under the supervision of Bhai Takhat singh. Later on, it emerged as a popular Sikh institution for women in and outside the Punjab. Chief Khalsa Diwan was set up in 1902. Chief Khalsa diwan also worked for the spread of education. Its greatest achievement in the field of education was its educational committee. Educational committee held educational conferences every year at different places of Punjab. As a result, educational movement was started. The conference showed deep interest in women education. It opened 1 college, 4 High schools,25 Middle schools,150 Primary schools for Girls. Gradually, the women participation in the Sikh educational conference started. By the Year 1947, there were 340 schools [primary, Middle and high schools], 5 Boarding houses, One Widow Ashram and 2 Girls college in the different districts of Punjab.[9] Most of these institutions were Located in Central and western Punjab.

## Indigenous efforts of Muslim Reformers

The position of Muslim women was worse. The Muslim responded to English education and female education very late in the 19th century. Therefore, the problem of female education received attention very late. Of course, the no. of Muslims girls attending schools and colleges was very small due to Purdah system. According to 1881 census, about 157,000 males and 6101 females were under instruction in Punjab. Muslim women had the lowest % of those receiving instruction, 5%compared to 8. 9% of other religions.[10]

**Aligarh Movement:** Sir Syed Ahmed Khan founded Aligarh movement. He was in favour of female education. The actual lead in the realm of female education by Aligarh movement was led by Sheikh Muhammad Abdullah. He shaped the Women's education movement & played a vital role for the future of women's education. He started a tiny girl's school [Aligarh school] with enrolment of 6 students. In 1929, the school became Intermediate College and in 1930 it became Women's College affiliated to Aligarh University.[11] Ahmediya movement: It was started in 1880s at Qadian, also favoured women education. The first girl's school was established at Qadian in 1928. The Muslims reformers started

organizing the Mohammadan educational conference in the late 19 century. The annual sessions of Muhammadan Educational conference were held at Lahore in 1918. About 600 women attended this meeting which shows the interest of Women to spread education. The Muslim religious movements and Anjumans played an important role in promoting female education. In 1873, Anjuman was established in Amritsar named Anjumans-i-Amritsar which aimed at the propagation of religious and western education, social welfare of the Muslims of Punjab. Anjumans played an important role in female education. Anjuman-i-Himayat-Islam, Lahore started 5 schools for girls under the management of local leaders in 1885 at Lahore. Initially, these schools imparted education up to primary level and by 1897 these schools were upgraded to the middle standard. Schools were also opened for Muslim girls at Amritsar and Batala.[12] Similar schools were opened by Anjuman-i-Islamia Btala and by several other Muslim societies as well. Hence, the Muslim Anjumans evoked general awareness of feminine awareness and prosperity in the Colonial Punjab.

## Conclusion

In conclusion, we can say that socio-religious movements in Punjab had played most significant role in the promotion of female education. They opened many schools and colleges for girls in different parts of Punjab. In Punjab, although the major efforts were made by Arya Samaj and Singh Sabha, yet the role of other socio religious movements like Dev samaj, Brahmo samaj, Radha Soamis and Sanatam Dharmis cannot be ignored. They opened educational institutes in even remote parts of Punjab. Cities like Lahore, Amritsar, Gurdaspur, Ferozepur Jalandhar etc. were developed as educational hubs. Today also these towns of Punjab are having a no. of educational institutes.

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# Digital Scholarship and Digital Humanities: Exploring Intersections, Challenges, and Opportunities

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## ABSTRACT

This paper provides an overview of digital scholarship and digital humanities, two related but distinct fields that leverage digital tools and methods to enhance and transform scholarship and engagement with the humanities. The paper explores the history and development of these fields, their key characteristics, examples of digital scholarship and digital humanities projects, and their benefits and limitations. The methodology employed in this paper involved conducting a comprehensive literature review, analyzing scholarly articles, books, and reports published between 2010 and 2023. The findings reveal the transformative potential of digital technologies in reshaping humanities research, the importance of interdisciplinary collaborations, the ethical considerations in digital scholarship and digital humanities, and the impact of these fields on academia and society. The paper also discusses the challenges and opportunities facing digital scholarship and digital humanities. Overall, this paper highlights the importance of digital scholarship and digital humanities in shaping the future of scholarship and society in the digital age, providing insights for researchers, educators, and practitioners in these fields.

# Digital Scholarship and Digital Humanities: Exploring Intersections, Challenges, and Opportunities

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**ABSTRACT-**

This paper provides an overview of digital scholarship and digital humanities, two related but distinct fields that leverage digital tools and methods to enhance and transform scholarship and engagement with the humanities. The paper explores the history and development of these fields, their key characteristics, examples of digital scholarship and digital humanities projects, and their benefits and limitations. The methodology employed in this paper involved conducting a comprehensive literature review, analyzing scholarly articles, books, and reports published between 2010 and 2023. The findings reveal the transformative potential of digital technologies in reshaping humanities research, the importance of interdisciplinary collaborations, the ethical considerations in digital scholarship and digital humanities, and the impact of these fields on academia and society. The paper also discusses the challenges and opportunities facing digital scholarship and digital humanities. Overall, this paper highlights the importance of digital scholarship and digital humanities in shaping the future of scholarship and society in the digital age, providing insights for researchers, educators, and practitioners in these fields.

**Keywords**: Academics, Challenges, Digital Age, Digital Humanities, Digital Scholarship, Digital Tools, Interdisciplinary Collaboration, Opportunities.

## INTRODUCTION

Digital scholarship and digital humanities are two fields that have gained significant attention in recent years as the use of digital technologies continues to permeate various aspects of academic research, teaching, and learning. These fields harness the power of digital tools and methods to enhance scholarship, explore human culture and society, and engage with diverse audiences in innovative ways. While digital scholarship focuses on leveraging digital technologies to advance research and scholarship, digital humanities specifically investigates humanistic topics through the lens of digital methodologies.

The rapid evolution of digital technologies has transformed the research landscape, enabling scholars to access vast amounts of information, analyze complex data sets, and collaborate across disciplines in ways that were previously unimaginable. With the proliferation of digital resources,

the boundaries of scholarly inquiry have expanded, allowing for new approaches to knowledge production and dissemination. Digital scholarship and digital humanities offer scholars and researchers exciting opportunities to explore research questions, uncover patterns and insights, and present their findings in engaging and accessible formats.

In order to gain a comprehensive understanding of digital scholarship and digital humanities, it is essential to examine their definition, evolution, characteristics, projects, and the challenges and opportunities they present. This paper aims to provide such an exploration, drawing on a selection of scholarly articles, books, and reports published between 2010 and 2021. By conducting a literature review and analyzing key works in the field, this paper seeks to shed light on the transformative potential of digital technologies, the interdisciplinary nature of these fields, the ethical considerations involved, and the impact they have on academia and society.

The methodology employed in this paper involves a systematic review of the literature, gathering relevant sources that offer insights into the definition and evolution of digital scholarship and digital humanities. By examining a diverse range of perspectives and case studies, the paper aims to present a comprehensive overview of the field, capturing its multifaceted nature and highlighting its significance in the digital age.

The findings of this paper will contribute to a deeper understanding of digital scholarship and digital humanities, providing researchers, educators, and practitioners with valuable insights into the evolving landscape of these fields. By exploring their characteristics, projects, challenges, and opportunities, this paper aims to inform current and future practices, foster interdisciplinary collaborations, and encourage critical reflections on the implications of digital technologies for scholarship and society.

In the following sections, this paper will delve into the definition and evolution of digital scholarship and digital humanities, examine their key characteristics, present examples of notable projects, discuss the challenges and opportunities they present, and reflect on their potential impact on academia and society. Through this exploration, we aim to shed light on the dynamic and transformative nature of digital scholarship and digital humanities, highlighting their role in shaping the future of scholarship and knowledge production in the digital era.

## REVIEW OF LITERATURE

The literature on digital scholarship and digital humanities is extensive, covering a broad range of topics related to these fields.

Some of the earliest works on digital scholarship and digital humanities date back to the 1990s, when the internet began to gain widespread adoption. For example, John Unsworth[28] explored the fundamental methods and tools used by scholars in the humanities, and how these could be supported and enhanced by digital technologies.

The "computational turn" in the digital humanities, as discussed by Berry (2011), marks a shift towards using computational methods and technologies for analysis and interpretation. Liu (2012) explores the intersection of digital humanities and cultural criticism, emphasizing the need to bridge the gap between digital and cultural scholarship. Rockwell and Sinclair (2012) introduce the concept of computer-assisted interpretation and thick mapping, demonstrating how digital tools enable new forms of analysis and interpretation.

Svensson (2016) examines the digital humanities as a form of digital culture, emphasizing the reciprocal relationship between digital technologies and humanities research. Presner, Shepard, and Kawano (2014) discuss hypercities and thick mapping as examples of digital tools that facilitate multi-layered analysis of cultural and historical data.

The collaborative nature of digital humanities projects is highlighted by Burdick et al. (2012), who emphasize the importance of interdisciplinary collaborations and the integration of technology with traditional humanities disciplines. Spiro (2012) explores the values and ethics within the digital humanities, emphasizing the need for critical reflection and responsible practices.

Nowviskie (2016) contextualizes the digital humanities within the Anthropocene, highlighting its potential for addressing environmental concerns and promoting sustainable research practices. Terras, Nyhan, and Vanhoutte (2013) provide a comprehensive collection of essays that offer diverse perspectives on defining digital humanities.

Since then, many academics have played a part in advancing and broadening the scope of digital scholarship and digital humanities. Specifically, the establishment of digital humanities as a separate field of study has resulted in a surge of research centered on the ways in which digital technologies and the humanities intersect. Some notable works in this area include Matthew K. Gold'sError! Reference source not found. edited volume "Debates in the Digital Humanities" (2012) and Tara McPherson'sError! Reference source not found. "Media Studies and the Digital Humanities" (2014).

In the last few years, there has been an increasing focus on the obstacles and possibilities confronting digital scholarship and digital humanities. The report titled "Digital Scholarship in the Humanities: An Exploration of the Changing Research Ecosystem," which was released in 2019 by the Council on Library and Information Resources (CLIR) and the Digital Library Federation (DLF)8, emphasized the importance of enhancing collaboration and providing support for digital scholarship and digital humanities projects.

Other works have focused on specific aspects of digital scholarship and digital humanities, such as data management, digital pedagogy, and the ethics of digital research. For example, Melissa Terras'sError! Reference source not found. "Digital Images for the Information Professional" (2008) explores the use of digital images in cultural heritage institutions, while Roopika Risam'sError! Reference source not found. "New Digital Worlds: Postcolonial Digital Humanities in Theory, Praxis, and Pedagogy" (2018) examines the intersection of digital technologies and postcolonial studies. Tweetorials that are educational in nature should be taken into account as digital scholarship and provide a method for evaluation that committees responsible for promotion can utilize while appraising a tweetorial created by an individual4.

The significant increase of publications in DH over last six years (2015-2020) is observed and USA, UK and Germany emerged as the major research contributor.

Overall, the literature on digital scholarship and digital humanities reflects the growing interest and importance of these fields, as well as the need for continued research and collaboration to address the challenges and opportunities they present.

## OBJECTIVES OF THE STUDY

The paper aims to provide a comprehensive understanding of digital scholarship and digital humanities and their relationship with each

other. It is intended for scholars and researchers who are interested in exploring the use of digital technologies in advancing research and scholarship, as well as for educators and students who are interested in exploring new methods and techniques for studying human culture and society.

## Principles

Digital scholarship and digital humanities encompass a wide range of principles and practices that utilize digital tools and methodologies to conduct research, analyze data, and communicate knowledge in the humanities and social sciences. While the field is continuously evolving, here are some specific principles that are often associated with digital scholarship and digital humanities:

- Interdisciplinary: Digital scholarship and digital humanities encourage collaboration across disciplinary boundaries. Researchers from various fields, such as history, literature, sociology, and computer science, come together to explore research questions using digital methods and approaches. This interdisciplinary approach fosters new insights and perspectives.

- Openness and Accessibility: Digital scholarship emphasizes openness and accessibility. It encourages scholars to share their research data, methods, and findings openly, enabling others to verify, reproduce, and build upon their work. Open access publishing, open data, and open-source software are central to the ethos of digital humanities.

- *Data-Driven Research: Digital scholarship involves the use of large-scale datasets and computational tools for analysis. Researchers utilize data mining, text analysis, network analysis,* and other computational techniques to extract patterns, uncover insights, and generate new knowledge. This data-driven approach allows for novel interpretations and discoveries.

- Visualization and Representation: Digital humanities employ visualizations, multimedia, and interactive technologies to enhance the presentation and communication of research findings. Visualization tools enable researchers to explore complex data visually, making patterns and relationships more comprehensible. Interactive platforms and websites engage audiences and encourage participation.

- Collaboration and Community Engagement: Digital scholarship thrives on collaboration and community engagement. Scholars often work together in teams, forming partnerships with libraries, museums, cultural institutions, and communities. Collaborative projects foster shared expertise, resource pooling, and collective problem-solving, amplifying the impact of research.

- Long-Term Preservation and Sustainability: Digital humanities emphasize the long-term preservation and sustainability of digital resources. Scholars strive to ensure that digital projects and datasets remain accessible and usable for future generations. They employ best practices for data management, metadata standards, and digital preservation strategies.

- Ethical Considerations: Digital scholarship raises important ethical considerations. Scholars must address issues such as privacy, consent,

representation, and power dynamics when working with digital sources, data, and communities. They should be conscious of bias, inclusivity, and the ethical implications of their methodologies and interpretations.

These principles form a foundation for the practice of digital scholarship and digital humanities, guiding researchers in their endeavors to explore and understand the human experience through the lens of digital technologies and methodologies.

## Digital Scholarship

Digital scholarship refers to the use of digital technologies and tools to enhance research, teaching, and learning in various academic and non-academic settings. It involves using digital resources to create, share, and analyze data and information in new and innovative ways.

Digital scholarship encompasses a wide range of activities, including digitization, data visualization, text mining, and social network analysis[30]. The goal of digital scholarship is to advance scholarship and research by utilizing the capabilities of digital technologies to improve efficiency, accessibility, and collaboration among scholars.

One example of digital scholarship is the digitization of historical documents and archives. By digitizing these materials, scholars can analyze and interpret them in new ways, such as using text mining to identify patterns and themes across large datasets. Another example is the use of data visualization tools to present complex data in an easily understandable format, allowing researchers to identify trends and patterns that may not be immediately apparent through traditional methods.

Digital scholarship has the potential to transform the way scholars conduct research and collaborate, ultimately advancing the field of academia as a whole[31]. It can increase access to resources, facilitate interdisciplinary collaboration, and promote the creation of new knowledge through the use of digital tools and techniques.

## History and development of digital scholarship

The history of digital scholarship dates back to the 1940s, with the development of electronic computers, but it wasn't until the 1980s and 1990s that it started to gain momentum. Early projects included digitizing works of Thomas Aquinas and ancient Greek and Roman texts, paving the way for the use of digital technologies in the humanities and social sciences. In the early 2000s, digital scholarship expanded to include new methods and techniques, such as data mining and analysis, leading to the development of new fields of study like digital humanities. Today, digital scholarship continues to evolve with the development of new tools and technologies that enable innovative research and collaboration, transforming academia as a whole.

## Characteristics of digital scholarship

Digital scholarship has several characteristics that distinguish it from traditional scholarship. These characteristics include:

*Use of digital technologies*: Digital scholarship utilizes digital technologies and tools to enhance research, teaching, and learning.

*Interdisciplinary*: Digital scholarship often involves collaboration between scholars from different disciplines, such as computer science, information science, and humanities.

*Collaboration*: Digital scholarship is often collaborative, with scholars working together to create, share, and analyze data and information.

*Openness*: Digital scholarship emphasizes openness and sharing, with scholars making

their research and data available to others through open access platforms and repositories.

*Innovation*: Digital scholarship encourages innovation and the development of new tools and techniques for research, teaching, and learning.

*Data-driven*: Digital scholarship is often data-driven, with scholars using digital tools to analyze and interpret large datasets.

*Efficiency*: Digital scholarship improves the efficiency of research and teaching by enabling scholars to access and analyze large amounts of data quickly and easily.

*Accessibility*: Digital scholarship promotes accessibility by making research and data available to a wider audience, including those who may not have had access to traditional scholarly resources.

*Impact*: Digital scholarship has the potential to have a greater impact on society and culture by enabling scholars to conduct research that is more relevant and responsive to contemporary issues and challenges.

Overall, the characteristics of digital scholarship reflect the ways in which digital technologies have transformed the research, teaching, and learning landscape, enabling scholars to work collaboratively, access and analyze large amounts of data, and make their research and data available to a wider audience.

## Examples of digital scholarship projects

Following are the examples of digital scholarship projects across various disciplines:

**Table 1: Various digital scholarship projects**

| Project | Description |
| --- | --- |
| The Digital Public Library of America (DPLA) | An online library that allows users to access a vast collection of digital materials, such as photographs, maps, and documents. These digital objects are sourced from libraries, archives, and museums located throughout the United States. |
| The Hathi Trust Digital Library | An online storage facility that contains millions of books and various other materials gathered from libraries globally. It provides access to out-of-print and hard-to-find books that would otherwise be inaccessible to researchers. |
| The Stanford Encyclopedia of Philosophy | An online encyclopedia that provides authoritative articles on a wide range of philosophical topics. |
| The Archaeology of the Americas Digital Library | A digital repository of archaeological data from North, Central, and South America. It provides access to primary data from archaeological excavations and surveys. |
| The Digital Atlas of Roman and Medieval Civilizations | An online resource that provides geographic and historical information about the Roman and medieval worlds. |
| The Mapping the Republic of Letters project | The Mapping the Republic of Letters project is a digital project that uses data visualization and mapping tools to analyze the correspondence networks of European intellectuals during the Enlightenment period. |

| The Our Marathon | The Boston Bombing Digital Archive project: The Our Marathon project is a digital archive of stories, photographs, and videos related to the Boston Marathon bombing in 2013. The project serves as a resource for researchers and the general public to better understands the impact of the bombing on the city of Boston. |
|---|---|

These examples demonstrate the diverse range of digital scholarship projects that are currently being undertaken. They emphasize the utilization of digital tools to enable the retrieval of information and resources, to visualize and scrutinize data, and to generate innovative insights and comprehension.

Digital scholarship and digital humanities offer several merits and demerits, which are outlined below:

**Merits and Demerits**

1. Increased Access: Digital scholarship and digital humanities enhance access to resources and research findings. Digital platforms allow for the dissemination of scholarly work to a broader audience, breaking down traditional barriers of time, location, and cost. It promotes inclusivity and democratizes knowledge by reaching individuals who may not have access to physical libraries or resources.

2. Collaboration and Interdisciplinarity: Digital scholarship fosters collaboration and interdisciplinary research. It encourages scholars from various disciplines to work together, bringing diverse perspectives and expertise to address complex research questions. This collaboration often leads to innovative approaches and new insights.

3. Data Analysis and Visualization: Digital humanities enable the analysis of large datasets and complex information. Researchers can employ computational tools and methods for data mining, text analysis, visualization, and network analysis. These approaches facilitate new discoveries, patterns, and interpretations that may not be readily apparent through traditional methods.

4. Preservation and Conservation: Digital scholarship facilitates the preservation and conservation of cultural heritage. By digitizing and archiving materials, scholars can safeguard fragile and rare artifacts, manuscripts, and documents, ensuring their long-term accessibility and mitigating the risks of physical deterioration.

5. Innovative Presentation and Engagement: Digital humanities provide innovative ways to present research findings. Multimedia elements, interactive visualizations, and immersive technologies engage audiences, enhancing comprehension and creating dynamic and interactive learning experiences. These digital tools enable scholars to communicate their work in engaging and accessible formats.

**Demerits**

1. Digital Divide: One of the significant demerits of digital scholarship is the digital divide. Unequal access to technology, high-speed internet, and digital resources can limit participation and hinder the potential impact of digital humanities initiatives.

Socioeconomic disparities, geographical constraints, and infrastructure limitations can exclude certain communities and individuals from fully engaging with digital scholarship.

2. Technological Challenges: Digital scholarship requires proficiency in digital tools, platforms, and methodologies. This can pose challenges for researchers who are less familiar with or lack access to the necessary technology and training. The learning curve associated with new technologies can also be time-consuming and may divert attention from the core research questions.

3. Quality Control and Evaluation: The proliferation of digital content can make quality control and evaluation challenging. With the ease of publishing and disseminating information online, the credibility and reliability of digital scholarship may vary. Ensuring rigorous peer review and maintaining scholarly standards in the digital realm can be a complex task.

4. Sustainability and Preservation: The rapid pace of technological advancements poses challenges for the long-term sustainability and preservation of digital scholarship. Formats and software become obsolete, requiring ongoing migration and maintenance efforts to ensure the accessibility and usability of digital resources over time. The potential loss of digital content due to technical failures, data loss, or changing platforms also presents a risk.

5. Ethical Concerns: Digital scholarship raises ethical concerns related to data privacy, consent, and representation. Researchers must navigate issues such as the use of personal data, protection of participants, and the potential for algorithmic bias in data analysis. Ensuring ethical practices and addressing these concerns in digital scholarship requires careful consideration and transparency.

It is important to note that while these demerits exist, efforts are being made within the field of digital scholarship and digital humanities to address these challenges and foster inclusivity, sustainability, and ethical practices.

## Benefits and limitations of digital scholarship

Digital scholarship offers benefits such as access to vast amounts of information, collaboration, efficiency, innovation, interdisciplinarity, and openness. However, it also has limitations such as the requirement for access to technology, a learning curve, varying data quality, perpetuating existing inequalities and creating a digital divide, and the need for digital preservation. Awareness of these limitations can help researchers address them and continue to advance digital scholarship for meaningful research and knowledge.

## Digital Humanities

The phrase Digital Humanities was coined just a couple of decades back Schreibman et al., 2004[22]. But it has gained significant attention among scholars in the humanities as well as professionals in library and information Science[1,15]. Digital Humanities (DH) is a field of study that uses digital tools and methods to analyze and interpret humanistic topics[6,7]. It is an interdisciplinary field that combines computer science, information science, and humanities disciplines such as literature, history, linguistics, and philosophy[12]. DH aims to apply computational methods to the study of human culture, history, and society in order to gain new insights and understanding. The Digital Humanities field is known for its robust

interdisciplinary nature and its intimate connection to computational linguistics and information science14,29. Publications in Digital Humanities are primarily interconnected by means of references to research in Computer Science, Linguistics, Psychology, and Pedagogical & Educational Research. (Gianmarco Spinaci, Giovanni Colavizza, Silvio Peroni,)10

## History and development

DH has its roots in the field of humanities computing, which emerged in the 1940s and 1950s with the development of computers and computational tools. In the 1960s, the field began to expand with the development of text encoding standards, electronic publishing, and digital archives. The term "Digital Humanities" was coined in the 1990s to describe the use of digital tools and methods in humanities research.

## Characteristics

Some of the key characteristics of DH include:

- Collaboration
- Digital tools and methods
- Access to data
- Interdisciplinary research
- Public engagement

## Examples of Digital Humanities Projects:

Some examples of Digital Humanities projects include:

**Table 2:** Various Digital Humanities projects

| | |
|---|---|
| The Digital Public Library of America (DPLA) | The DPLA allows users to access a vast collection of digital resources, such as books, photographs, and manuscripts, sourced from libraries, archives, and museums throughout the United States. |
| The Textual Communities project | The Textual Communities project is a digital archive of historical texts that enables researchers to explore the circulation of ideas and texts across different communities. |
| The Digital Thoreau project | The Digital Thoreau project uses digital tools to explore the writings of American author Henry David Thoreau. |
| The Viral Texts project | The Viral Texts project analyzes the spread of news and information in nineteenth-century American newspapers. |
| The Mapping the Republic of Letters project | The project uses data visualization tools to analyze the correspondence networks of European intellectuals during the Enlightenment period. |

Overall, Digital Humanities offers a unique approach to the study of human culture, history, and society, and has the potential to generate new insights and understanding by applying digital tools and methods to humanities research.

## Benefits and limitations of digital humanities

Digital humanities (DH) is an interdisciplinary field that offers benefits such as improved access to cultural artifacts and historical documents, preservation, collaboration, innovation, and engagement. However, DH also has limitations such as limited access to materials, technical expertise requirements,

biases in data, limitations of digital tools, and funding constraints. It is important for DH scholars to be aware of these limitations and challenges to ensure that DH projects have the desired impact.

## The Intersection of Digital Scholarship and Digital Humanities

Digital scholarship and digital humanities are two related but distinct fields that intersect in many ways. Here are some of the key intersections between digital scholarship and digital humanities:

- Digital tools and methods
- Data-driven research
- Interdisciplinary collaboration
- Open access
- Critical inquiry

Overall, the intersection of digital scholarship and digital humanities highlights the potential for interdisciplinary collaboration and innovation in using digital tools and methods to explore cultural and historical data.

## Overview of the relationship

Digital scholarship and digital humanities are related but distinct fields that intersect in many ways. Digital scholarship encompasses the use of digital tools and methods to enhance and transform scholarship across disciplines, while digital humanities focuses specifically on the application of digital tools and methods to explore cultural and historical data. Despite these differences, both fields rely on digital tools and methods to enhance scholarship, promote interdisciplinary collaboration, and open access to research and data. In practice, scholars in both fields often work together on projects that involve the use of digital tools and methods to explore cultural and historical data, highlighting the potential for interdisciplinary collaboration and innovation.

## Examples of projects that combine digital scholarship and digital humanities

The Digital Public Library of America, the Shelley-Godwin Archive, the Digital Atlas of Roman and Medieval Civilization, the Orlando Project, and the Stanford Literary Lab are examples of projects that combine digital scholarship and digital humanities. These projects involve collaboration between scholars from different disciplines and use digital tools and methods to enhance scholarship, analyze and interpret cultural and historical data, and promote open access to research and data.

## Benefits and limitations of combining digital scholarship and digital humanities

Combining digital scholarship and digital humanities has benefits such as interdisciplinary collaboration, innovation, accessibility, preservation, and open access. However, it also has limitations such as requiring technical expertise, funding constraints, potential biases, limitations of digital tools, and restricted access to certain materials. It is important for scholars to be aware of these limitations and work to mitigate them in order to fully realize the potential of digital scholarship and digital humanities.

## Challenges and Opportunities in Digital Scholarship and Digital Humanities

There are many challenges and opportunities in digital scholarship and digital humanities. Here are a few:

### Challenges

Digital scholarship and digital humanities face several challenges, including the digital divide, technical expertise, sustainability, access to technology, intellectual property & copyright issues, preservation & archiving, and diversity & inclusivity. Access to digital tools and resources can create barriers to collaboration and hinder innovative projects. Technical

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can help to advance scholarship and promote broader public engagement with the humanities.

In the years to come, it is likely that digital scholarship and digital humanities will continue to play an increasingly important role in scholarship and society, providing new tools and methods for generating and disseminating knowledge, and promoting engagement, innovation, and social justice.

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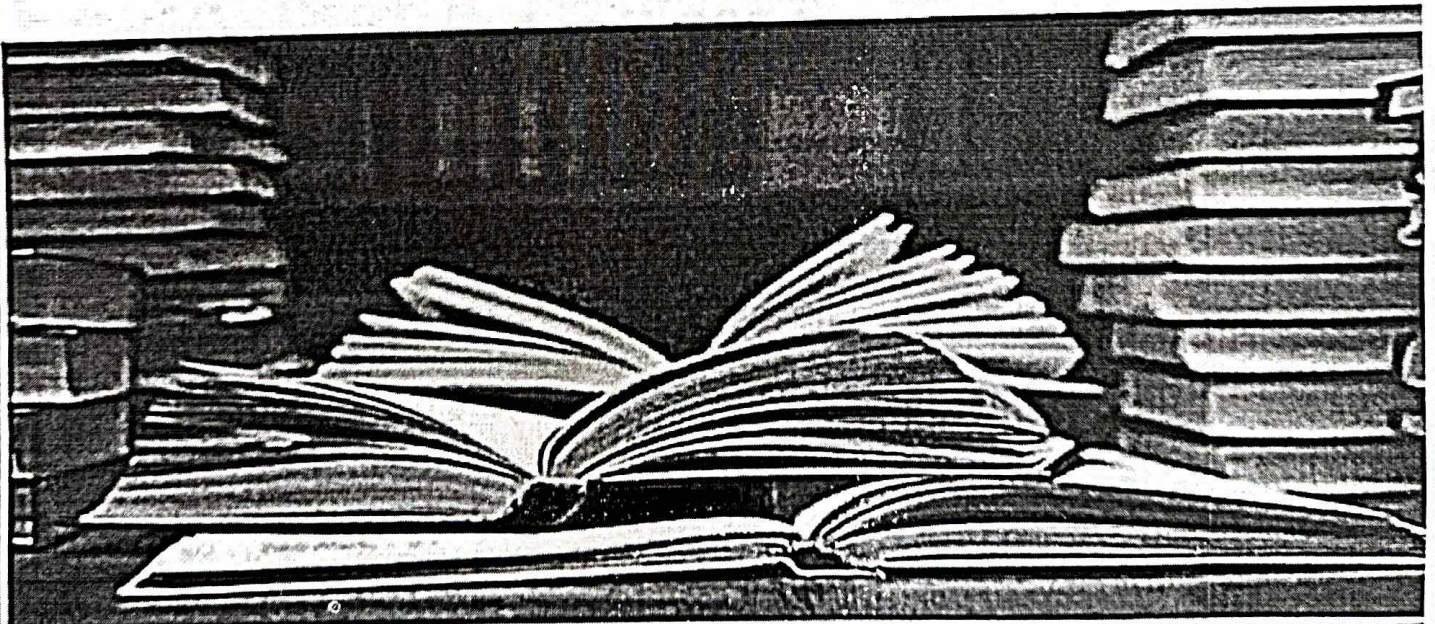
Dr Amandeep, mr. Gurjeet, mr Sumit

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# Alterations in Attributes of Chlorophyta in River Sutlej due to Confluence of Buddha Dariya

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Khalsa College for Women, Sidhwan Khurd

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## ABSTRACT

Phytoplankton in any aquatic body is the main component of the food chain as it occupies an exclusive position in the chain as producer. They consume much of the carbon dioxide in the atmosphere, fix it in organic matter by Photosynthesis and produce oxygen for non- Photosynthetic fauna. Aquatic life chiefly depends on producers such as Phytoplankton; thus, the richness of aquatic biodiversity depends upon the richness of Phytoplankton. Any Physiochemical change in the water affects plankton richness and in cascade, the biodiversity of that ecosystem is affected accordingly. So, it is a prime necessity to conserve Phytoplankton in order to sustain aquatic life and its diversity. This research mainly focuses on causes responsible for depletion and various practices that can successfullyenrich plankton in water bodies.

## INTRODUCTION

Water is a natural resource which is available for all the living organisms on the earth. Water serves as most important factor for all living things but fresh water is not always available for the living beings and also for ecosystem use [5][6]. Indian Rivers are continuously being polluted due to drainage of domestic waste, municipal sewage, industrial effluents and agriculture run-off, which keeps on degrading water quality of Indian rivers and makes it unsafe for drinking and for other purposes [7][8][9]. The domestic sewage and agriculture run-off are usually alkaline in nature due to ammonia compounds present in it while industrial waste can be acidic and alkaline[2].

In the Punjab region, River Sutlej receives a large amount of effluents from various industries and city sewage drain via Buddha Dariya and East Bein River which keeps on degrading water quality of the river at different stretches as pH, Turbidity, Total Alkalinity, Total Hardness, COD, BOD and dissolved carbon dioxide change gradually [1].
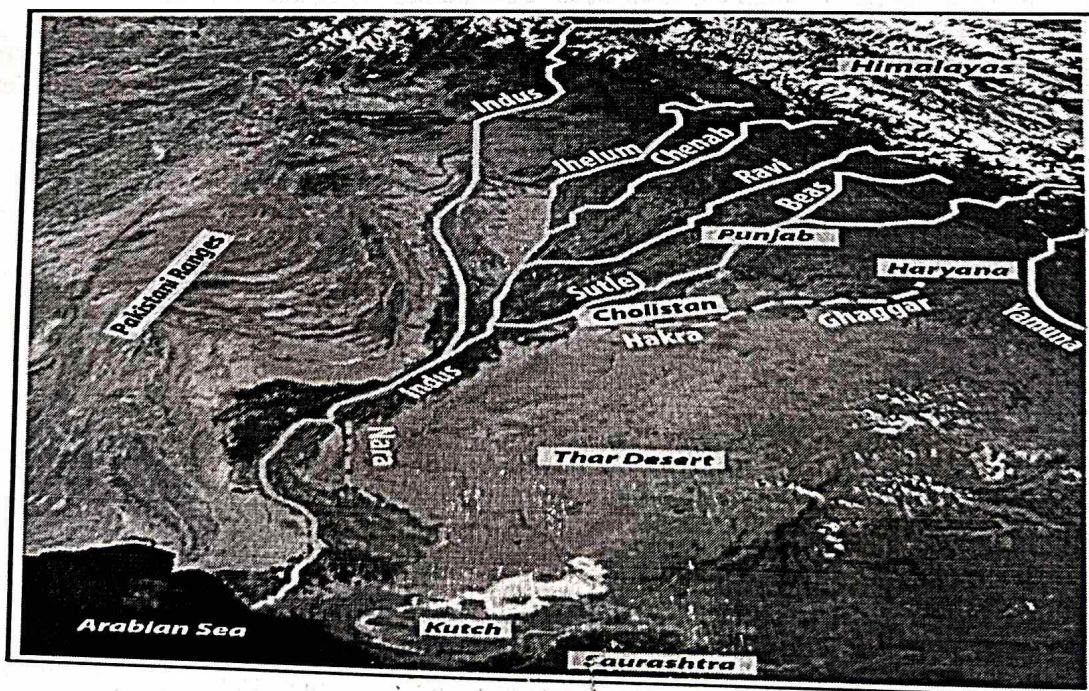


Image showing river Sutlej

December, January and February to estimate Chlorophyta. Water sample is collected from the depth of 3 meter in the river. Water sample preserved in a 125 ml glass jar with Lugol's iodine Solution. Lugol's iodine is prepared before a week from each sampling.

| Sr. No | Sampling depth | Sampling | Preservative | PH water | Temperature |
|--------|---------------|----------|-------------|----------|-------------|
| 1 | 3 meter | December | Lugol'siodine | 5.8- 6 | 17°C |
| 2 | 3 meter | January | Lugol'siodine | 6 | 16°C |
| 3 | 3 meter | February | Lugol'siodine | 6 to 6.1 | 16°C |

Each sample is preserved and kept under Low temperature to lowering the microbial activity. Sample kept remain undisturbed up to 24 hours so that planktons settled down properly.

Supernatant is siphoned out and sediment is further centrifuged. After centrifugation supernatant examined under microscope to check the presence and identification of Chlorophyta. The qualitative analysis of chlorophyta is based on frequency of occurrence in microscopic examination while quantitative analysis done by Sedge-wick-rafter cell counting chamber. Identification and characterisation of chlorophyta group is done as per instruction of National Institute of Oceanography [23].

## RESULT AND DISCUSSION

Phytoplankton concentrate from each sample are examined under microscope on 10X and 40X. Each sample is examined under microscope by preparing 10 slides for each sample for every time. The frequency of occurrence of Chlorophyta in each slide is recorded.

**Qualitative analysis:** - The qualitative analysis is purely based on random frequency of occurrence of microscopic organism under slide examination.

In the microscopic examination, we found the organisms related to the Cyanophyceae (blue green algae), Bacillariophyceae (Diatoms), Euglenophyceae in each sample and the absence of Chlorophyceae. The presence of abundance of blue green algae in river water sample indicating algal blooming that is killing the Chlorophyll bearing organism and other oxygen consumer organismalgroups.

**Sample- 1**

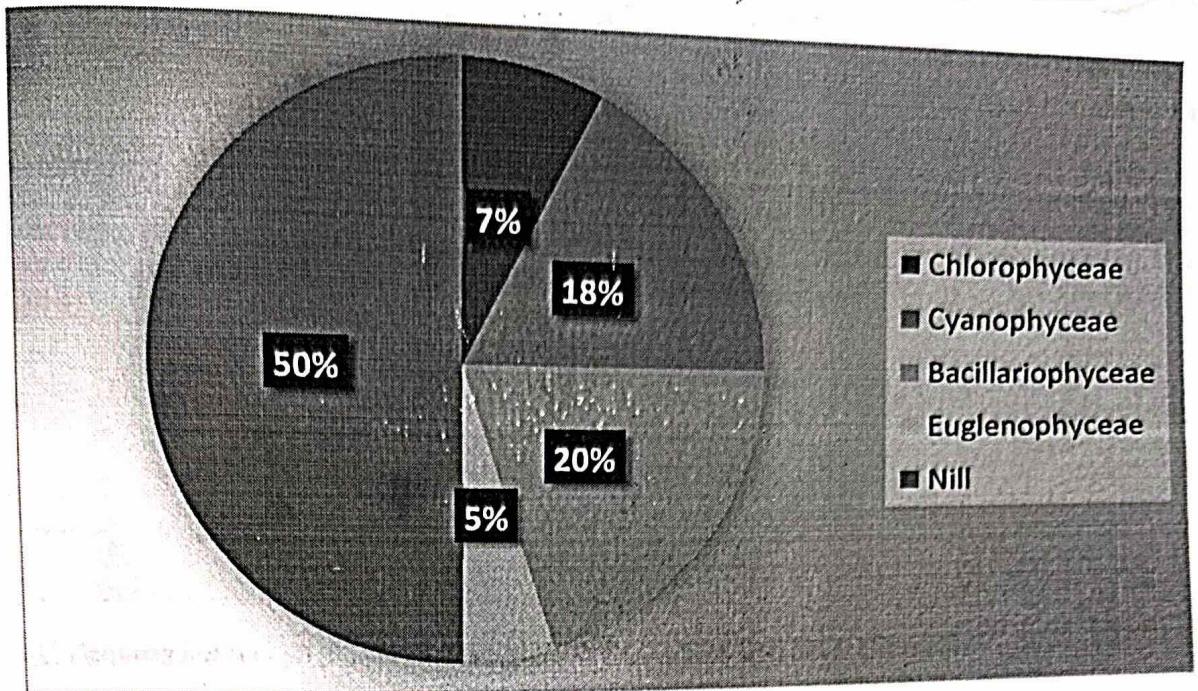| Slide No | Chlorophyceae | Cyanophyceae | Bacillariophyceae | Euglenophyceae |
|----------|---------------|--------------|-------------------|----------------|
| 1 | - | + | - | + |
| 2 | - | + | + | - |
| 3 | + | + | + | - |
| 4 | - | - | - | + |
| 5 | - | + | - | + |
| 6 | - | - | + | - |
| 7 | + | + | + | - |
| 8 | - | + | + | + |
| 9 | - | + | - | - |
| 10 | - | + | + | + |

Image- 1.2

Pie chart showing persentage of various phytoplankton groups

Sample 3

| Sfide No | Chlorophyceae | Cyanophyceae | Bacillariophyceae | Euglenophyceae |
|---|---|---|---|---|
| 1 | - | + | + | + |
| 2 | - | + | - | - |
| 3 | - | + | + | - |
| 4 | - | + | + | - |
| 5 | - | + | - | + |
| 6 | - | + | + | - |
| 7 | + | + | - | - |
| 8 | - | + | + | + |
| 9 | - | + | + | - |
| 10 | - | + | + | - |

| Sr. No | Phytoplanktons | Frequency of occurrence | Frequency % |
|---|---|---|---|
| 1 | Chlorophyceae | 1 | 2.5% |
| 2 | Cyanophyceae | 10 | 25% |
| 3 | Bacillariophyceae | 7 | 17.5% |
| 4 | Euglenophyceae | 3 | 7.5% |
| 5 | Nil(negative result) | 16 | 47.5% |

this qualitative analysis we found that the population of chlorophyceae among the phytoplanktons is very low. Other phytoplanktons such as cyanaphyceae and bacillariophycea's population are increasing with lowring of chlorophycean groups.

**Quantitative analysis:** - For the quantitative analysis Sedgwick rafter cell counting chamber is used. For this all three samples are mixed properly so that the population of chlorophyta cumulatively accounted. During quantitative analysis we found that the population density of Bacillerophyceae was very high and it counted as 4 cell per micro litre and about 4000000 or $4\times10^6$ cell per Litre. Beside this we found that the population density of chlorophyceae was very low as it was $3\times10^5$ cell Per Litre which is very low and indicating that how much the poor quality of water is.

| Sr.No | Phytoplankton | Total count per Litre |
|---|---|---|
| 1 | Chlorophyceae | $3\times10^5$ Per Litre |
| 2 | Cyanophyceae | $3\times10^6$ per Litre |
| 3 | Bacillerophyceae | $4\times10^6$ per Litre |
| 4 | Euglenophyceae | $2\times10^6$ per Litre |



Phytoplankton count per liter
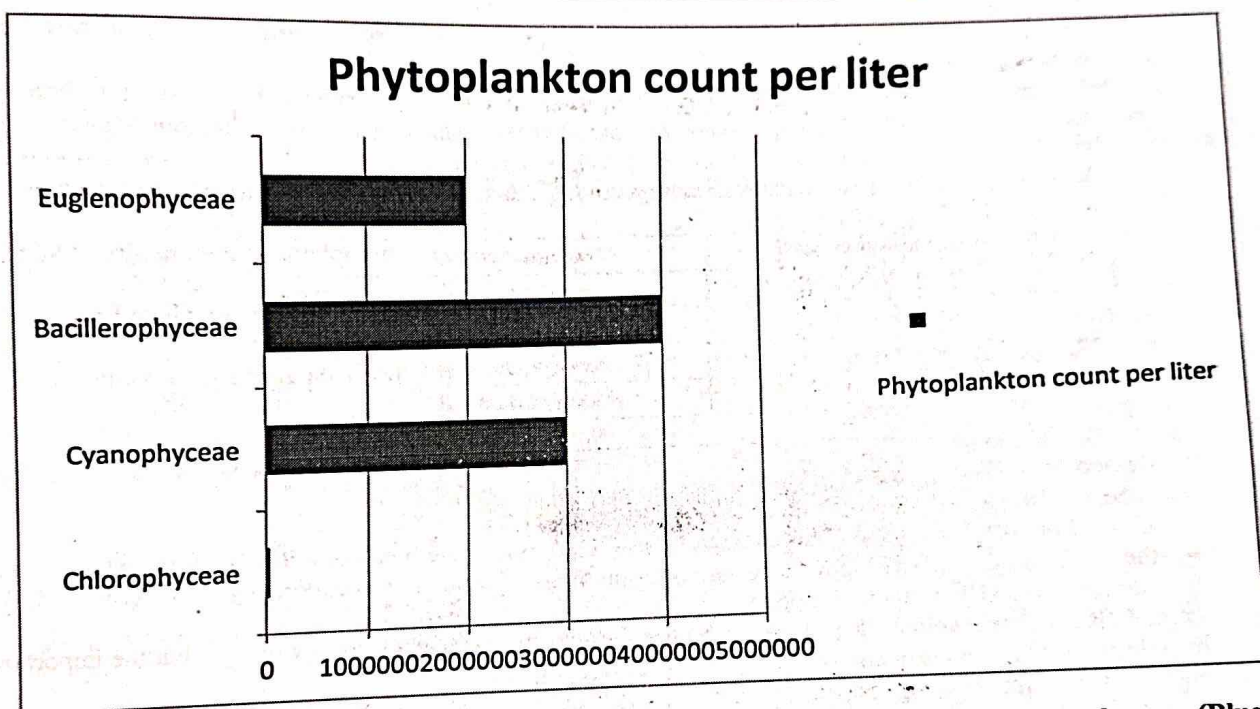
The very low population density of chlorophyceae and high population density of Cyanophyceae (Blue-green algae) in Sutlej River water indicating the deleterious condition for aquatic life.

In Qualitative examination we found negligible amount of Chlorophyta. This is due to the pH value of the River Sutlej water is about less than 6 which results in destruction of Chlorophyta groups. The low value of pH observed for this river is also due to the accumulation of free $CO_2$, higher respiratory activity, low photosynthetic activity, high rate of decomposition of organic matter and addition of rain water.

## CONCLUSION

The results from the quantitative and qualitative analysis show that the quality of river water in term of chlorophyta population is very poor. All these findings showing that River is dying slowly which is an alarming situation for us? Mainly Buddha Dariya is responsible for this situation. The water coming from Buddha Dariya carrying industrial, commercial, municipal, agricultural and domestic effluents changes the physical and chemical property of river water which results in lowering pH and increasing the Eutrophication which results algal bloom, which is killing the river gradually. Sewage water coming from Buddha Dariya should be treated properly. To prevent the seeping of sewage water from Buddha dariya, the base of Buddha Dariya should be concreted such as done in irrigation canal, along its entire length. A mega sewage treatment plant should be installed on the exit of Buddha Dariya from heavily populated city Ludhiana. Which is might be efficient in extracting harmful chemical and heavy metals before it drains into th River.

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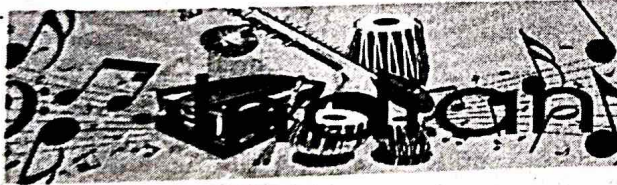*Dr Geitanjali Arora*

# B.Aadhar

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## हिंदुस्तानी संगीत में लोक संस्कृति एवग् लोक संगीत का संरक्षण

# July -2023

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# INDEX

## लोकसंगीत के विविध आयाम

### डॉ. गीतांजलि अरोहा

सहायक आचार्य, संगीत विभाग, खालसा कॉलेज फार वूमैन, सिधवांबुर्द, लुधियाना।

**भूमिका**

भारतीय संस्कृति एवं संगीत का अत्यंत घनिष्ठ एवं महत्वपूर्ण संबंध है।सदैव से ही संगीत के दो रूप प्रचलित रहे हैं।एक 'लौकिक' तथा दूसरा 'शास्त्रीय'।'लौकिक' संगीत का अभिप्रायः ऐसे संगीत से है, जो व्यक्ति विभिन्न सामाजिक अवसरों पर सब के मनोरंजन के लिए या कभी-कभी स्वयं के मनोरंजन के लिए स्वेच्छा से गाया करता है। अपने सुखात्मक एवं दुःखात्मक भावों की अभिव्यक्ति के लिए इस संगीत का प्रयोग करता है। प्राचीन काल में इसे 'देशी संगीत' के नाम से जाना जाता था। भरत काल में इसके लिए 'लोक' शब्द प्रचलित हुआ।'शारंगदेव' का कथन है कि किसी देश में उस देश के लोगों को रुचि के अनुसार मनोरंजन के लिए प्रयुक्त संगीत ही देशी संगीत है।[1] आज भी लोक संगीत को 'देशी' संगीत कहते हैं।

'लोक-संगीत' एक ऐसा माध्यम है, जो हमारे देश भारत को ही नहीं अपितु सम्पूर्ण विश्व को एक सूत्र में बांधे हुए है। जैसे ही हम भारतीय 'लोक-संगीत' की कल्पना करते हैं, तो पूरे देश का मानचित्र ही नेत्रों के सम्मुख आ जाता है। भारत में अनेक प्रान्त हैं, जिनका अपना अपना लोक संगीत है, अपनी अपनी भाषा है,जिससे उस प्रांत अथवा प्रदेश की पहचान होती है। भारतीय संगीत की ही भाँति लोक संगीत का क्षेत्र भी बहुत विस्तृत है। इसके अंतर्गत लोक गीत, लोक वाद्य, लोकनृत्य आते हैं।

लोक गीत किसी प्रदेश या जाति के हृदय का प्रकाश होते हैं। यह लोगों के मन में आए भावों,इच्छाओं, वेदनाओं इत्यादि के रूप में होते हैं, जो सहजतापूर्वक शब्दों को ओढ़कर रुपमान हो जाते हैं।

जिस प्रकार फूलों के साथ कांटे होते हैं, उसी प्रकार मानव जीवन में भी सुख-दुःख होते हैं। प्रत्येक प्रकार के अवसर पर लोक गीत गाए जाते हैं। जैसे जन्म के समय के गीत, विवाह के समय पर गाए जाने वाले गीत,घोड़ी,सेहरा,डोली, सुहाग आदि।पर्व,उत्सव, त्योहार आदि सभी लोक संगीत का विषय हो सकते हैं। गीतों का साथ देने के लिए तथा उन्हें और अधिक आकर्षित करने के लिए लोक वाद्यों का भी निर्माण हुआ तथा नृत्यों का भी प्रसन्नता के विभिन्न अवसरों पर आयोजन होने लगा।

लोक संगीत में वीर गाथाओं का अपना ही एक स्थान है। प्रत्येक प्रदेश की कुछ न कुछ ऐसी ऐतिहासिक घटनाएं होती हैं, जो कि इन गीतों में पाई जाती हैं। यह कथाएँ परंपरागत रूप से ही चली आ रही हैं। गीतों की कथाएं एवं कहानियों एक ऐतिहासिक बिन्दु से प्रारंभ होती हैं और समय के साथ साथलोक-भाषा अथवा लोकवाणी इन्हें आस्था, कल्पना तथा मनोरंजन के प्रसंगों से संवारती तथा निखारती रहती हैं।

**वार**

यह आवश्यक नहीं है कि वीरगाथाएं ऐतिहासिक ही हों, बल्कि युद्ध में वीरगति प्रास करने वाले योद्धाओं की गाथाएं भी ऐतिहासिक कथाओं की तरह ही गाई जाती हैं। जैसे'पंजाब'कीवारें।

वार का नायक कोई प्रसिद्ध ऐतिहासिक वीर ही होता है, जो अपने धर्म एवं कौम की रक्षा के लिए रणभूमि में जाता है। वहाँ आकर वह या तो जीत जाता है या फिर शहीद हो जाता है।

वार का मुख्य उद्देश्य उस गाथा में वर्णित नायक या नायिका की वीरता के यश को एक ऐसी धुन तथा लय में गाना होता है, जिससे कलाकार एवं श्रोताओं के मन में भी उत्साह भर जाए और वह भी अपने देश पर विपत्ति आने पर उस योद्धा नायक अथवा नायिका की ही भाँति लड़ने को तैयार हो जाएं। पुराने समय में राजाओं के मध्य लड़ाइयों

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[1]संगीत रत्नाकर : शांगदेव, डॉ.आर. के. श्रृंगे प्रेमलता शर्मा,मुंशीराम मनोहरलाल पब्लिशर्स प्रा.लि., नई दिल्ली, भाग एक- 1978, 1.1.23.

एवं मुद्द होते रहते मे। इसलिए उन्होंने अपने दरबार में वारें गाने वाले 'ढाढी' गायक रखे होते थे।ये योगा'नृ' व 'सारंगी' वाद्य का वादन करते हुए वीर रस से ओत-प्रोत काव्य तथा लोक धुनों का गायन करते थे।'ढह'वाद्य के विशेष भारक होने के कारण ही हम का नाम ढाढी पड़ गया। इन ढाढीयों का मुख्य कार्य प्रायः वार गायन ही रहा, जो लोक धुनों पर आधारित होती थी।ये सम्राटों पर आने वाले योद्धाओं की वारें बड़े जोश से सुनाते थे। फलस्वरूप सिपाही दुशमन से लड़ने के लिए तैयार हो जाते मे।

पंजाब मेंशहीद ऊधम सिंह,हरि सिंहमलवा, चंडी दी वार इत्यादि वारें आज भी बड़ी जोशीली एवं ओजस्वी वाणी में गाई जाती हैं। हरि सिंह नलवा की वार का एक अंश जिसमें उसकीवीरता का वर्णन है, निम्नलिखित है-

असफ़ांफ़रीजमणांकहण सारे
हरि सिंह दूसे सरदार ताई॥
जमाधारबेली, राजे साहब कोलो
कद ऊंचानुलंब सरकार ताई ॥

इसी तरह से कई प्रकार की वीर गाथाएं गाई जातीहैं।

**समय चक्र तथा ऋतु संबंधी लोक गीत**

इस श्रेणी के अंतर्गत पर्वों, त्योहारों और ऋतुओं से संबंधित लोक गीत गाए जाते हैं।वर्ष के 12 महीने होते हैं। इन्हें प्रायः तीन मौसमों के अंतर्गत समाविष्ट कर दिया गया है, जिन्हें ग्रीष्म काल,शीतकालऔर वर्षा काल कहा जाता हैपंजाबी गीतों में प्रायः 'बारहमाहा' शीर्षकके अंतर्गत रचनाएँ पाईजातीहैं। इन 'बारहमाहा' गीतों में मास विशेष की प्राकृतिक छटा, उसकी शीत-ताप और मानव मन पर उसके प्रभाव आदि का निरूपण किया जाता है। मनुष्य का प्रकृति से अत्यंत घनिष्ठ संबंध है।मानव प्रकृति की प्रशंसा में अनेक प्रकार के गीत गुनगुना उठता है।बारहमाहा और ऋतुओं से संबंधित काव्य रचनाएं लोकसाहित्य ही नहीं, उच्च साहित्य में भी मिलती हैं। संस्कृत के ग्रंथों विशेषकर 'रामायण' और 'महाभारत' महाकाव्यों में इस परंपरा का निर्वाह अनिवार्य रूपेण हुआ है। पंजाब में भी लोक संगीत के क्षेत्र में ही नहीं अपितु धार्मिक क्षेत्र में बारहमाहा को महत्त्व प्राप्त है। गुरु नानक देव जी तथा गुरु अर्जुन देव जी द्वारा रचित बारहमाहों का गायन भक्तों के हृदय को निरंतर रसमग्न करता आया है।[2]

**ऋतु से संबंधित गीत**

मानव एवं वर्षा ऋतु का भी अद्भुत संबंध है। ग्रीष्म से ऊबकर मानव वर्षा के बादलों की प्रतीक्षा करता है। इसलिए सावन माह का विशेष महत्त्व है। सावन से संबंधित अनेक प्रकार के लोक-गीत पाए जाते हैं, जिनका वर्णन इस प्रकार है-

1.साउणदा महीनाजी नी करदासोहरेजाण नूं
2.साउण माह,झड़ीयां गरमी झाड़ सुट्टी

**संस्कार संबंधी लोकगीत**

प्रत्येक धर्म जाति और वर्ग के अपने विशेष संस्कार होते हैं। ये मानव-जीवन के जन्म मरण के बीच मेंस्थितविविमिश्रआयामों के साथ जुड़े होते हैं। हर्षोल्लास से संबंधित संस्कारों में जन्म संबंधी गीत प्रचुरता से गाए जाते हैं। जन्म की घटना ही मानव जीवन में सर्वप्रथम मंगल संस्कार का रूप धारण करती है। ये गीत मुख्यतःस्त्री वर्ग में ही गाए जाते हैं।जैसे बच्चे के जन्म के समय घर का वातावरण हर्ष एवं उल्लास से भर जाता है। ऐसे अवसर पर पंजाब में निम्न लोक गीत गाया जावा है-

हरयानी माये हरयानी भैणें,
हरया तेभागी भरिया।
जिन विहाड़े मेरा हरया नी जिम्मा,
सोईयो विहाड़्या भागी भरिया।

**विवाह संबंधी लोक गीत**

[2]पन्नन गीता:पंजाब की संगीत परम्परा, राधा पब्लिकेशंज,अंसारी रोड, दरियागंज नई दिल्ली, 1988. पृ. 36.

भारत के सभी प्रदेशों, प्रत्येक वर्ग, प्रत्येक धर्म और प्रत्येक जाति में विवाह संस्कार बहुत महत्वपूर्ण माना जाता है। विवाह के अवसर पर भी प्रायः मनोरंजन एवं खुशी की अभिव्यक्ति के लिए गीत गायन की प्रथा प्रचलित है। ये गीत सामूहिक रूप से गाए जाते हैं और वाद्य के रूप में मुख्यतः ढोलक का ही प्रयोग होता है। इन लोक गीतों का इतना अधिक प्रभाव होता है कि इनके बिना विवाह की सारी रस्में अधूरी-सी प्रतीत होती हैं। इन लोक गीतों की समारंभ विवाह के कुछ दिनों पूर्व ही आरंभ हो जाती हैं और विवाह के पश्चात् भी कुछ दिनों तक चलती रहती हैं। वर पक्ष के गीतों को घोड़ीयां तथा वधू पक्ष के गीतों को सुहाग के गीत कहते हैं। अतः वर पक्ष एवं वधू पक्ष से संबंधित अत्यंत प्रचलित गीतों का वर्णन किया जा रहा है।

## सुहाग के गीत

सुहाग के गीत अत्यंत भावपूर्ण होते हैं। इनमें कन्या अपने माता पिता से अनुरोध करती है कि उसके लिए सुशील, धनी, सभ्रांत परिवार का वर ढूंढा जाए। जैसे-

बेटी। चनन दे ओहले ओहले क्यों खड़ी?
नी जाइये चनन दे ओहले ओहले क्यों खड़ी?
मैं ता खड़ी सां बाबुल जी दे बार,
बाबुल। वर लोड़ीये
बेटी केहो जेहा वर लोड़ीये?
नी जाइये केहो जेहा वर लोड़ीये?
बाबल जिउं तारियां विच चन्न,
चन्ना विच कान्ह, कन्हैया वर लोड़ीये।

## विदाई के गीत

पुत्री के वियोग की कल्पना से आकुल हृदय के भाव प्रायः इन गीतों द्वारा दर्शाए जाते हैं। इन गीतों में कन्या का ससुराल जाते समय अपनी सखियों से विदा मांगना इन गीतों को अत्यधिक करुणामयी और मर्मस्पर्शी बना देता है। पंजाब प्रांत में ऐसे अवसर पर निम्न गीत गाए जाते हैं-

साडुा चिड़ियां दा चम्बा वे,
बाबल असां उड़ जाणा।
साडी लम्बी उडारी वे,
बाबल केहड़े देस जाणा।

इस प्रकार के गीतों द्वारा अत्यंत करुणामयी भावनाओं का संचार होता है।

## घोड़ीआं

लोकगीत का यह प्रकार विवाह के अवसर पर वर पक्ष द्वारा गाया जाता है। विवाह के लिए प्रस्थान करते समय वर को घोड़ी पर बैठाकर ले जाने की प्रथा है। यह गीत भी अधिकतर स्त्रियों द्वारा ही गाए जाते हैं जैसे कि-

घोड़ीसोहदी काठीयां दे नाल, काठी डेढ़ तेहजार।
उमरावांदी तेरी चाल, मैं बलिहारी वे मौं दिया सुरजणां।

## सिट्ठणीआं

ये हास परिहास में रंजित गीत होते हैं, जो विवाह के उल्लासपूर्ण अवसर को और अधिक आकर्षक एवं रंगीन बनाते हैं। ये गीत भी प्रायः स्त्रियां तथा नवयुवतियां सामूहिक रूप में गाती हैं। जैसे-

कुड़ीतां साढी तिल्ले दी तार ऐ,
मुंडातां दिस दा कोई घुमिआरऐ,
जोड़ी तां फबदी नहीं।

## छन्द

वर जब विवाह के लिए ससुराल जाता है तो अवसर पाकर उसकी सालीयां और वधु की सहेलियां उसे घेर लेती हैं और हास-परिहास, व्यंग्य-विनोद से ओत-प्रोत संवाद आरंभ हो जाता है। यह संवाद प्राचीन काल में प्रायः छन्दों में हुआ करता था और इसके द्वारा वर की साहित्यिक अभिरुचि की परीक्षा भी हो जाती थी। अभी भी छन्द प्रायः रटे-

रटाये काव्य द्वारा हास-परिहास के वातावरण का निर्माण करते हैं। आज भी स्व-रचित तुकबंदी में अथवा पद्य का आभास देने वाली भाषा में सम्मान जताने की परंपरा है। परंपरा अनुसार चले आ रहे कुछ छंद इस प्रकार है -

छंद पराणे आईये, छंदपराणेवासीयां,
सोने या मैं महल चिणावां, बिच बिठावां सालीयां।
छंद पराणे आईये आईये, छंद पराणे पहीया,
पूजाकरता सुणावां, जे सस्ता देवे रुपइया।

इस प्रकार विवाह संबंधी सभी लोक गीतों द्वारा प्रेम, साहस, हर्ष, प्रसन्नता तथा सामूहिकता की भावना का संचार होता है, जो कि मानवीय रिश्तों को पुष्ट बनाने में, शांति एवं समृद्धि लाने में सहायक होती हैं।

### मृत्यु संबंधी गीत

मनुष्य के जीवन का अंत होने पर भी गीत गाए जाते हैं। इन गीतों के माध्यम से दुख के प्रभाव को दूर करने का प्रयास किया जाता है। इन गीतों या रचनाओं में ऐसे विचार होते हैं, जिनको सुनने से शोक संतप्त परिजन को सांत्वना मिलती है। पंजाब में इन गीतों को 'वैण' तथा 'अलाहणे' कहते हैं। जब स्त्री अकेली गाती है, तो 'वैण' कहते हैं, परन्तु जब स्त्रियां सामूहिक रूप में गाती हैं तो उसे 'अलाहणे' कहते हैं। 'श्री गुरु ग्रंथ साहिब' में भी अलाहणे संकलित हैं, जिनमें पांच गुरु नानक देव जी द्वारा रचित हैं। ये अलाहणे राग वड़हंस शीर्षक के अंतर्गत हैं और सिखों द्वारा गाए जाते हैं। अलाहणे को भैरवी राग में गाने की प्रथा है। वैण भैरवी राग में गाए जाते हैं। इस राग के स्वरों में करुण वातावरण के सृजन की विशेष क्षमता है। प्रिय व्यक्ति के वियोग से उत्पन्न शोक के अवसर पर गाए जाने वाले इन गीतों के द्वारा उसके परिवार के सदस्यों का हौसला दिया जाता है। इन गीतों द्वारा उनमें माहस आदि भावनाओं का संचार होता है।

### उपसंहार

लोक संगीत सांस्कृतिक विस्तार हेतु एक उत्तम साधन हो सकता है। लोक संगीत की भाषा भी सरल होती है तथा इसकी धुनें भी सरल होती हैं। जिसकारण साधारण जनता भी सुगमतापूर्वक इनको समझ कर आनंद लेती है। लोक संगीत सुनने एवं समझने वाले लोगों की संख्या भी अधिक है। वैसे भी प्रत्येक व्यक्ति अपने प्रांत, गांव के साधारण संगीत अथवा लोक संगीत से जुड़ा होता है तथा परिचित होता है। साधारण व्यक्ति आज भी लोक संगीत को अधिक से अधिक मात्रा में सुनना चाहता है। अत: लोक संगीत के अंतर्गत इन गीतों वाद्यों नृत्यों को कलाकार पुन:साधारण जनता में प्रचलित कर प्रेम, भातृत्व जैसी उच्च भावनाओं का संचार करने का प्रयास करें। कलाकार अपने परिश्रम द्वारा स्थान-स्थान पर भ्रमण कर लोक संगीत के इन तत्वों एवं ज्ञान को विश्व के कोने कोने में पहुँचाएं। लोगों के हृदयों से भय, हिंसा, कलुषता को मिटाकर शांति का संदेश फैलाएं तथा लोक संगीत के माध्यम से जनसाधारण का नैतिक उत्थान करने में अपना सहयोग दें।

'पन्जाब गीता:पंजाब की संगीत परम्परा, राधा पब्लिकेशंज,अंसारी रोड, दरियागंज नई दिल्ली, 1988, पृ. 43.

*mrs. Jaspreet Kaur*

# Gurmukhi Text: A Dataset for Natural Scene Gurmukhi Text Detection and Recognition

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*Abstract*

Digitization of text plays a vital role in the area of image processing and pattern recognition. However, recognizing text from natural scene has become a challenging task for the researchers due to the challenges of the natural scene along with the lack of benchmark datasets. Public datasets are available for the Latin and Arabic scripts which are useful for research in the field of natural scene text recognition. But for Gurmukhi script no public dataset is available for natural scene text. This paper introduces a new dataset for the natural scene Gurmukhi text images. Dataset contains 500 images of Gurmukhi text which can be used to test the system against different challenges. Dataset contain complete scene images and can be used for script identification, detection and recognition for Gurmukhi. This paper also provides a survey of benchmark public datasets available for natural scene text recognition.

*Keywords: recognition, Gurmukhi, identification, benchmark*

## Introduction

Natural scene text recognition portrays the computer's ability to digitize text which further can be processed for various applications such as geo-localization, label recognition, to facilitate tourists through translation in the global language. Many benchmark datasets such as ICDAR 03, 05, 11, 13 [1], incidental Scene Text' [2], SVT [3], NEOCR [4], MSDR-500[5] have been published which played major role for research in Latin script recognition. However, very negligible work is done for non-Latin scripts especially for Gurmukhi script in case of natural scene text recognition as no benchmark dataset is available. Major role of this research is provide a public dataset of Gurmukhi text images which can be used for testing of existing techniques along with development of new ones.

## Gurmukhi Script

Gurmukhi script is used for writing Punjabi language which is very popular language in India and Pakistan. Around 100,000,000 people around the world use Punjabi language and this is the tenth most widely spoken language around the world. Gurmukhi follows cursive structures and written from left to right direction. There are some distinctive features of Gurmukhi script as a) It uses three zones ie. upper, middle and lower for its text formation. b) there is no uppercase or lowercase letters in Gurmukhi. The key contribution of our work is a development of a dataset for Gurmukhi which will help the researchers to contribute in this field.

## Dataset Collection

As no benchmark dataset exists for natural scene Gurmukhi textual images, therefore we have collected experimental dataset of natural scene images using different smart phones having minimum 8 megapixel camera. Images of signboards, banners, pamphlets, hoarding, and text written on walls, book covers, charts or other natural scene containing text are captured. Our Dataset consists of 500 images of natural scene images that are available in our surrounding such as schools, gurdwaras, street signboards, banners, flex boards, bus-stands,

storefronts and also from book covers that are complex in nature. Images are captured in different lightening conditions as taken from both indoor and outdoor scenes. Our dataset covers a broad range of aspects which distinguishes real world images from scanned images. Dataset is enriched with images of different alignments and orientations, noise, blurring, uneven lightening, shadows as well as different font size and style, caused by natural scene and mobile camera. However, natural scene images contain both handwritten and machine printed text which makes text detection and recognition process more cumbersome due to different writing styles and fonts. Images captured from streets, which consist of a large variety of complicated real-world scenarios, e.g., store fronts and landmarks, making the challenge extreme high by narrowing gaps between research and real applications. Dataset contains images based on the conditions and challenges related with textual image which are: normal, low light, shadow, blurring, noise, curved, multi oriented, skewed, perspective distortion, and cluttered background. Therefore, Dataset can be used as a benchmark to test the performance of GurmukhiOCR against different challenges.

Sample images from the collected dataset are shown in the Figure 1 that show various challenges related with complexity of natural scene images.



Figure 1: Dataset Sample Images

## Literature Survey on benchmark Datasets for Natural Scene Text Detection

Several benchmark datasets are available for detection of text from natural scene images for both Latin and non-Latin scripts. These benchmark algorithms can be used to evaluate text detection algorithms for natural scene images.

ICDAR [1] has three variants. ICDAR' 03 started out with 509 camera taken scene text images. All the scene texts in the dataset appear in horizontal orientation. In ICDAR'11, the total number of images were reduced to 484 to eliminate duplication in the previous version. ICDAR'13 further trimmed down the 2011 version to 462 images of horizontal English text only, improvement was done to increase its text categories and tasks. Recently, ICDAR launched a new challenge named as the 'incidental Scene Text' [2] which is based on 1670 images captured with wearable devices. It is more challenging than previous datasets as it has included text with arbitrary orientation and most of them are out of focus.

Street View Dataset (SVT) [3] contains 350 pictures captured from Google Street View and annotated at word level using Axis aligned bounding boxing. This dataset has not annotated all instances of text.

NEOCR: Natural Environment OCR Dataset [4] consists of 659 real world images with 5238 annotated bounding boxes (text fields). Dataset is collected by different persons independently so contains broad range of characteristics which distinguish natural scene images from document text. All text recognizable by humans has been annotated for all images.

MSRA Text Detection 500 Database [5] is collected and released publically as a benchmark to evaluate text detection algorithms for Chinese and English scripts. Images are taken from both indoor and outdoor scenes such as offices, malls and streets which are mainly focused on billboards, guideboards, caution plates etc. Dataset is challenging due to the presence of complex backgrounds, multi-orientations, color and size of text. Dataset contain total 500 natural scene images from which any random 300 can be used as training set and other 200 for testing set.

CUTE80 [6] dataset is created with 80 complex background, curved text line images having low resolution and perspective distortion issues. This dataset is a benchmark to test the performance of a method against curved and low resolution text images of English.

COCO-Text Dataset [7] is the largest dataset available with 63686 annotated images and 173589 text instances. The source of images is Microsoft COCO dataset. Images are having versatile properties such as blurriness, clarity and both handwritten and machine printed.

Total-Text Dataset [8] is a comprehensive scene text dataset which contains 1555 images which are collected from internet sources and captured from real world scenes that put emphasis on curved text images which is a missing feature in most of the available datasets as those focus on horizontal and multi-oriented text. Total-Text is created with diversified orientation images and almost fifty percent pictures contain more than two orientations. It is annotated for three different tasks: detection, recognition, and segmentation. English is the only annotated language; the rest of the language was labelled as 'do not care' region.

RCTW17 [9] dataset is designed with more than 12000 images along with complete annotations which are created using polygon box drawing around the text. Location and transcription of text is also included in the annotations.

CTW [10] is a large dataset having Chinese text images which are annotated at character level. Dataset ignores other languages text present in the images and annotates only Chinese text.

CTW1500 [11] is created with curved text Chinese images where each image contains at least one curved text along with arbitrary orientations.

Large Scale Street View Text with Partial Labelling (LSVT) [12] consists of 20,000 testing data, 30,000 training data in full annotations and 400,000 training data in weak annotations, which are referred to as partial labels. For most of the training data in weak labels, only one transcription per image is provided, which is referred as 'text-of-interest'.

Table 1: A Comparison of Publically Available Natural Scene Text Datasets

| Dataset | Year | Language | Number of Images | Training Images | Testing Images | Text Orientation | Annotation |
|---|---|---|---|---|---|---|---|
| ICDAR 2003 | 2003 | English | 509 | 258 | 251 | Horizontal | Word |
| SVT | 2010 | English | 350 | 100 | 250 | Arbitrary | Word |
| ICDAR 2011 | 2011 | English | 484 | 229 | 255 | Horizontal | Word/Characte |

Additionally, the paper provides a valuable survey on benchmark public datasets available for natural scene text recognition, offering insights and comparisons that can guide further research initiatives. The dataset, captured under various real-world scenarios and exhibiting the complexities inherent in natural scene images, has the potential to significantly contribute to the research community by driving advancements in text recognition algorithms and techniques, especially for Gurmukhi script.

In future works, the potential enhancement of this dataset with more diversified examples and exploring machine learning or deep learning models for improved recognition of Gurmukhi script from natural scene images would be highly beneficial. Further, the application of these advancements in practical use-cases like real-time translation or navigation assistance can be explored.

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# ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਅਤੇ ਆਨਲਾਈਨ ਗਿਆਨ ਸਰੋਤ

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ਵਿਮੈਨ, ਸਿੱਧਵਾਂ ਖੁਰਦ
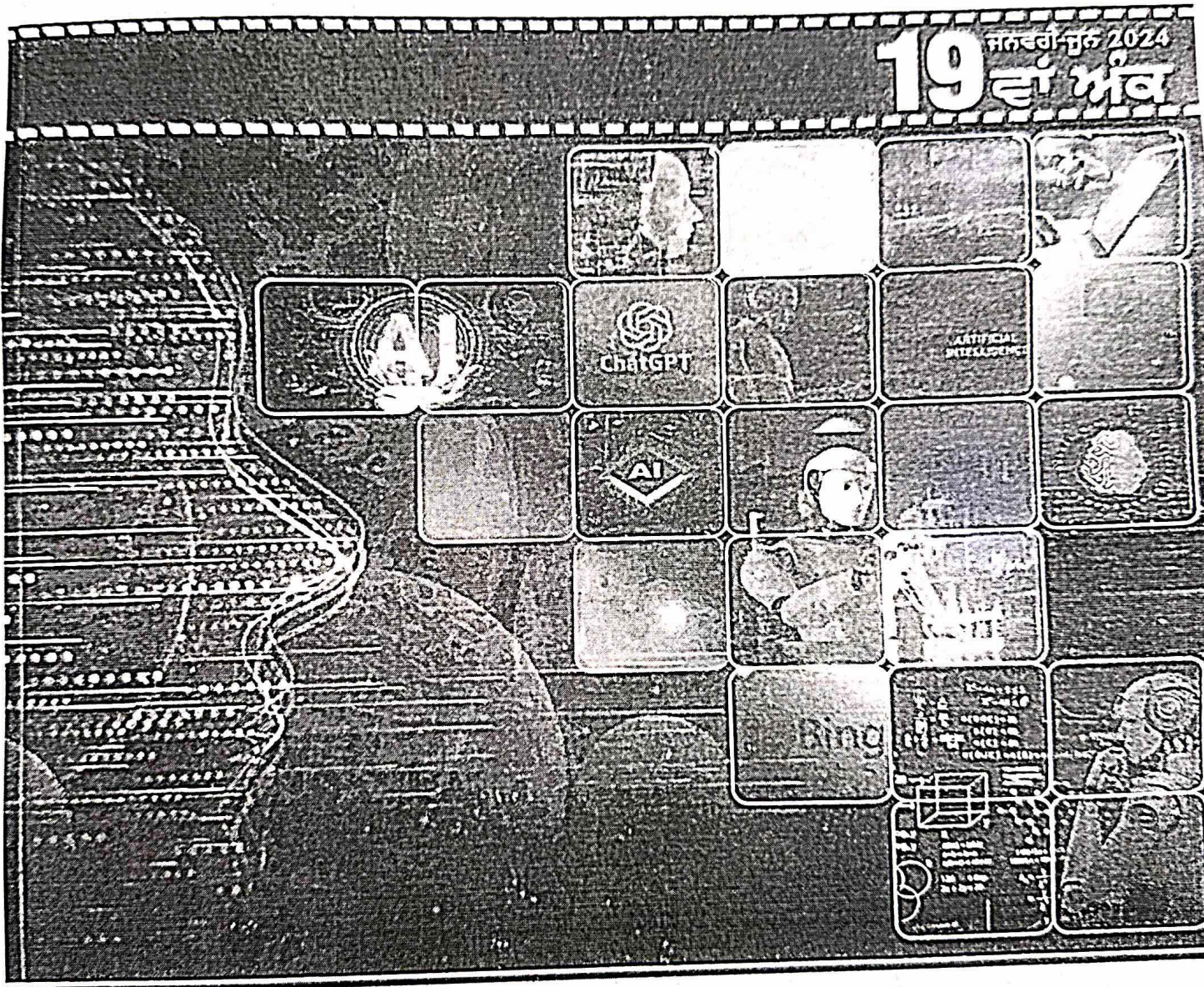
ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਜਾਂ ਬਣਾਉਟੀ ਬੁੱਧੀ ਤੋਂ ਭਾਵ ਮਸ਼ੀਨਾ ਅਤੇ ਸਾਫਟਵੇਅਰ ਅਧਾਰਿਤ ਬੁੱਧੀ ਹੈ। ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਦੇ ਪਿਤਾਮਾ ਪ੍ਰੋਫ਼ੈਸਰ ਜੌਹਨ ਮੈਕਕਾਰਥੀ ਅਨੁਸਾਰ ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ "ਬੁੱਧੀਮਾਨ ਮਸ਼ੀਨਾਂ ਬਣਾਉਣ ਦਾ ਵਿਗਿਆਨ ਅਤੇ ਇੰਜੀਨੀਅਰਿੰਗ"[1] ਹੈ। ਸਮਕਾਲ ਵਿਚ ਮਨੁੱਖ ਦੇ ਸੋਚਣ, ਵਿਸ਼ਲੇਸ਼ਣ ਕਰਨ, ਯਾਦ ਰੱਖਣ ਦਾ ਕੰਮ ਮਨੁੱਖ ਦੀ ਬੁੱਧੀ ਦੀ ਥਾਂ 'ਤੇ ਕੰਪਿਊਟਰ ਭਾਵ ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਵੱਲ ਰੁਝਾਨ ਵਧ ਰਿਹਾ ਹੈ। ਅੱਜ-ਕੱਲ੍ਹ ਸਰਕਾਰ, ਉਦਯੋਗ, ਸੁਰੱਖਿਆ, ਟਰਾਂਸਪੋਰਟ, ਸਿੱਖਿਆ, ਗਿਆਨ ਆਦਿ ਖੇਤਰਾਂ ਵਿਚ ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਦੀ ਵਰਤੋਂ ਵੱਡੇ ਪੱਧਰ 'ਤੇ ਹੋ ਰਹੀ ਹੈ। ਇਸ ਖੋਜ ਪੱਤਰ ਵਿਚ ਸਾਡੇ ਸਾਹਮਣੇ ਸਵਾਲ ਇਹ ਹੈ ਕਿ ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਗਿਆਨ ਦੇ ਖੇਤਰ ਵਿਚ ਕਿਵੇਂ ਕੰਮ ਕਰਦੀ ਹੈ। ਆਮ ਕਰਕੇ ਮੰਨ ਲਿਆ ਜਾਂਦਾ ਹੈ ਕਿ ਜਦੋਂ ਮਨੁੱਖੀ ਬੁੱਧੀ ਕਿਸੇ ਡਾਟੇ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰਦੀ ਹੈ ਤਾਂ ਉਸ ਵਿਚ ਅਧਿਐਨ ਕਰਨ ਵਾਲੇ ਦੀ ਨਿੱਜਤਾ, ਭਾਵੁਕਤਾ ਆਦਿ ਸ਼ਾਮਿਲ ਹੋ ਜਾਂਦੀ ਹੈ ਅਤੇ ਡਾਟੇ ਦੇ ਵਿਸ਼ਲੇਸ਼ਣ ਤੋਂ ਪ੍ਰਾਪਤ ਹੋਣ ਵਾਲੇ ਸਿੱਟਿਆਂ ਨੂੰ ਪ੍ਰਭਾਵਿਤ ਕਰਦੀ ਹੈ। ਇਹ ਵੀ ਕਿਹਾ ਜਾ ਸਕਦਾ ਹੈ ਕਿ ਮਨੁੱਖੀ ਬੁੱਧੀ ਡਾਟੇ ਦੇ ਅਧਿਐਨ ਸਮੇਂ ਆਪਣਾ ਕੋਈ ਨਿਜ ਹੋਣ ਕਰਕੇ ਜਾਂ ਕੋਈ ਭਾਵੁਕ ਸਾਂਝ ਹੋਣ ਕਰਕੇ ਨਤੀਜਿਆਂ ਨੂੰ ਕੋਈ ਵੱਖਰਾ ਕੋਣ ਦੇ ਸਕਦੀ ਹੈ। ਇਹਨਾਂ ਵਿਚਾਰਾਂ ਦੇ ਆਧਾਰ 'ਤੇ ਇਹ ਕਿਹਾ ਜਾ ਸਕਦਾ ਹੈ ਕਿ ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਨਿਰੋਲ ਰੂਪ ਵਿਚ ਮਸ਼ੀਨ ਅਧਾਰਿਤ ਹੋਣ ਕਰਕੇ ਉਹ ਨਤੀਜੇ ਦੇਣ ਦੇ ਕਾਬਿਲ ਹੈ ਜਿਸ ਵਿਚ ਮੰਨਿਆ ਜਾਂਦਾ ਹੈ ਕਿ ਮਨੁੱਖੀ ਬੁੱਧੀ ਕਿਤੇ ਨਾ ਕਿਤੇ ਆਪਣਾ ਪੱਖ-ਪਾਤ ਕਰ ਸਕਦੀ ਹੈ। ਇਸ ਪੇਪਰ ਵਿਚ ਗਿਆਨ ਅਤੇ ਸੂਚਨਾ ਦੇ ਖੇਤਰ ਵਿਚ ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਦੀ ਕਾਰਜ ਵਿਧੀ, ਇੰਟਰਨੈੱਟ 'ਤੇ ਉਪਲਬਧ ਗਿਆਨ ਸਰੋਤਾਂ ਦੀ ਰਾਜਨੀਤੀ ਅਤੇ ਇਸ ਰਾਜਨੀਤੀ ਤੋਂ ਪ੍ਰਭਾਵਿਤ ਹੋਣ ਵਾਲੇ ਨਤੀਜਿਆਂ ਨੂੰ ਸਮਝਣ ਦਾ ਜਤਨ ਕਰਾਂਗੇ।

ਅਜੋਕੇ ਸਮੇਂ ਵਿਚ ਇੰਟਰਨੈੱਟ ਦੇ ਯੁੱਗ ਵਿਚ ਗਿਆਨ ਜਾਂ ਜਾਣਕਾਰੀ ਦੇ ਵੱਡੇ ਸਰੋਤ ਵੱਖ-ਵੱਖ ਸਰਚ ਇੰਜਣ ਮੰਨੇ ਜਾਂਦੇ ਹਨ। ਇਹ ਸਰਚ ਇੰਜਣ ਵੱਖ-ਵੱਖ ਸਰਵਰਾਂ ਉੱਪਰ ਬਾਈਨਰੀ ਭਾਸ਼ਾ ਵਿਚ ਉਪਲੱਬਧ ਡਾਟੇ ਨੂੰ ਪ੍ਰੋਸੈਸ ਕਰਕੇ ਮੰਗੀ ਗਈ ਜਾਣਕਾਰੀ ਅਨੁਸਾਰ ਨਤੀਜਾ ਦਿੰਦੇ ਹਨ। ਡਾਟੇ ਨੂੰ ਪ੍ਰੋਸੈਸ ਕਰਨ ਲਈ ਬਹੁਤ ਸਾਰੇ ਐਲਗੋਰਿਦਮ ਵਰਤੇ ਜਾਂਦੇ ਹਨ। ਅੱਜ ਦੇ ਯੁੱਗ ਵਿਚ ਵਰਤੇ ਜਾਣ ਵਾਲੇ ਐਲਗੋਰਿਦਮ ਮਸ਼ੀਨ ਲਰਨਿੰਗ ਅਤੇ ਡੀਪ ਲਰਨਿੰਗ ਉੱਪਰ ਅਧਾਰਿਤ ਹਨ। 'ਇਹ ਐਲਗੋਰਿਦਮ ਉਹਨਾਂ ਸਵਾਲਾਂ ਦੇ ਜਵਾਬ ਦੇਣ ਲਈ ਵੱਧ ਤੋਂ ਵੱਧ ਵਰਤੇ ਜਾਂਦੇ ਹਨ ਜਿਨ੍ਹਾਂ ਦਾ ਕੋਈ ਇਕ ਸਹੀ ਉੱਤਰ ਨਹੀਂ ਹੈ ਸਗੋਂ ਇਕ

ਤੋਂ ਵਧੇਰੇ ਸਹੀ ਉੱਤਰ ਹੁੰਦੇ ਹਨ। ਇਹ ਐਲਗੋਰਿਦਮ ਸਿਰਫ਼ ਮਨੁੱਖ ਵੱਲੋਂ ਦਿੱਤੇ ਡਾਟੇ ਨੂੰ ਪ੍ਰੋਸੈਸ ਕਰਕੇ ਨਤੀਜਾ ਦਿੰਦੇ ਹਨ'। ਇੱਥੇ ਸਵਾਲ ਇਹ ਪੈਦਾ ਹੁੰਦਾ ਹੈ ਕਿ ਜੋ ਡਾਟਾ ਵੱਧ-ਘੱਟ ਸਰਵਰਾਂ ਉੱਪਰ ਪ੍ਰੋਸੈਸ ਹੁੰਦਾ ਹੈ ਜਿਸ ਨੂੰ ਕਿਸੇ ਵੀ ਸਰਚ ਇੰਜਣ ਨੇ ਐਲਗੋਰਿਦਮ ਦੀ ਮਦਦ ਨਾਲ ਪ੍ਰੋਸੈਸ ਕਰਕੇ ਢੋਈ ਜਾਣਕਾਰੀ ਗਿਆਨ ਦੇਣੀ ਹੈ, ਕੀ ਉਹ ਡਾਟਾ ਨਿਰਪੱਖ ਹੈ? ਕਿਸੇ ਇੱਕ ਵਿਸ਼ੇਸ਼ ਧਿਰ ਦਾ ਪੱਖ ਤਾਂ ਨਹੀਂ ਪੂਰ ਰਿਹਾ ਸਰਵਰਾਂ ਉੱਪਰ ਉਪਲਬਧ ਡਾਟੇ ਉੱਪਰ ਕਿਸੇ ਇੱਕ ਵਰਗ ਦੀ ਇਜਾਰੇਦਾਰੀ ਤਾਂ ਨਹੀਂ। ਇਸ ਤਰ੍ਹਾਂ ਆਰਟੀਫੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਦੌਰ ਵਿਚ ਕੋਈ ਵੀ ਸਾਫਟਵੇਅਰ ਜਾਂ ਮਸ਼ੀਨ ਮਨੁੱਖ ਵੱਲੋਂ ਵਰਚੁਅਲ ਸੰਸਾਰ ਉੱਪਰ ਅਪਲੋਡ ਕੀਤੇ ਡਾਟੇ ਨੂੰ ਵੱਖ-ਵੱਖ ਐਲਗੋਰਿਦਮਾਂ ਦੀ ਮਦਦ ਨਾਲ ਪ੍ਰੋਸੈਸ ਕਰਕੇ ਨਤੀਜੇ ਦਿੰਦੇ ਹਨ। ਇਸ ਖੋਜ ਪੇਪਰ ਵਿਚ ਸਰਵਰਾਂ ਉੱਪਰ ਉਪਲਬਧ ਡਾਟੇ ਦਾ ਅਧਿਐਨ ਕਰਨ ਦਾ ਵੀ ਯਤਨ ਕਰਾਂਗੇ।

ਇੰਟਰਨੈੱਟ ਟੈਕਨਾਲੋਜੀ ਅਮਰੀਕੀ ਫੌਜ ਵੱਲੋਂ ਆਪਣੇ ਸੰਦੇਸ਼ ਭੇਜਣ ਦੀ ਲੋੜ ਵਿਚੋਂ ਉਪਜਦੀ ਹੈ ਅਤੇ ਨਿਰੰਤਰ ਵਿਕਾਸ ਕਰਦੀ-ਕਰਦੀ ਅੱਜ ਇਸ ਸਥਿਤੀ ਵਿਚ ਪਹੁੰਚ ਜਾਂਦੀ ਹੈ ਕਿ ਮਹਿਸੂਸ ਹੁੰਦਾ ਹੈ, ਜਿਵੇਂ ਇੰਟਰਨੈੱਟ ਦੀ ਅਣਹੋਂਦ ਮਨੁੱਖੀ ਜੀਵਨ ਵਿਚ ਇਕ ਵੱਡੀ ਰੁਕਾਵਟ ਬਣ ਸਕਦੀ ਹੈ। ਸਤਹੀ ਪੱਧਰ 'ਤੇ ਦੇਖਣ ਤੋਂ ਮਹਿਸੂਸ ਹੁੰਦਾ ਹੈ ਕਿ ਇੰਟਰਨੈੱਟ ਇਕ ਨਿਰਪੱਖ ਵਰਤਾਰਾ ਹੈ। ਪਰ ਅਸਲ ਵਿਚ ਇੰਟਰਨੈੱਟ ਇਕ ਸਮਾਜਕ ਉਤਪਤੀ ਹੈ ਅਤੇ ਜਿਸ ਤਰ੍ਹਾਂ ਸਮਾਜ ਵਿਚ ਸਮਾਜਕ, ਆਰਥਿਕ ਤੇ ਰਾਜਨੀਤਕ ਪੱਖੋਂ ਸਾਧਨ ਸੰਪੰਨ ਲੋਕਾਂ ਵੱਲੋਂ ਗੈਰ ਸਾਧਨ ਸੰਪੰਨ ਲੋਕਾਂ ਨੂੰ ਹਾਸ਼ੀਏ 'ਤੇ ਧੱਕਿਆ ਜਾਂਦਾ ਹੈ, ਠੀਕ ਉਸੇ ਤਰ੍ਹਾਂ ਇੰਟਰਨੈੱਟ ਦਾ ਵਰਤਾਰਾ ਵੀ ਅਜਿਹੀ ਸਮਾਜਕ ਹਾਲਤ ਤੋਂ ਅਭਿੱਜ ਨਹੀਂ ਹੈ। ਇੰਟਰਨੈੱਟ ਉਪਰਲੇ ਗਿਆਨ ਸਰੋਤਾਂ ਦਾ ਅਧਿਐਨ ਕਰਨ ਤੋਂ ਪਹਿਲਾਂ ਮੋਟੇ ਤੌਰ 'ਤੇ ਇੰਟਰਨੈੱਟ ਦੀ ਸੰਸਾਰ ਪੱਧਰ 'ਤੇ ਵਰਗ ਵੰਡ ਨੂੰ ਸਮਝਣਾ ਬਹੁਤ ਜ਼ਰੂਰੀ ਹੈ। 'World Internet Statis' ਦੇ ਅਨੁਸਾਰ 21ਵੀਂ ਸਦੀ ਦੇ ਦੂਜੇ ਦਹਾਕੇ ਦੇ ਅਖੀਰ ਤਕ ਦੁਨੀਆਂ ਦੀ 67 ਪ੍ਰਤੀਸ਼ਤ ਦੇ ਲਗਭਗ ਆਬਾਦੀ ਇੰਟਰਨੈੱਟ ਦੀ ਵਰਤੋਂ ਕਰਦੀ ਹੈ। ਅੰਕੜਿਆਂ ਅਨੁਸਾਰ 'ਗਲੋਬਲ ਸਾਊਥ' (ਏਸ਼ੀਆ, ਅਫਰੀਕਾ, ਲੈਟਿਨ ਅਮਰੀਕਾ) ਵਿਚ ਇੰਟਰਨੈੱਟ ਦੇ 76 ਪ੍ਰਤੀਸ਼ਤ ਆਬਾਦੀ ਉਪਭੋਗੀ ਹੈ ਅਤੇ 'ਗਲੋਬਲ ਨੌਰਥ' (ਅਮਰੀਕਾ, ਯੂਰਪ, ਆਸਟਰੇਲੀਆ) ਦੀ 24 ਪ੍ਰਤੀਸ਼ਤ ਆਬਾਦੀ ਉਪਭੋਗੀ ਹੈ।' ਇਵੇਂ ਮਹੱਤਵਪੂਰਨ ਸਵਾਲ ਇਹ ਉੱਠਦਾ ਹੈ ਕਿ ਸੰਸਾਰ ਦੇ ਕੁੱਲ ਇੰਟਰਨੈੱਟ ਦਾ ਤੀਜਾ ਹਿੱਸਾ ਉਪਭੋਗੀ 'ਗਲੋਬਲ ਸਾਊਥ' ਹੈ ਪਰ ਇੰਟਰਨੈੱਟ ਉੱਪਰ ਗਿਆਨ ਜਾਂ ਸੂਚਨਾ ਪਾਉਣ ਵਾਲਿਆਂ ਅਤੇ ਗਿਆਨ ਸੂਚਨਾ ਦੇ ਵਿਸ਼ਿਆਂ ਵਿਚ 'ਗਲੋਬਲ ਸਾਊਥ' ਦੀ ਹਿੱਸੇਦਾਰੀ ਕਿੰਨੀ ਹੈ? ਉਦਾਹਰਨ ਲਈ ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਵੈਬਸਾਈਟ ਦੇ ਅੰਕੜੇ ਦੇਖੇ ਜਾ ਸਕਦੇ ਹਨ। ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਸੰਸਾਰ ਦੀਆਂ ਵੱਧ ਦੇਖੀਆਂ ਜਾਣ ਵਾਲੀਆਂ ਅੰਗਰੇਜ਼ੀ ਭਾਸ਼ੀ ਸਿਖਰਲੀਆਂ ਦਸ ਵੈੱਬਸਾਈਟਾਂ ਵਿਚੋਂ ਇਕ ਹੈ।'² ਅੰਕੜਿਆਂ ਅਨੁਸਾਰ ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਉੱਪਰ ਉੱਤਰੀ ਅਮਰੀਕਾ ਅਤੇ ਯੂਰਪ ਦੇ 20 ਪ੍ਰਤੀਸ਼ਤ ਲੋਕ ਹੀ 80 ਪ੍ਰਤੀਸ਼ਤ ਸਮੱਗਰੀ ਨੂੰ ਸੰਪਾਦਿਤ ਕਰਦੇ ਹਨ। ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਉੱਪਰ ਯੂਰਪ ਅਤੇ ਉੱਤਰੀ ਅਮਰੀਕਾ ਬਾਰੇ 84 ਪ੍ਰਤੀਸ਼ਤ ਲੇਖ ਹਨ।'³ '2014 ਦੀ ਖੋਜ ਮੁਤਾਬਕ 'ਗਲੋਬਲ ਸਾਊਥ' ਬਾਰੇ ਲੇਖ 'ਗਲੋਬਲ ਨੌਰਥ' ਵੱਲੋਂ ਲਿਖੇ ਜਾ ਰਹੇ ਹਨ।'⁴ 'Whose Knowledge' ਅਮਰੀਕਾ ਦੀ ਇਕ ਸੰਸਥਾ ਹੈ ਜੋ ਇੰਟਰਨੈੱਟ ਉੱਪਰ ਉਪਲਬਧ ਗਿਆਨ ਸਮੱਗਰੀ ਦਾ ਅਧਿਐਨ ਕਰਦੀ ਹੈ ਅਤੇ ਇਹ ਇੰਟਰਨੈੱਟ ਦੇ ਗਿਆਨ ਸਰੋਤਾਂ ਦੇ ਵਿਕੇਂਦਰੀਕਰਨ ਲਈ ਸੰਘਰਸ਼ ਕਰ ਰਹੀ ਹੈ। Whose Knowledge ਦੀ ਕੋ-ਫਾਊਂਡਰ ਅਨਸੁਈਆ ਆਪਣੇ ਖੋਜ ਪੇਪਰ ਵਿਚ ਲਿਖਦੀ ਹੈ ਕਿ "ਇੰਟਰਨੈੱਟ ਉੱਪਰ ਸਾਰੇ ਲੋਕ ਬਰਾਬਰ ਜੁੜੇ ਹੋਏ ਹਨ ਪਰ ਇਸ ਦੇ ਬਾਵਜੂਦ ਇਸ ਦਾ ਝੁਕਾਅ ਪੱਛਮੀ ਅਤੇ ਗੋਰੇ ਲੋਕਾਂ ਵੱਲ ਵੱਧ ਕਿਉਂ ਹੈ।"⁵ ਉਹ ਆਪਣੀ ਸੰਸਥਾ ਰਾਹੀਂ ਹੇਠ ਲਿਖੇ ਦੋ ਸਵਾਲ ਜ਼ੋਰਦਾਰ ਢੰਗ ਨਾਲ ਉਠਾਉਂਦੀ ਹੈ-

1. ਗਿਆਨ ਉਤਪਾਦਨ ਵਿਚ ਹਿੱਸੇਦਾਰੀ ਕਿਸ ਦੀ ਅਤੇ ਕਿੰਨੀ ਹੈ?
2. ਕੀ ਆਨਲਾਈਨ ਗਿਆਨ ਸਰੋਤਾਂ ਦੀ ਵਿਭਿੰਨਤਾ ਨੂੰ ਕਾਇਮ ਰੱਖ ਸਕਦੇ ਹਾਂ?

ਪੇਪਰ ਦੇ ਸ਼ੁਰੂ ਵਿਚ ਵਿਚਾਰ ਕੀਤਾ ਹੈ ਕਿ ਸਰਚ ਇੰਜਣ ਐਲਗੋਰਿਦਮਾਂ ਦੀ ਮਦਦ ਨਾਲ ਉਪਲਬਧ ਡਾਟੇ ਨੂੰ ਪ੍ਰੋਸੈਸ ਕਰਕੇ ਹੀ ਨਤੀਜਾ ਦਿੰਦੇ ਹਨ। ਇੱਥੇ ਇਕ ਸਵਾਲ ਹੋਰ ਉੱਠਦਾ ਹੈ ਕਿ ਇੰਟਰਨੈੱਟ ਉੱਪਰ ਉਪਲਬਧ ਇਨੇ ਪੱਖਪਾਤੀ ਅੰਕੜਿਆਂ ਵਿਚੋਂ ਕੋਈ ਸਰਚ ਇੰਜਣ ਨਿਰਪੱਖ ਨਤੀਜਾ ਦੇ ਸਕਦਾ ਹੈ? ਇਸ ਦਾ ਅਧਿਐਨ ਕਰਨ ਲਈ ਵਰਚੁਅਲ ਸੰਸਾਰ ਦੀ ਪ੍ਰਤੀਨਿਧ ਵੈੱਬਸਾਈਟ ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਨੂੰ ਦੇਖ ਸਕਦੇ ਹਾਂ। ਵਿਕੀਪੀਡੀਆ 15 ਜਨਵਰੀ 2001 ਨੂੰ ਸ਼ੁਰੂ ਹੁੰਦਾ ਹੈ। ਇਹ ਵੈੱਬਸਾਈਟ ਪਰੰਪਰਕ ਵੈੱਬਸਾਈਟਾਂ

ਨਾਲੋਂ ਇਕ ਵੱਖਰੇ ਕਿਸਮ ਦੀ ਵੈਬਸਾਈਟ ਹੈ। ਵਿਕੀਪੀਡੀਆ ਨੂੰ ਕਿਸੇ ਸਿਗਲਾ ਜਾਂ ਅਦਾਰੇ ਨੇ ਨਹੀਂ ਬਣਾਇਆ ਸਗੋਂ ਇਸਨੂੰ ਲੋਕਾਂ ਦੁਆਰਾ ਸਮੂਹਿਕ ਰੂਪ ਵਿਚ ਵੱਖ-ਵੱਖ ਸਰੋਤਾਂ ਦੀ ਮਦਦ ਨਾਲ ਗਿਆਨ ਦਾ ਬਣਾਇਆ ਹੈ। ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਬਾਰੇ ਕੁਝ ਤੱਥ ਹੇਠ ਲਿਖੇ ਅਨੁਸਾਰ ਹਨ-

1. ਵਿਸ਼ਵ ਦੇ 20 ਪ੍ਰਤੀਸ਼ਤ (ਉਤਰ ਅਮਰੀਕਾ ਅਤੇ ਯੂਰਪ ਦੇ ਗੋਰੇ ਮਰਦ ਸੰਪਾਦਕ) ਸੰਗੂਦਾ ਵਿਕੀਪੀਡੀਆ ਦੇ 80 ਪ੍ਰਤੀਸ਼ਤ ਹਿੱਸੇ ਨੂੰ ਸੰਪਾਦਿਤ ਕਰਦੇ ਹਨ।

2. ਵਿਕੀਪੀਡੀਆ ਦੇ 10 ਸੰਪਾਦਕਾਂ ਪਿੱਛੇ ਕੇਵਲ ਇਕ ਔਰਤ ਸੰਪਾਦਕ ਹੈ।

3. ਵਿਕੀਪੀਡੀਆ ਦੇ 84 ਪ੍ਰਤੀਸ਼ਤ ਲੇਖ ਯੂਰਪ ਅਤੇ ਉਤਰੀ ਅਮਰੀਕਾ 'ਤੇ ਕੇਂਦਰਤ ਹਨ।

4. ਗਲੋਬਲ ਸਾਊਥ ਬਾਰੇ ਲੇਖ ਗਲੋਬਲ ਨੌਰਥ ਵੱਲੋਂ ਲਿਖੇ ਜਾਂਦੇ ਹਨ।

ਵਿਕੀਪੀਡੀਆ ਗਿਆਨ ਮੁਫ਼ਤ ਜ਼ਰੂਰ ਦਿੰਦਾ ਹੈ ਪਰ ਇਸ ਦੀ ਪਹੁੰਚ ਨਿਰਪੱਖ ਨਹੀਂ ਜਾਪਦੀ। ਇਕ ਹੋਰ ਉਦਾਹਰਨ ਲਈ ਹੇਠ ਦਿੱਤੀ ਤਸਵੀਰ ਦੇਖੀ ਜਾ ਸਕਦੀ ਹੈ। ਇਹ ਤਸਵੀਰ ਵਿਚ ਦਿਖ ਰਿਹਾ ਚਿੱਟਾ ਰੰਗ ਵਿਕੀਪੀਡੀਆ ਦੇ ਉਹਨਾਂ ਆਰਟੀਕਲਾਂ ਨੂੰ ਦਰਸਾ ਰਿਹਾ ਹੈ ਜਿਨ੍ਹਾਂ ਆਰਟੀਕਲਾਂ ਵਿਚ ਨਕਸ਼ੇ (Google Map) ਦੇ ਲਿੰਕ ਪਾਏ ਹੋਏ ਹਨ ਭਾਵ ਕਿਸੇ ਭੂਗੋਲਿਕ ਖੇਤਰ ਬਾਰੇ ਆਰਟੀਕਲ ਹਨ। ਇਸ ਨੂੰ ਵੰਦਾਂ ਵੀ ਸਮਝਿਆ ਜਾ ਸਕਦਾ ਹੈ ਕਿ ਚਿੱਟੇ ਰੰਗ ਵਾਲੀਆਂ ਥਾਵਾਂ ਉਪਰ ਵਿਕੀਪੀਡੀਆ ਦੇ ਆਰਟੀਕਲ ਬਣੇ ਹੋਏ ਹਨ। ਇਹ ਆਰਟੀਕਲ 'ਗਲੋਬਲ ਨੌਰਥ' 'ਤੇ ਜ਼ਿਆਦਾ ਕੇਂਦਰਤ ਹਨ। ਇਸ ਤਸਵੀਰ ਨੂੰ ਦੇਖ ਕਿ ਮਹਿਸੂਸ ਹੁੰਦਾ ਹੈ ਕਿ 'ਗਲੋਬਲ ਸਾਊਥ' ਵਿਚ ਮੁਕਾਬਲਤਨ ਪਿੰਡਾਂ, ਸ਼ਹਿਰਾਂ ਜਾਂ ਆਬਾਦੀ ਦੀ ਸੰਘਣਤਾ ਬਹੁਤ ਘੱਟ ਹੈ ਪਰ ਅਸਲ ਵਿਚ ਅਸਲੀਅਤ ਇਸ ਦੇ ਉਲਟ ਹੈ।

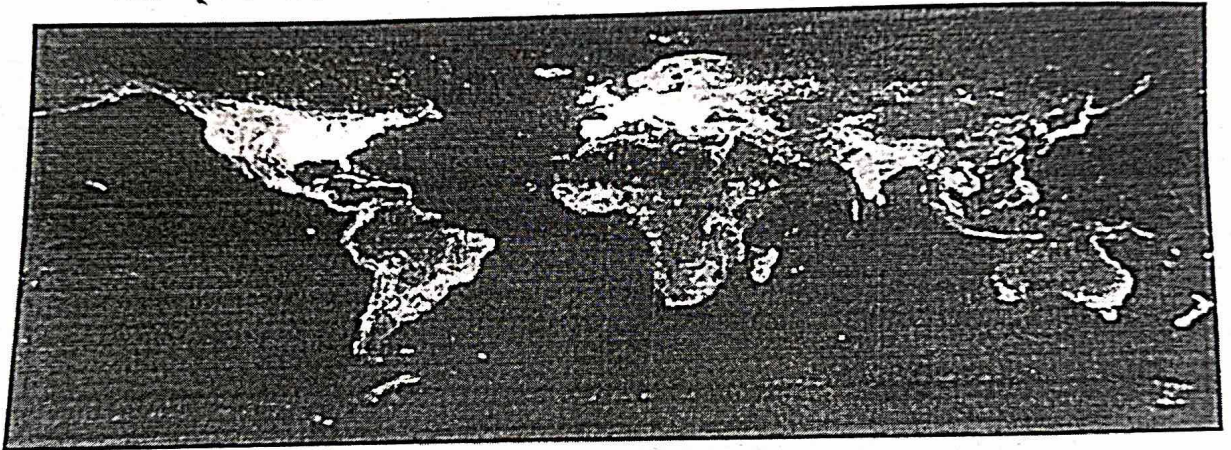ਇਸ ਪ੍ਰਕਾਰ ਜਦੋਂ ਕੋਈ ਵੀ ਐਲਗੋਰਿਦਮ ਵਿਕੀਪੀਡੀਆ ਦੇ ਭੂਗੋਲਿਕ ਕੋਆਰਡੀਨੇਟਸ



Figure 1.1: 'Density Map of All Geographic Coordinates'

(Geographic Coordinates) ਨਾਲ ਸਬੰਧਿਤ ਡਾਟੇ ਨੂੰ ਪ੍ਰੋਸੈਸ ਕਰਕੇ ਕੋਈ ਨਤੀਜਾ ਦੇਵੇਗਾ ਤਾਂ ਯਕੀਨਨ ਉਹ ਨਤੀਜਾ ਪੱਖਪਾਤੀ ਹੋਵੇਗਾ। ਇਹਨਾਂ ਕੁਝ ਅੰਕੜਿਆਂ ਤੋਂ ਇਹ ਤਾਂ ਸਪੱਸ਼ਟ ਹੋ ਜਾਂਦਾ ਹੈ ਕਿ ਜਿੱਥੇ ਗਿਆਨ ਉਤਪਾਦਕਾਂ ਅਤੇ ਉਤਪਾਦਤ ਡਾਟੇ ਵਿਚ ਪਾੜਾ ਐਨਾ ਵੱਡੀ ਪੱਧਰ 'ਤੇ ਹੋਵੇਗਾ ਉੱਥੇ ਹਾਸ਼ੀਏ 'ਤੇ ਧੱਕੇ ਲੋਕਾਂ ਦਾ ਗਿਆਨ ਵੀ ਹਾਸ਼ੀਏ 'ਤੇ ਹੀ ਹੋਵੇਗਾ। ਇੱਥੋਂ ਇਹ ਸਪੱਸ਼ਟ ਹੁੰਦਾ ਹੈ ਕਿ ਕਿਸੇ ਵੀ ਸਰਚ ਇੰਜਨ ਨੇ ਜਿਹੜੇ ਡਾਟੇ ਨੂੰ ਪ੍ਰੋਸੈਸ ਕਰਨਾ ਹੈ, ਉਸ ਡਾਟੇ ਵਿਚ 'ਗਲੋਬਲ ਨਾਰਥ' ਦਾ ਪੱਲੜਾ ਭਾਰੂ ਹੈ ਅਤੇ ਉਸ ਸਰਚ ਇੰਜਨ ਕੋਈ 'ਕੀ-ਵਰਡ' ਭਰਨ ਉਪਰੰਤ ਨਤੀਜੇ 'ਗਲੋਬਲ ਨਾਰਥ' ਉਪਰ ਕੇਂਦਰਿਤ ਵਧੇਰੇ ਹੋਣਗੇ।

ਅੰਗਰੇਜ਼ੀ ਭਾਸ਼ਾ ਤੋਂ ਇਲਾਵਾ ਖੇਤਰੀ ਭਾਸ਼ਾ ਪੰਜਾਬੀ ਵਿਚ ਚੱਲ ਰਹੇ ਪੰਜਾਬੀ ਵਿਕੀਪੀਡੀਆ ਨੂੰ ਵੀ ਅਸੀਂ ਆਪਣੇ ਅਧਿਐਨ ਵਿਚ ਸ਼ਾਮਲ ਕੀਤਾ ਹੈ। ਪੰਜਾਬੀ ਵਿਕੀਪੀਡੀਆ ਦੇ ਕੁਝ ਮਹੱਤਵਪੂਰਨ ਪਹਿਲੂ ਹੇਠ ਲਿਖੇ ਅਨੁਸਾਰ ਹਨ-

ਵਿਕੀਪੀਡੀਆ ਦੀ ਸ਼ੁਰੂਆਤ ਅੰਗਰੇਜ਼ੀ ਭਾਸ਼ਾ ਵਿਸ਼ਵਕੋਸ਼ ਤੋਂ ਹੁੰਦੀ ਹੈ। ਇਹ ਵਿਸ਼ਵਕੋਸ਼ 2003 ਤਕ 60 ਤੋਂ ਵੱਧ ਭਾਸ਼ਾਵਾਂ ਵਿਚ ਉਪਲੱਬਧ ਹੋ ਜਾਂਦਾ ਹੈ। ਪੰਜਾਬੀ ਸਮਾਜ ਇੰਟਰਨੈੱਟ ਅਤੇ ਤਕਨੀਕੀ ਤੌਰ 'ਤੇ ਜ਼ਿਆਦਾ ਨਾ ਵਿਕਸਤ ਹੋਣ ਕਰਕੇ ਪੰਜਾਬੀ ਵਿਕੀਪੀਡੀਆ ਸ਼ੁਰੂਆਤੀ ਦੌਰ ਵਿਚ ਜ਼ਿਆਦਾ ਗਤੀ ਨਹੀਂ ਫੜ

ਸਰਵ ਹੁੰਦੇ ਹਨ ਉਹਨਾਂ ਦੀ ਸੂਚੀ ਦਿੱਤੀ ਜਾਵੇ ਤਾਂ ਜੋ ਉਹ ਗਿਆਨ ਸਮੱਗਰੀ ਤਿਆਰ ਕੀਤਾ ਜਾ ਸਕੇ ਜਿਸ ... ਪੰਜਾਬੀ ਲੋਕ ਆਪਣੀ ਮਾਤ ਭਾਸ਼ਾ ਵਿਚ ਇੰਟਰਨੈੱਟ ਉਪਰ ਵਧੇਰੇ ਆਪਣੀ ਧੋਜ ਦਾ ਹਿੱਸਾ ਬਣਾਉਂਦੇ ... ਉਹਨਾਂ ਨੇ ਅਜਿਹੀ ਕੋਈ ਵੀ ਸੂਚੀ ਦੇਣ ਤੋਂ ਇਨਕਾਰ ਕਰ ਦਿੱਤਾ। ... ਇੱਥੇ ਇਹ ਸਵਾਲ ਉਠ ਸਕਦਾ ਹੈ ਕਿ ਜਿਹੜੇ 'ਕੀ-ਵਰਡ' ਗੂਗਲ ਵਿਚ ਜ਼ਿਆਦਾ ਸਰਚ ਕੀਤੇ ਜਾਂਦੇ ਹਨ ਕੀ ਉਹ ਨਿਰਪੱਖ ਹੋਣਗੇ ਜਾਂ ਕੀ ਉਹ ਸਾਰੇ ਵਰਗਾਂ ਦੀ ਪ੍ਰਤੀਨਿਧਤਾ ਕਰਦੇ ਹੋਣਗੇ? ਸਾਨੂੰ ਇਹ ਅਧਿਐਨ ਕਰਨ ਦੀ ਲੋੜ ਹੈ ਕਿ ਕਿਹੜਾ ਗਿਆਨ ਪਹਿਲ ਦੇ ਆਧਾਰ 'ਤੇ ਤਿਆਰ ਕਰਨਾ ਚਾਹੀਦਾ ਹੈ? ਸਾਡੀ ਪਰਾਥਮਿਕਤਾ ਕੀ ਹੋਣੀ ਚਾਹੀਦੀ ਹੈ ? ਕੀ ਅਸੀਂ ਇੰਟਰਨੈੱਟ ਉਪਰ ਆਪਣੀ ਖੇਤਰੀ ਭਾਸ਼ਾ ਵਿਚ ਗਲੋਬਲ ਨਾਰਥ ਬਾਰੇ ਗਿਆਨ ਸਮੱਗਰੀ ਤਿਆਰ ਕਰਨੀ ਹੈ ਜਾਂ ਅਸੀਂ ਆਪਣੇ ਖੇਤਰੀ ਗਿਆਨ ਨੂੰ ਡਿਜੀਟਲ ਸਪੇਸ ਉਪਰ ਲੈ ਕੇ ਆਉਣਾ ਹੈ। ਭਲਾ ਹੀ ਡਿਜੀਟਲ ਗਿਆਨ ਸਰੋਤਾਂ ਉਪਰ ਕਾਬਜ਼ ਗੂਗਲ ਵਰਗੀਆਂ ਕੰਪਨੀਆ ਅਜਿਹੀਆਂ ਸੂਚੀਆਂ ਨਾ ਦੇਣ ਜਿੱਥੋਂ ਇਹ ਪਤਾ ਲੱਗ ਸਕੇ ਕਿ ਕਿਸੇ ਵੀ ਸਰਚ ਇੰਜਣ ਵਿਚ ਗੁਰਮੁਖੀ ਲਿਪੀ ਵਿਚ ਵਧੇਰੇ ਕੀ ਸਰਚ ਹੁੰਦਾ ਹੈ ਪਰ ਪੰਜਾਬੀ ਵਿਕੀਪੀਡੀਆ ਦੀ ਲੋਕਲ ਟੀਮ ਨੂੰ ਇਹ ਫੈਸਲਾ ਕਰਨਾ ਚਾਹੀਦਾ ਹੈ ਕਿ ਉਹਨਾਂ ਨੇ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਕਿਹੜਾ ਗਿਆਨ ਪਹਿਲ ਦੇ ਅਧਾਰ ਉਪਰ ਤਿਆਰ ਕਰਨਾ ਹੈ।

ਅੰਤ ਵਿਚ ਇਹੀ ਕਿਹਾ ਜਾ ਸਕਦਾ ਹੈ ਕਿ ਜੋ ਇੰਟਰਨੈੱਟ ਰਾਹੀਂ ਮੁਫ਼ਤ ਵਿਚ ਮਿਲ ਰਿਹਾ ਹੈ ਉਸ ਦੇ ਪਿਛਲੀ ਰਾਜਨੀਤੀ ਨੂੰ ਸਮਝਣ ਦੀ ਲੋੜ ਹੈ। ਅੰਗਰੇਜ਼ੀ ਵਿਕੀਪੀਡੀਆ ਉਪਰ ਨਹੀਂ ਤਾਂ ਪੰਜਾਬੀ ਵਿਕੀਪੀਡੀਆ ਉਪਰ ਹਾਸ਼ੀਆਕ੍ਰਿਤ ਵਿਸ਼ਿਆ ਬਾਰੇ ਗਿਆਨ ਉਤਪਾਦਨ ਬਾਰੇ ਸੋਚਣਾ ਪਵੇਗਾ। ਵਿਕੀਮੀਡੀਆ ਫਾਉਂਡੇਸ਼ਨ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅਸੀਂ ਇੰਟਰਨੈੱਟ ਉਪਰਲੀ ਗਿਆਨ ਦੀ ਇਸ ਰਾਜਨੀਤੀ ਨੂੰ ਅਸੀਂ ਬਸਤੀਵਾਦੀ ਪੰਜਾਬ ਦੇ ਮੁੱਢ ਨਾਲ ਜੋੜ ਕੇ ਵੀ ਦੇਖ ਸਕਦੇ ਹਨ। ਜਦੋਂ ਅੰਗਰੇਜ਼ਾਂ ਨੇ ਪੰਜਾਬ ਉਪਰ ਪੂਰਨ ਤੌਰ 'ਤੇ ਕਬਜ਼ਾ ਕੀਤਾ ਤਾਂ ਉਹਨਾਂ ਨੇ ਆਪਣੇ ਮੁੱਢਲੇ ਕੰਮਾਂ ਵਿਚ ਮਹੱਤਵਪੂਰਨ ਕੰਮ ਇਹ ਕੀਤਾ ਕਿ ਉਨ੍ਹਾਂ ਨੇ ਪੰਜਾਬ ਵਿਚ ਛਾਪਾਖਾਨਾ ਲਾਇਆ ਅਤੇ ਆਪਣੇ ਧਾਰਮਿਕ ਗ੍ਰੰਥਾਂ ਨੂੰ ਪੰਜਾਬੀ ਵਿਚ ਛਾਪ ਕੇ ਵੱਡੀ ਗਿਣਤੀ ਵਿਚ ਪੰਜਾਬ ਵਿਚ ਵੰਡਿਆ। ਇਸ ਛਾਪੇਖਾਨੇ ਕਾਰਨ ਹੀ ਪੰਜਾਬੀ ਦੇ ਬਹੁਤ ਸਾਰੇ ਸਾਹਿਤ ਦੀ ਸੰਭਾਲ ਹੋ ਗਈ। ਸਿੰਘ ਸਭਾ ਲਹਿਰ ਬਹੁਤ ਸਾਰੀਆਂ ਧਾਰਮਿਕ ਪੁਸਤਕਾਂ ਨੂੰ ਛਾਪੇਖਾਨੇ ਦੀ ਮਦਦ ਨਾਲ ਲੋਕਾਂ ਤਕ ਲੈ ਕੇ ਗਈ। ਇਸ ਸਾਰੇ ਵਰਤਾਰੇ ਦੀ ਸਤਹੀ ਸਮਝ ਤਾਂ ਇਹ ਕਹਿੰਦੀ ਹੈ ਕਿ ਅੰਗਰੇਜ਼ਾਂ ਜਾਂ ਇਸਾਈ ਮਿਸ਼ਨਰੀਆਂ ਨੇ ਛਾਪਾਖਾਨਾ ਲਾਇਆ ਜਿਸ ਨਾਲ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਪੰਜਾਬੀ ਸਾਹਿਤ ਨੂੰ ਵੱਡਾ ਹੁਲਾਰਾ ਮਿਲਿਆ। ਪਰ ਜੇ ਇਸ ਗੱਲ ਨੂੰ ਡੂੰਘਾਈ ਨਾਲ ਦੇਖਣਾ ਹੋਵੇ ਤਾਂ ਅਜਿਹਾ ਨਹੀਂ ਹੈ। ਅੰਗਰੇਜ਼ਾਂ ਜਾਂ ਇਸਾਈ ਮਿਸ਼ਨਰੀਆਂ ਨੇ ਆਪਣੇ ਧਰਮ ਦੇ ਪ੍ਰਚਾਰ-ਪਾਸਾਰ ਲਈ ਅਜਿਹੇ ਕਦਮ ਪੁੱਟੇ ਜਿਸ ਨਾਲ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸਾਹਿਤ ਨੂੰ ਵੀ ਹੁਲਾਰਾ ਮਿਲਿਆ। ਪਰ ਬਸਤੀਵਾਦ ਨੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸਾਹਿਤ ਉਪਰ ਆਪਣਾ ਜੋ ਅਸਰ ਪਾਇਆ ਹੈ ਉਸ ਦਾ ਗਲਬਾ ਹਾਲੇ ਤਕ ਵੀ ਟੁੱਟਣ ਦਾ ਨਾਮ ਨਹੀਂ ਲੈ ਰਿਹਾ। ਹੁਣ ਤਕਨੀਕ ਦੇ ਇਸ ਯੁਗ ਅੰਦਰ ਵੀ ਠੀਕ ਉਸੇ ਤਰ੍ਹਾਂ ਇਤਿਹਾਸ ਦੁਰਹਾਇਆ ਜਾ ਰਿਹਾ ਹੈ। ਇੰਟਰਨੈੱਟ ਉਪਰ ਬਸਤੀਆਂ ਭੌਤਿਕ ਸਪੇਸ ਦੀ ਥਾਂ ਵਰਚੁਅਲ ਸਪੇਸ ਉਪਰ ਬਣ ਰਹੀਆਂ ਹਨ। ਇੰਟਰਨੈੱਟ ਉਪਰ ਜ਼ਿਆਦਾ ਪ੍ਰਸਿੱਧ ਵੈਬਸਾਈਟਾਂ ਅਮਰੀਕਾ ਅਧਾਰਿਤ ਹਨ, ਜਿਨ੍ਹਾਂ ਦੇ ਆਪਣੀਆਂ ਵਰਚੁਅਲ ਸਪੇਸ ਉਪਰ ਬਸਤੀਆਂ ਦਾ ਨਿਰਮਾਣ ਕੀਤਾ ਹੋਇਆ ਹੈ। ਵਰਚੁਅਲ ਸਪੇਸ ਦੀਆਂ ਬਸਤੀਆਂ ਇਸਾਈ ਮਿਸ਼ਨਰੀਆਂ ਵਾਂਗ ਆਪਣੀ ਮਰਜ਼ੀ ਦਾ ਗਿਆਨ ਉਤਪਾਦਿਤ ਕਰਵਾ ਰਹੀਆਂ ਹਨ। ਪੰਜਾਬੀ ਸਮੇਤ ਹੋਰ ਖੇਤਰੀ ਭਾਸ਼ਾਵਾਂ ਵਿਚ ਕੰਮ ਕਰਨ ਵਾਲੇ ਵਿਅਕਤੀਆਂ ਨੂੰ ਇਹਨਾਂ ਬਸਤੀਆਂ ਦੇ ਡਿਜੀਟਲ ਹਮਲਿਆਂ ਤੋਂ ਬਚਣ ਦੀ ਲੋੜ ਹੈ। ਪੰਜਾਬੀ ਭਾਈਚਾਰੇ ਨੂੰ ਵਧੇਰੇ ਆਪਣਾ ਵਧੇਰੇ ਧਿਆਨ ਖੇਤਰੀ ਗਿਆਨ ਆਪਣੀ ਖੇਤਰੀ ਭਾਸ਼ਾ ਵਿਚ ਬਾਈਨਰੀ ਕੋਡ ਵਿਚ ਤਬਦੀਲ ਕਰਨ ਦੀ ਲੋੜ ਹੈ ਤਾਂ ਜੋ ਕੋਈ ਵੀ ਸਰਚ ਇੰਜਣ ਜਿੰਨੀ ਸਪੇਸ 'ਗਲੋਬਲ ਨਾਰਥ' ਨੂੰ ਦਿੰਦਾ ਹੈ, ਉਨੀ ਸਪੇਸ ਹੀ 'ਗਲੋਬਲ ਸਾਊਥ' ਦੇ ਹਿੱਸੇ ਵੀ ਆ ਸਕੇ ਅਤੇ ਉਹ ਆਪਣੇ ਪੱਖਪਾਤੀ ਰਵੱਈਏ ਤੋਂ ਮੁਕਤ ਅਤੇ ਆਪਣੇ ਸੁਭਾਅ ਅਨੁਸਾਰ ਨਿਰਪੱਖ ਹੋ ਕੇ ਸਧਾਰਨ ਮਨੁੱਖ ਨੂੰ ਨਤੀਜੇ ਦੇਣ ਲਈ ਯਤਨਸ਼ੀਲ ਹੋਵੇ।

ਆਰਟੀਫ਼ੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ ਅਤੇ ਆਨਲਾਈਨ ਗਿਆਨ ਸਰੋਤ

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Ms. Ramanpreet Kaur

# Human Action Recognition using an Ensemble Deep Learning Model for Video Datasets

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**Abstract:** Human Action Recognition is used to analyse the videos to identify the actions performed by humans. In recent years, it has gained much popularity due to its large domain of applications presented in various fields. Several research contributions are available in this area but still the requirement is to achieve good results for various challenging datasets and limited hardware resources. In order to overcome these issues, an ensemble deep learning model is proposed in this paper based on custom convolutional neural network (CNN). ResNet50 is merged with a handcrafted CNN, to identify human actions in challenging video datasets. This model is trained and tested on UCF-101 and HMDB-51 datasets and gained very good results. The experimental results showcased that the proposed model outperforms some recent works in this domain.

**Keywords:** HAR, CNN, ResNet50, Deep Learning

## 1. Introduction

Human Action or Activity Recognition involves identifying the goals or objectives of one or more actions by analysing a series of observed actions and their environmental conditions. Achieving accurate activity recognition poses various challenges due to the complexity and diversity of human activities. The terms "action" and "activity" are often used interchangeably. An action refers to a fundamental human motion, such as jumping or walking. On the other hand, an activity is a complex human motion that comprises multiple basic actions. For example, drinking water can be defined as a sequence of actions: opening a bottle, pouring water into a glass, and then drinking it [1]. The recognition of human actions from videos and images has garnered significant attention over the past few decades. This field has numerous practical applications in daily life due to the widespread use of cameras. Surveillance cameras aid in fraud detection, human-computer interaction enables gaming experiences, and activity detection assists in healthcare and elder care. Additionally, activity recognition plays a vital role in content-based video retrieval, as most web search engines heavily rely on textual data. Over the years, researchers have proposed numerous techniques and approaches for human action and activity recognition. Given the complexity of recognizing actions and activities from images and videos, achieving high accuracy in challenging environments has been a focal point of these efforts. However, there is still a need to develop efficient techniques for human action recognition from images and videos.

In traditional approaches to human activity recognition, machine learning models heavily rely on hand-crafted features. However, this process is challenging and demands a significant level of domain expertise and feature engineering. The advent of deep neural networks has revolutionized this field by enabling models to automatically learn features from raw sensor data. As a result, classification outcomes have substantially improved. In this paper, we present a novel approach for human activity recognition using ensemble learning of multiple convolutional neural network (CNN) models. Two different CNN models are trained on the publicly available datasets. The performance of the proposed model is better than the approaches available in literature review.

The Paper is organized as follows: the related work is explained in section II. The proposed model is explained in section III. The results and discussion about the model is presented in section IV.

## 2. Review of Literature

Deep learning is a specialized branch of machine learning that employs neural networks to autonomously extract valuable features directly from the data. It has demonstrated impressive achievements in various computer vision tasks,

notably action recognition. Convolutional Neural Networks (CNNs) [2] and Recurrent Neural Networks (RNNs) [3] are frequently employed deep learning models in the field of action recognition. These models excel at learning highly resilient and distinguishing features, surpassing the capabilities of manually crafted features. However, their training process demands substantial volumes of annotated data and significant computational resources.

Numerous methods utilizing deep learning for human action recognition have been extensively explored [4, 5]. In comparison to traditional machine learning approaches for recognizing human behavior, deep learning methods do not rely on specific human experience or knowledge. Instead, they directly identify human actions in videos using end-to-end approaches [6]. These methods can be categorized into two groups based on feature extraction techniques: human action recognition based on skeletons and human action recognition based on feature maps. Notably, spatiotemporal networks and Two-Stream networks are prominent deep learning approaches [7]. Among these approaches, Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) are widely adopted [8, 9].

Hritam Basak, *et al.* [10] proposed a framework that employs deep learning and swarm intelligence-based meta-heuristic for human action recognition that uses 3D skeleton data for action classification. The model extracts four different types of features from the skeletal data and uses a modified version of Inception-ResNet for classification. The model has been evaluated on three publicly available HAR datasets, achieved competitive results. Zehua Sun, *et al.* [11] presented a comprehensive survey of recent progress in deep learning methods for HAR based on the type of input data modality. It reviews the current mainstream deep learning methods for single data modalities and multiple data modalities, including the fusion-based and the co-learning-based frameworks.

Hao Yang, *et al.* [12] developed a novel network, named Feedback Graph Convolutional Network (FGCN) that introduces a feedback mechanism into GCNs for action recognition. The model provides predictions on-the-fly and has achieved the state-of-the-art performance on three datasets.

Yanan Liu, et al proposed a kernel adaptive graph transformer network (KA-AGTN) which models the higher-order dependencies between joints by the transformer operator based on multihead attention. The model outperforms the baseline AGCN and achieves the state-of-the-art performance on the Kinetics-Skeleton 400 dataset.

Zehra, Narjis et al. [14] presented three CNN based models as well as their ensembles for WISDM dataset of HAR. It was proved that the performance of the ensemble model is better than that of individual models. In [15], authors proposed a deep neural architecture called LSTM-RNN. The network demonstrates the capability to successfully and efficiently learn all six activity classes with a relatively low number of training epochs, achieving high levels of accuracy. The model has been successfully exported and integrated into an Android app, utilizing the Tensorflow library. This implementation allows for real-time predictions to be made. The multiclass SVM approach mentioned in [16] gave an overall accuracy of 94.12%.

In [17], the Resnet-50 Pre-Trained Model is used for extracting features and classification. The features extracted are fused by the Canonical Correlation Analysis (CCA). Then features are selected using the Shanon Entropy-based threshold function. The selected features are finally passed to multiple classifiers for final classification. Experiments are conducted on five publicly available datasets as IXMAS, UCF Sports, YouTube, UT-Interaction, and KTH. They have achieved very good results for these datasets.

### 3. Proposed Work

The primary objective of this paper is to develop a system for human action recognition using video data. The videos are first segmented, and the individual frames are imported as input data. Two deep learning techniques are employed to generate feature maps specifically designed for human action recognition. During the training phase, the network learns to recognize different human actions and assigns class tags accordingly. To evaluate the performance of the proposed approach, standard datasets such as UCF101 and

HMDB51 are used. In this section, we provide an overview of these datasets, highlighting their characteristics and relevance to the task at hand. Subsequently, we delve into the implementation details of our approach, outlining the specific methodologies employed to achieve accurate human action recognition.

## A. Datasets

UCF101 [18] is a comprehensive dataset for action recognition, containing a wide range of realistic action videos sourced from YouTube. It expands upon the UCF50 dataset by including 101 action categories, making it the largest and most diverse collection of its kind. With a total of 13,320 videos, UCF101 offers a remarkable variety of actions, encompassing various factors such as camera motion, object appearance, pose, scale, viewpoint, background clutter, and illumination conditions. This diversity makes UCF101 a highly challenging dataset, pushing the boundaries of action recognition research. Unlike many existing datasets that feature staged performances by actors, UCF101 aims to foster new avenues of study by introducing novel and realistic action categories. The videos in UCF101 are organized into 25 groups, each consisting of 4-7 videos representing a specific action. Videos within the same group often share common characteristics, such as similar backgrounds or viewpoints, providing additional contextual information for analysis. The action categories in UCF101 can be classified into five main types: Human-Object Interaction: Actions that involve interactions between humans and objects, such as "eating," "drinking," or "using a computer." Body-Motion Only: Actions that primarily focus on human body movements without explicit object interactions, including actions like "walking," "jumping," or "running." Human-Human Interaction: Actions involving interactions between two or more humans, such as "hugging," "shaking hands," or "fighting." Playing Musical Instruments: Actions that revolve around playing musical instruments, covering a range of activities like "playing the guitar," "drumming," or "singing." Sports: Actions related to various sports activities, encompassing actions like "basketball-dunk," "soccer-juggling," or "tennis-swing." By providing a diverse and realistic dataset, UCF101 encourages researchers to explore and advance the field of action recognition, enabling the development of more robust and accurate models for real-world applications.

The HMDB51 [19] dataset comprises 51 distinct action categories, with a minimum of 101 clips per category, resulting in a total of 6,766 video clips sourced from a diverse range of origins. It stands as the largest and most realistic dataset available to date, providing valuable resources for action recognition research. Each video clip has undergone validation by a minimum of two human observers, ensuring consistency in the dataset. Furthermore, the HMDB51 dataset includes additional meta information that enhances its utility. This meta information allows for precise selection of testing data and facilitates the training and evaluation of recognition systems. The provided meta tags offer insights into various aspects of the clips, including camera viewpoint, the presence or absence of camera motion, video quality, and the number of actors involved in the action. These meta tags enable researchers to conduct more flexible experiments by utilizing specific subsets of the dataset for evaluating the performance of computer vision systems. Overall, the HMDB51 dataset is a comprehensive collection of action categories, combined with the meticulous validation process and rich meta information, makes it an invaluable resource for advancing the field of computer vision and action recognition. Researchers can leverage this dataset to develop and evaluate more robust recognition systems that can accurately analyze and understand actions in real-world scenarios.

Table 1: Challenges present in UCF101 and HMDB51 Datasets.

| Dataset | Background | No. Of Cameras | Camera Movement | View Type | Occlusion | Acted |
|---|---|---|---|---|---|---|
| UCF101 | Dynamic | Unspecified | Dynamic | Single | Yes | No |
| HMDB51 | Cluttered | Unspecified | Non-Static | Single | No | Yes |

To address the issue of vanishing gradients that arises when increasing the depth of a neural network, the Residual Network [20] was introduced. This architecture incorporates a clever mechanism where any given layer K not only receives input from the previous layer but also takes in the output of an earlier layer, which is then connected as input to the Kth layer. As a result, the output for the Kth layer can be expressed as:

$$H(x)l = f(x) + x \qquad \qquad -- (1)$$

Here, f(x) represents the function of the lth layer, and x denotes the previous input to the (l-1)th layer. The ResNet architecture comes in several versions, including ResNet34, ResNet50, ResNet101, and ResNet152. ResNet50 is created by replacing each two-layer block in 34 layer 34-layer net with 3-layer bottleneck block. This model has 3.8 billion FLOPs.

The proposed ensemble model's architecture is a testament to creative innovation, with the outputs from two networks being concatenated together. This concatenated layer is then passed through a series of dense, batch normalization, and dropout layers, which serves a dual purpose. The dense layers enhance the model's learning capacity while the batch normalization layers ensure a smooth and speedy training process by controlling the input mean and variance to subsequent layers. Dropout layers are introduced to encourage model robustness by reducing overfitting. Figure 3 represents the structure of proposed model.
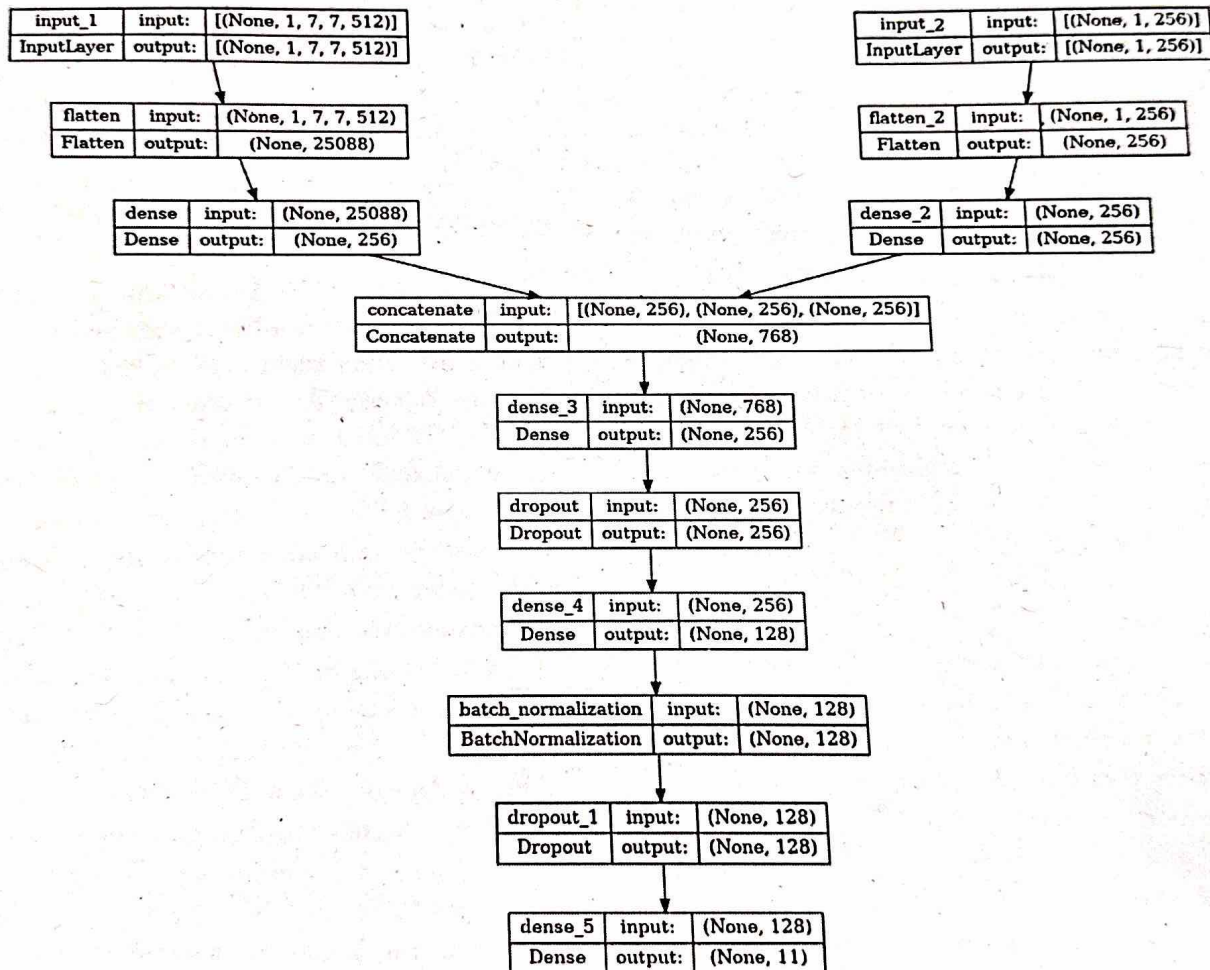


**Figure 3. Basic structure of the proposed model.**

## 4. Result and Discussion

In this work, we focus on the application of ensemble learning within the field of deep learning for video action recognition. Our approach is novel due to several distinct and innovative aspects, primarily in the model's architecture, the feature extraction process, and the pre-processing techniques utilized. Traditionally, video action

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_Mr. Ashish Kumar_

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# The Indian Government's Environmental Stewardship: A Review of Pollution Control Efforts

## Ashish Kumar

_Abstract: This paper is an attempt to get and make acquainted with the role that the Indian Government had/has played or is playing to curb the brisk expansion of pollution which is affecting human health and the environment drastically and disastrously. Different contamination types viz. Air Contamination, Water Contamination, Soil Contamination, Noise Contamination, Land Contamination, Photo Contamination etc. have brought immutable adverse changes in all sorts of lives existing to breathe in air, water and soil. In addition, the synthetic and natural non-living creations are also influenced detrimentally. The citizens of nation, whether educated or uneducated are at par responsible for destruction of every component of the environment. Worthless is not mentioning here the appreciable endeavors that the Government has put on its part through its policies that are framed, although not implemented with vigor on real grounds, to rein the outburst of pollution. National Ambient Air Quality Standards, National Air Quality Monitoring Programme, National Air Quality Index (AQI), Hari Diwali and Swasth Diwali campaign, National Clean Air Programme (NCAP), Graded Response Action Plan (GRAP), National Ambient Noise Monitoring Network Programme, Horn Not OK Please campaign, Scheme of Assistance for abatement of pollution, Scheme of Common Effluent Treatment Plants, standards for emission of environmental pollutants, water pollutants and noise pollutants, National Green Corps (NGC), Sewage Treatment Plants Effluent Discharge Standards, Recognition of Environmental laboratories under Environment (Protection) Act, Apex committee, SAMEER App, E-Track for Industries, Swachh Bharat Abhiyan, Namami Gange Programme, National Solar Mission and Pradhan Mantri Ujjwala Yojana etc. are the prime and prominent initiative steps taken by the Govt. which has brought fruit in one and more sections of the society putting the graph of harms produced by contaminants to plateau and/or negative slope._

_Keywords: Air Contamination, Indian Government, Pollution Control, National Green Corps (NGC), Air Quality Index (AQI), Contamination, Water Contamination_

## I. INTRODUCTION

The word POLLUTION is derived from Latin word POLLUENE which means to contaminate any feature of environment. Pollution is an undesirable change in physical, chemical or biological characteristics of our air, water or land that may or will harmfully affect human life, flora, fauna and materials [1].

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This occurs only when short term economic gains are made at the cost of long term ecological losses of humanity. It affects all components of environment viz. atmosphere, lithosphere, hydrosphere as well as biosphere terribly. Pollution causing agents are known as Pollutants which can be broadly classified as primary pollutants (consequences observed immediately after release in environment) and secondary pollutants (adverse results are seen after interaction with moisture, sunlight or other pollutants). On the basis of ecological perspective, pollutants are classified as Degradable or Non-Persistent pollutants (Rapidly broken by chemical reaction and natural processes. E.g. Domestic sewage, discarded vegetables etc), Slowly Degradable or Persistent pollutants (Remain in the environment for decades unchanged and their degradation is highly slow. E.g. Pesticides like DDT, industrial chemical waste like polychlorobiphenyls, Dioxins and Furans etc) and Non-Degradable pollutants (Never get degraded and remain unaltered in environment. E.g. Toxic metals, Plastic, Nuclear waste etc.). Furthermore, on the basis of their physical state, they are classified as Particulate matter and the Gaseous Pollutants. In addition to these basis categories, pollutants are of numerous variety viz. organic, inorganic, pathogens, suspended solids, nutrients and agriculture pollutants, thermal, radioactive, naturally occurring, synthetic, biotic, A-biotic etc.

## II. CONTAMINATION TYPES

On the basis of the resource contaminated, following categories are worth discussion:

**Air Pollution:** A mixture of solid and gaseous particles in air that results from automobile emissions, factories' chemical wastes/smokes, dust, pollen, and mold spores which remain suspended in air. Common air contaminants include carbon oxides, sulfur oxides, CFCs, nitrogen oxides etc.

**Water pollution:** It occurs when toxic substances enter water bodies like lakes, rivers, oceans etc. and then getting dissolved in them, lying suspended in water, or depositing on the bed and eventually making water worthless. Common causes include discharge of sewage into water bodies, chemical contaminants, industrial waste, domestic waste, mining practices etc.

**Soil pollution:** Presence of unwanted poisonous substances in soil and that too in high concentration making it less fertile and posing a risk to ecosystem and human health is soil pollution. The contaminants include salts like phosphates, carbonates, sulfates, nitrates etc and other organic compounds like lipids, fatty acids, hydrocarbon, PAHs, alcohols etc.

1

**Thermal pollution:** Also called Thermal Enrichment is the degradation of water quality by any process that elevates the temperature of water in water bodies. The main contributors to thermal heat pollution are thermal or nuclear power plants; industrial effluents such as petroleum refineries, pulp and paper mills, chemical plants, steel mills and smelters; sewage effluents, biochemical activities and deforestation.

**Noise pollution:** It occurs when sound reaches hazardous levels causing cardiovascular disorders, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances etc. Noise above 65 decibels (dB) as noise pollution. To be precise, noise becomes harmful when it exceeds 75 decibels (dB) and is painful above 120 dB.Its major causes are vehicles, aircraft, industrial machines, loudspeakers, crackers, etc. When used at high volume, some other appliances also contribute to noise pollution, like television, transistor, radio, etc.

**Light or Photo Pollution:** It is the excess and poorly implemented lighting in day or night leading to headaches, irritability, anxiety, cancer due to less production of melatonin, loss of sleep, disruption of ecosystem and wastage of energy. Street lights, security lights, floodlights at sports venues, excess glares from clubs and pubs etc are the chief causes of this disturbance.

**Land Pollution:** This involves the decline in quality of Earth's land surface in terms of landscaping and ability to support life forms. Land pollution id transpired when garbage is not disposed off correctly thus introducing toxins and chemicals on and in the land. Mineral exploitation equally leads to disruption of land surface.

## III. GLOBAL RESPONSE TO POLLUTION

To fight the pervasive impact of pollution on societies, the world's ministries of environment gathered at the United Nations Environmental Assembly 2017 and expressed their political commitment to working towards a pollution free planet. The governments also adopted resolutions targeting specific aspects of pollution: Air quality, water pollution, soil pollution, marine litter and micro-plastics, chemicals and wastes. An implementation plan was devised, cutting across all these resolutions, with the aim to promote accelerated action, enhance capacities to address pollution and achieve the sustainable development goals. The environment assembly has welcomed the plan and recognized it as the key vehicle for prompt implementation. Sustainable Development Goals related to pollution are:

- No poverty
- Zero hunger
- Good health
- Quality education
- Gender equity
- Clean water and Sanitation
- Affordable and Clean energy
- Decent work and Economic growth
- Industry, Innovation and Infrastructure
- Reduced inequalities
- Sustainable cities and communities
- Responsible consumptions and productions
- Climate action

- Life below water
- Life on land
- Peace justice and Strong Institutions
- Partnerships for the goal

## IV. GOVERNMENT INITIATIVES TOWARDS CONSTRUCTION OF POLLUTION FREE ENVIRONMENT

To tackle with widespread problem of pollution that is woefully affecting every living and non-living being on the planet directly or indirectly, commendable steps have been taken by the government authorities and bodies so that nation could be saved from disastrous repercussions of pollution.

### A. Initiatives for mitigation of Air pollution

➤ National Ambient Air Quality Standards envisaging 12 pollutants have been notified under EPA, 1986 and 115 emission/effluent standards for 104 different sections of industries, besides 32 general standards for ambient air have also been notified.

➤ Government is executing a Nation-wide programme of ambient air quality monitoring known as National Air quality Monitoring Programme (NAMP). The network consists of seven hundred and three manual operating stations covering three hundred and seven cities in twenty nine states and six union territories of the country [2].

➤ With reference to vehicular pollution, the steps taken include introduction of cleaner fuels like CNG,LPG, ethanol blending, universalization of BS-IV by 2017, leap flogging from BS-IV to BS-VI fuel standards by 1st April 2020, ongoing promotion of public transport network of metro, buses, E-rickshaws and promotion of car-pooling, streamlining, granting pollution under control certificates, land disciplinary vehicle maintenance etc.

➤ National Air Quality Index (AQI) was launched by the Prime Minister in 2015 starting with 14 cities which has now been extended in 34 cities. The AQI is a tool for the effective communication of air quality status to people in terms, which are easy to understand [2].

➤ In order to engage people in the effort, the govt. launched a campaign called 'HariDiwali and SwasthDiwali' during September 2017 involving over two thousand schools in Delhi and over two lakh schools in the country.

➤ The Central Government has launched National Clean Air Programme (NCAP) under the Central Sector "Control of Pollution" Scheme as a long-term, time-bound, national level strategy to tackle the air pollution problem across the country in a comprehensive manner with targets to achieve 20% to 30% reduction in PM10 and PM2.5 concentrations by 2024 keeping 2017 as the base year for the comparison of concentration

➤ Graded Response Action Plan (GRAP) was notified on January 12, 2017, for prevention, control and abatement of air pollution in Delhi and NCR [2]. It identifies graded measures and implementing agencies for response to four AQI categories, namely, Moderate to Poor, Very Poor, Severe and Severe + or Emergency.

## B. Initiatives for mitigation of Noise pollution

As a follow up of section 5.2.8(IV) of National Environmental Policy-2006, ambient noise has been included as a regular parameter for monitoring in specified urban areas. Protocol for National Ambient Noise Monitoring Network Programme has been prepared and circulated to state pollution control boards. The Indian government has also launched various campaigns to raise awareness about the harmful effects of noise pollution. For instance, the National Pollution Control Day is observed every year on December 2 to highlight the importance of controlling pollution, including noise pollution. The government has also launched public awareness campaigns, such as the "Horn Not OK Please" campaign, to encourage people to reduce unnecessary honking. The government has also taken steps to address noise pollution from transportation. For example, the Ministry of Road Transport and Highways has issued guidelines to reduce noise from vehicles. The government has also introduced stricter noise standards for two-wheelers and four-wheelers. In March 2011, the Union government set up the National Ambient Noise Monitoring Network (NANMN) through CPCB and the state pollution control boards (SPCBs) to monitor noise on a 24x7 basis in India's seven largest cities [3] which include Mumbai, Delhi, Kolkata, Chennai, Bangalore, Lucknow and Hyderabad.

## C. Scheme of Common Effluent Treatment Plants

The concept arose in order to make a co-operative movement for pollution control. The main objective of the CETPs is to reduce the treatment cost to be borne by an individual member unit to a minimum while protecting the environment to a maximum. A Central Sponsored Scheme (CSS) had been undertaken by the government for enabling small scale industries to set up new and upgrade the existing CETPs to cover all the states in the country. The central subsidy has been increased from 25% to 50% of the project cost. The management of CETP is to be entrusted to a special purpose vehicle registration under an appropriate status. Performance of guarantee at full design load is to be ensured upfront.

## D. Control of Pollution Development of Standards

The Ministry of Environment, Forest and Climate Change formulates and notifies standard for emission of environmental pollutants, water pollutants and noise pollutants from industries, operation or processes with an aim to protect and improve the quality of the environment and abate environment pollution. The Ministry of Environment, Forest and Climate Change is implementing Environment Education, Awareness and Training Scheme with the objective to promote environmental awareness among all sections of the society and to mobilize people's participation for conservation of environment. Under the National Green Corps (NGC) programme of the Ministry, about one lakh schools have been identified as Eco-clubs, wherein, nearly thirty lakh students are actively participating in various environment protection and conservation activities including the issues related to the air pollution. MoEFCC has also notified environmental standards for 84 sectors out of which the effluent standards have been notified for 45 industrial sectors and the emission standards have been notified for 63 industrial sectors [2].

## E. 42 Action Points

CPCB has issued a comprehensive set of directions under Section 18 (1) (b) of Air (Prevention and Control of Pollution) Act, 1986, for the implementation of 42 measures [2]. These measures address various sources of pollution such as vehicle emissions, dust kicked up from roads, other unintentional emissions, burning of biomass and municipal solid waste, industrial pollution, construction and demolition activities, and general steps to combat pollution. Initially, a set of 42 action points was issued for implementation in the NCR, and later, these directions were expanded to include state boards for implementation in other cities that do not meet the air quality standards.

## F. Sewage Treatment Plants Effluent Discharge Standards

The issue has gained significance because of the stress of water bodies which are getting increasing pollutants and may have severe repercussions in maintaining the quality environment in the country. The discharge of effluent from sewage treatment plants is governed by strict standards set by the Central Pollution Control Board (CPCB). The standards are designed to ensure that the effluent discharged into water bodies is not harmful to the environment or human health. The effluent discharge standards for sewage treatment plants that discharge into rivers, lakes or other inland surface waters are more stringent than those for plants that discharge into the sea. Similarly, the standards for plants that treat domestic sewage are different from those that treat industrial wastewater. In the notified standard, the permitted pH range of treatment effluent is 6.5 to 9.0, Biochemical Oxygen Demand(BOD) is less than 50mg/l, Total Suspended Solid (TSS) is less than 10mg/l, Chemical Oxygen Demand(COD) is less than 10mg/l, total Nitrogen is less than 5mg/l and Fecal Coliform is less than 500 MPN/100ml.

## G. SAFAR Program

The SAFAR program [4] was first introduced in Delhi during the 2010 Commonwealth Games to provide air quality forecasts. Later on, the program was expanded to cover three other major cities. In a more recent development, the Ministry of Earth Sciences, in collaboration with the U.S. National Centre for Atmospheric Research, implemented air quality forecasting for Delhi. This included the assimilation of satellite data to achieve a high level of spatial resolution. However, it is important to note that India currently lacks a regularly updated national emissions inventory. This absence has the potential to impact the quality of modeling that relies on accurate emission inventories.

## H. Recognition of Environmental laboratories under Environment (Protection) Act

The successful implementation of environmental protection programme essentially requires identifying and quantifying the pollution sources and pollutants, conducting baseline survey, laying down standards and build up monitoring systems.

3

The Environment (Protection) Act, 1986, provides the legislative framework for the prevention and control of environmental pollution in India. One of the key provisions of the Act is the recognition of environmental laboratories to ensure the accuracy and reliability of environmental data generated through laboratory testing. The environmental laboratory plays a very important role in assessing the status of environment comprising both abiotic (soil, water and air) and biotic (flora, fauna and human being) components [1] The recognition process involves a comprehensive evaluation of the laboratory's technical capabilities, quality management systems, and compliance with relevant standards and guidelines. Laboratories that meet the criteria are granted recognition by the Central Pollution Control Board (CPCB) or the State Pollution Control Board (SPCB).Recognition of environmental laboratories is crucial for maintaining the integrity of environmental monitoring and ensuring the implementation of effective pollution control measures. It facilitates the identification of sources of pollution and provides accurate data to support decision-making and policy formulation. It also enhances public trust in the environmental monitoring process by ensuring that data is generated by competent and reliable laboratories.

## I. Programme on Environmental Health

Ministry has been implementing a programme on environmental health. An Apex committee and working Group have been reconstituted for screening/evaluation of project proposals on environmental health. Under this scheme, below mentioned actions have been taken:

- Action plan for monitoring air quality in polluted cities.
- National water quality monitoring and publishing annual water quality reports.
- National Ambient Noise Monitoring and publishing the report
- Carrying out and sponsoring research activities to environmental protection.

## J. Scheme of Assistance for abatement of pollution

The scheme was conceptualized in 1992 during the seventh five-year plan with the objective inter alia to strengthen the CPCB and SPCBs/PCCs for enforcing statutory provision for pollution abatement [6]. The scheme is a part of centrally sponsored umbrella scheme of pollution abatement. Under this scheme the grants are provided to the state pollution control board/ UT Pollution Control Committees, Environmental Departments of state/UTs, Central/State research institutions and other govt. agencies and organizations with the aim of strengthening their technical capabilities to achieve the objectives of the policy statement.

## K. SAMEER App

The SAMEER App [5] is developed and available for android and IOS devices to display AQI. The App is crafted by the Central Pollution Control Board (CPCB) in India, aimed at mitigating the menace of air pollution. This app furnishes users with up-to-date air quality data and timely alerts in the event of poor air quality in their vicinity. In addition, it disseminates crucial information regarding pollution sources and health advisories particularly for vulnerable demographics. Through this app, citizens can report pollution incidents and monitor the status of their complaints. The app

also features a mechanism that provides access to emissions data from industrial units, allowing users to monitor compliance with pollution control regulations. The Sameer App is a potent tool in raising awareness and empowering citizens to combat air pollution.

## L. Swachh Bharat Abhiyan

The Swachh Bharat Abhiyan [7] or Clean India Mission is another significant initiative launched in 2014. This mission aims to make India open-defecation free and promote cleanliness and sanitation across the country. The initiative also focuses on solid waste management, which is a major contributor to environmental pollution in India. Under this mission, the government has constructed over 100 million household toilets, built community toilets, and provided safe sanitation facilities in public places. The initiative has also led to a significant reduction in open defecation and an increase in the number of waste disposal facilities across the country.

## M. The National River Conservation Plan and NamamiGangeProgramme

The National River Conservation Plan (NRCP) is another government initiative aimed at controlling environmental pollution in India. The NRCP was launched in 1985 with the objective of improving the water quality of the country's rivers. The plan includes measures like sewage treatment, riverfront development, afforestation, and public participation. The government has also established The Namami Gange programme [7] which is a comprehensive initiative launched by the Government of India in 2014, with the aim of cleaning and rejuvenating the Ganges river, which is considered as one of the holiest rivers in India. The programme is one of the largest and most ambitious river cleaning projects in the world, covering 11 states and over 4,000 towns and cities along the river. The programme involves a wide range of activities, including sewage treatment, river surface cleaning, solid waste management, afforestation, and public awareness campaigns. The Namami Gange programme is being implemented through a multi-disciplinary approach, involving various government agencies, civil society organizations and the private sector.

## N. Protection of energy resources

To reduce dependence on fossil fuels and promote the use of renewable energy, the government has implemented several measures. The National Solar Mission, launched in 2010, aims to achieve 100 GW of solar energy capacity by 2022. The government has also launched schemes like the Pradhan Mantri Ujjwala Yojana, which provides LPG connections to households below the poverty line to reduce the use of solid fuels like wood and charcoal for cooking.

## V. CONCLUSION

In conclusion, pollution is an undesirable change in the environment that has harmful effects on living organisms and non-living items. It is caused by pollutants which can be primary or secondary and can be classified as degradable,

Slowly degradable, or non-degradable. Pollution can take various forms, including air pollution, water pollution, soil pollution, thermal pollution, noise pollution, and light pollution. To address the widespread issue of pollution, governments worldwide have taken initiatives and implemented measures. These include the establishment of air quality monitoring programs, the introduction of cleaner fuels and emission standards for vehicles, the launch of awareness campaigns, and the implementation of pollution control schemes and standards. Governments have also focused on sewage treatment, recognition of environmental laboratories, and promoting environmental health. The global response to pollution has been addressed through the United Nations Environmental Assembly and the adoption of resolutions targeting specific aspects of pollution. These efforts align with the Sustainable Development Goals, which aim to achieve a pollution-free planet while addressing other critical issues. In India, the government has implemented several initiatives to combat pollution. These include the National Clean Air Programme, the Graded Response Action Plan, and the Swachh Bharat Abhiyan. The government has also developed apps like SAMEER and online portals like E-Track for industries to monitor and address pollution-related issues. While these efforts are commendable, it is essential for individuals, communities, industries, and governments to work together to reduce pollution and create a cleaner and healthier environment for current and future generations.

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mr Sumit Kumar

# TABLE OF CONTENTS

# Secret's of Aging and It's Perspectives Epigenetic Clock Theory Review

Sumit Kumar

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## ABSTRACT

Each individual got birth, grow, reproduce and got older and finally die. This whole process is known as lifespan. Lifespan is the ability of the body to maintain its life, which is a complex quantitative trait. The process of becoming older is known as aging. Each individual has a definite lifespan under which an organism completes its whole life cycle. For instance, human has a lifespan of about 80-90 years. Some of them are known to live more than up to 120 years. An epigenetic clock based on DNA methylation level of CPGs nucleotide markers can precisely estimate the biological age of an organism. As each organ and tissue in the body has its age thus the biological age is the sum and overall age of all tissue and organs. CPGs nucleotide repeats are a very accurate biomarker of aging that can tell us the age of organism. The factors such as stress-resistant, metabolic regulation, and telomere repeats can affect the aging rate and help the organism to live longer. The mutation in a gene that suppresses the factor in normal condition can resume the longevity. Organ activity decreases with chronological age and eventually leading to death. The status of organ functionality defined by biological age. Thus, a fully efficient and functionally stableorgan can contribute to the longevity of organisms.

Keywords- Lifespan, Aging, Longevity Gene, Biological Age

## What is aging?
Each individual got birth, grow, reproduce & get older and finally die. This whole process is known as lifespan. The process of becoming older is known as aging and the study of the aging process is termed as gerontology. In general; the aging process is continual and progressive change that occurs in any organism that makes it susceptible to disease and death. Aging takes place in cells and organs or within total organisms over time. [35]

Progressive decline in the ability to withstand stress, damage and disease and that is characterized by an increase in the incidence of degenerative and neoplastic disorders clearly define aging. Successful aging is characterized by the avoidance of disease, themaintenance of high cognitive and physical function and an engagement with life.[3]

## Theories of aging
There are several theories of aging that able to explain aging and the aging process. The most promising theory is given below-

## Biological or genetic theory of aging
According to this theory; the lifespan of a cell or organism is genetically determined. The gene of the animal contains a "program" that determines its lifespan. It is pre-determined in their genetic code that when and what changes are going to occur.

The genetic theory of aging is generally based on telomeres. Telomer is a repeated segment of DNA occurring at the end of the chromosome in cells. Telomers are repeated segments of DNA that consists of the sequence 5'TTAGGG3' at the end of the chromosome.

Human cells consist up to 1500 -2000 repeats of this 5' TTAGGG 3' sequence in telomer that determines the maximum lifespan of cells. when a cell divide, it loses multiple repeats each time .once telomeres have been reduced to a certain nucleotide repeats and the cell reaches a critical point and is prevented from dividing further and as result, the cell grows and aged and eventually die.[ 35]

Longevity – "Longevity" means long life, endurance, and prolonged existence. Longevity ofany organism depends upon his diet, way of living and longevity genes suppression or activation.[ 1 ]

## Longevity and Limitation
The limitation is not defined as such because death is not the final result of aging. aging is just a calendar time that has been passed since birth. Any organism subjected to death only when its organs and cells stop working or failed to maintain life in the body. So any organism can live longer by maintaining organs in working conditions in somehow

## How age is calculated?

The chronological age of any person is very straight forward and can easily be understood. Chronological age is an imperfect surrogate measure of the aging process as it does not tell the actual age of the body or organism ( 1).

Thus to know the accurate or more precise age which is biological age; there is a strict need to have an age estimator or biological age estimator. The function of the age estimator is to define the actual biological age. Age estimator help to understand the stage of organ condition in which they currently working. To know the age of organism which is a biological age; reliable biomarkers are required. Which must be the same for all tissue of organism.

## Biomarkers-

The most defining feature of biomarkers is " these are age-associated ". They keep on changing with increase of the age of organ. Biomarkers can accurately and rapidly able to predict the functional capability of a person or organ and how it changes with time(4, 1).thus a perfect biomarker can function as accurate and most reliable age estimator.

For recent; we have approx. six types of potential biological age estimator.

### Epigenetic Clock

1. Telomer length
2. Transcriptomic based
3. Proteomic based
4. Metabolic based
5. Composite biomarker

From all of these age estimators; the epigenetic clock is the most promising molecular estimator of biological age. [5]

### Epigenetic Clock

Epigenetic clock is a biochemical test that can be used to measure age. The test is based on DNA methylation level( 1).

It is developed by steve Horvath and Kenneth Raj and popularly known as epigenetic clock theory of aging which is based on the methylation level of DNA of a tissue and hence age is estimated.

DNA of an organism is made up of nucleotide which is in turn composed of nitrogen bases such as A, T, G, C. The specific arrangement of these nitrogen bases forms a specific nucleotide sequence. there is a specific Dinucleotide sequence in which cytosine or C is followed by guanine or G in 5' to 3' direction, commonly called CpG dinucleotides.

Cytosine in CpG dinucleotide can be methylated to form 5' methylcytosine. ( 1,4,5)

Chronological age, as well as organ condition, has a great effect on the methylation state of CpG dinucleotide as methylation level changes with time or age.

CpG clock- set of CpG are epigenetic age estimator thus it termed as CpG clock of aging. Epigenetic age estimator coupled with mathematical algorithm to estimate age. Epigenetic age may regard as a DNAm age that is not only the reflection of chronological age but also of the biological age of DNA. Due to its accuracy about aging, it regarded as epigenetic clock.

A supervised machine learning analysis yields both a set of CpGs and a corresponding mathematical algorithm that incorporates the DNA methylation level into an age estimate.[6-13,8,11,12,14,15]

Each part of body and organ, tissue and cell has different biological age thus it becomes difficult it estimate the real and actual biological age of that organism. Thus there are two types of biomarkers that are used to determine age. These biomarkers are based on methylation levels in single tissue and in multiple tissues.

### Single tissue DNA methylation-based age estimator

This age estimator applies to only one tissue. This age estimator is based on 76 CpG methylation levels in a single tissue and is invented by Hannum and thus it is known as Hannum clock. It was first constructed by using DNA extracted from saliva.[16,17]

### Multi - Tissue DNA Methylation-Based Age Estimator

This age estimator should apply to all tissue and cell types. This multi-tissue age estimator often referred to as Horwath clock. The rate of change of DNAm age is faster during growth and development. Horwath clock was trained and validated using 8,000 publicly available microarray samples from over 30 different tissue and cell types collected from

HIF-1 is induced in response to hypoxia. thus by inducing mutation in the gene that suppresses genes such as FOXO, HIF-1, NRF2, etc can lead to longevity. Sirtuins are a family of nicotinamide adenine dinucleotide dependent enzyme, which posses deacetylase and ADP- ribosyltransferase activity.SIRT1 homolog, sir2 mediates the beneficial effect of caloric restriction on lifespan in yeast, nematodes, and flies. ( 46 )

Over expression of JKN homolog in the nervous system lived longer and they were more resistant to oxidative stress. In contrast, mutation and stocks with JNK knocked out by RNA interference had a shorter lifespan and elevated sensitivity to the stress factor. ( 47 )

## Metabolism regulation and aging genetics
Growth hormone (GH, somatotropin) and insulin-like growth factor 1 (IGF-1) cause numerous pleiotropic effects (48 ).

The main physiological role of these hormones is growth stimulation. The hormone-receptor complex GH/GHR possesses a tyrosine kinase activity. It triggers the JAK/STAT pathway in liver cells to upregulate IGF-1 expression.

The IGF-1 circulating in the bloodstream interacts with receptor IGF-1R on the cell surface in peripheral tissues. The receptor transduces the signal to IRS proteins, which transduce it further to kinases PI3K, Akt/PKB, and mTOR. mTOR performing two function simultaneously, one is suppression while another one is repression. At same time mTOR suppresses the transcription of FOXO gene and repression and stimulation of transcription of nacrosis factor NF-kβ and both results in cellular aging. Inhibition of FOXO support cellular aging while NK-kβ destroy altered structure supporting growth. In the case of mTOR, kinase S6K is activated to enhance cell metabolism and growth (49 ). The experimental disruption of these IGF-1 effects extends the lifespans of yeast, nematodes, insects (50 , 51 ), and mice (52 ). this pathway is accompanied by the deactivation of energy-consuming processes supporting stress resistance in cells. Similar observations were made in studies of the suppression of theGH/IGF-1 axis in human populations (53 ).

The signaling pathway of the transforming growth factor-beta (TGFβ) is involved in several cellular processes, such as growth, differentiation, apoptosis, and homeostasis maintenance (54 ). Receptors of the factor phosphorylate transcription factors SMAD, which regulate the expression of FOXO3, TERT, MYC, CDKN2B, CDKN1A, APP, TNC, and MET ( 55 ). These genes control bone-forming cell differentiation, neurogenesis, ventral mesoderm specialization, gonad development, angiogenesis, and extracellular matrix neogenesis. They are also involved in the arrest of the G1 phase of the cell cycle and other processes (Hannon and Beach, 1994). Factor TGFβ supports the induction of gene markers of cellular aging and participates in the formation of the senescent cell phenotype under oxidative stress (56 ).

Studies of nematodes have shown that the knockout of the gene encoding the TGFβ homolog favors the formation of dauer larvae and extends their lifespan (57 ). It also extends the period of animal reproduction (58 ). A polymorphism in the coding sequence of TGF β in humans is associated with longevity (59 ).

Another example of proteins favoring longevity and regulating metabolism is AMP-activated protein kinase (AMPK). It is triggered by elevation of the AMP: ATP ratio resulting from cellular energy deprivation, mitochondrial respiration disruption, or hypoxia ( 60 ). AMPK controls a variety of metabolic pathways, including the uptake and consumption of glucose and lipid oxidation ( 61 ). It may affect the lifespan and health of animals and humans (62 ). It is responsible for the beneficial effect of restrictive diets, in particular, by mediating SIRT1 induction (63 ). AMPK activation prolongs the lives of worms and flies ( 64,65 ). The lives of mice and worms are prolonged by treatment with AMPK activators: phenformin and metformin (66,67 ).

## Support of Genome Integrity
Lifespan directly correlates with the efficacy of DNA repair. The efficacy of excision DNA repair increases with the maximum lifespan in seven mammalian species (68 ). The activity of poly [ADP-ribose] polymerase 1 (PARP-1), which is a sensor of DNA breaks, directly correlates with the maximum lifespan in 13 mammalian species (69 ). Also, the maximum lifespans of seven mammalian species correlate with the cellular levels of enzyme Ku80, which recognizes double-strand DNA breaks (70 ). Extraordinary copy numbers or specific features of nucleotide sequences of some DNA repair genes are observed in animals with outstanding longevity. (71,72,73 ). In man, at least 25 genes for repairing double-strand DNA breaks are associated with longevity in centenarians (74 )

DNA integrity is maintained by mechanisms supporting DNA break recognition, cell cycle arrest at checkpoints, and removal of DNA lesions either by their repair or by arresting cell division and apoptosis. Lowered activity of genes responsible for genome stability shortens lifespan and stress tolerance, and overexpression of some such genes is beneficial. Many progeria syndromes are caused by mutations in genes encoding enzymes that recognize and repair DNA lesions. Such syndromes include the Werner syndrome (mutation in the WRN gene), xeroderma pigmentosum (mutation in one of the genes controlling the excision repair of nucleotides), the Cockayne syndrome (mutations in the CSA and CSB genes), ataxiatelangiectasia (mutation in the ATM gene), the Seckel syndrome (mutation in the ATR

gene), and the Nijmegen breakage syndrome (mutation in the NBS1 gene for cofactor of ATM kinase) (75 ).

Kinases ATM and ATR are the most important sensors for double- and single-strand DNA breaks. They control the start of cell cycle checks, initiation of cell cycle arrest, and DNA repair. They phosphorylate the key proteins of the signaling cascades in response to DNA damage such as p53, Chk1, Chk2, Mdm2,NSB1 and AMPK etc.

One of the targets of these kinases is transcription factor p53. Its activation is essential for various responses of a cell to stress: cell cycle arrest, DNA repair, and cell death (apoptosis).

The transcription factor p53 controls the expression of genes for the excision repair of the bases and nucleotides and for mismatch repair. Such genes include other longevity genes, e.g., GADD45. The GADD45 gene family encodes small regulatory proteins involved in many processes that support genome stability via protein–protein and DNA–protein interactions (76 ). In Drosophila, a mutation in the D-GADD45 gene shortens lifespan and distorts biological responses to gamma irradiation (77 ). In contrast, D-GADD45 overexpression in the nervous system of Drosophila considerably prolongs life without weakening the life quality parameters (78 ). Beneficial effects are also produced by overexpression of other genes supporting genome integrity, such as PARP-1 or XPF (75, 79).

Telomerase activity also contributes much to genome integrity. Telomerase is a reverse transcriptase. It synthesizes highly repetitive telomeric DNA, which is shortened by each division of mature somatic cells (80 ). Although the data for the correlation between telomere length with lifespan and aging rate are inconsistent, it is known that human cardiovascular diseases are accompanied by a considerable shortening of telomeres in endothelium cells. In Alzheimer patients, telomeres are not shortened, but they operate incorrectly (81).

The overall reactivation of telomerase allows preserving the length of intact telomere regions, which should improve the replicative and reparative ability of tissues (82 ) and favor health preservation and life prolongation.

Also, telomerase is involved in the regulation of intracellular signaling pathways, such as mTOR (83 ), NF-κB, and COX-2 (84 ); mitochondrion function mechanisms; and response to oxidative stress (85).

### Circadian Rhythms

Circadian Rhythms are physical, mental and behavioral changes that follow a daily cycle. they respond primarily to light and darkness in an organism's environment. Sleeping at night and being awake during the day is an example of light-related circadian Rhythm. Circadian rhythms are genetically determined variations of the physiological parameters occurring at about 24-h periods and depending on the light/dark regime. They are controlled by a strictly hierarchical system of molecular oscillators based on transcription–translation or translation–translation feedback loops. Genes for circadian rhythms and their products are involved in many molecular processes associated with aging; in particular, in the development of age-related disorders (86 ). the lifespans of various model species were altered by manipulations with the circadian rhythm genes. Individual mutants for *BMAL1*( Brain and Muscle ARNT-like1) and knockout for it had shorter lifespans. Deletion of BMAL1 gene from circadian loop is responsible for activation of nacrosis factor NF-kβ which shorten lifespan in case of mice while in case Drosophila tim gene or timeless gene of circadian loop inhance lifespan if drosophila is subjected to restricted caloric intake.[87 ] The deletion of that gene from drosophila genome can shorten the lifespan. Thus ,The protein affects the senescence rate by interacting with components of the mTOR signaling pathway (88 ) CLOCK activates proinflammatory factor NF-κB, which shortens lifespan. The Drosophila Timeless gene considerably prolongs life with increased caloric intake (89).

## CONCLUSION

Various physiological behavior and genes are responsible for aging in an organism. Biological aging can be retarded and can slow by having mutation intently or accidentally in a gene that suppresses the longevity gene. Well stable and functionally good organs can extend the lifespan of organism.

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