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Role of AI in reviving Indian Knowledge System

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ABSTRACT

Indian Knowledge System (IKS) stock still in ancient wisdom embrace vast areas such as medicine, Ayurveda, Science, Art and philosophy. These sources of knowledge struggling challenges of preservation and accessibility in the modern digital era. Artificial Intelligence (AI) arise as a transformative tech for digitizing, preserving, and promoting IKS globally.

This paper explores AI's ability to preserve Indian knowledge, enhancing accessibility, and nurturing innovation. It fosterages AI credibility in Natural Language Processing, translation, and upholding knowledge while pointing initiatives and challenges in integrating responsible innovation that balances technological efficiency with cultural heritage.

KEY WORDS: - Artificial Intelligence, Language Processing, Indian Knowledge Systems.

Introduction: -

India, with its rich history and diverse cultural heritage, is always a source of knowledge that have shaped its civilization for millennia. Rooted in ancient scriptures, philosophical treatises (Vedas and Upanishads), and empirical wisdom such as Aryabhata's works in mathematics and the Charaka Samhita in medicine demonstrate advanced scientific thinking of ancient times, IKS have shaped global intellectual and cultural traditions for centuries. This knowledge system, however, faces challenges of preservation due to language barriers, fragile manuscripts, and a lack of integration into contemporary learning frameworks. The innovation of Artificial Intelligence (AI) provide a transformative opportunity to address these challenges. AI including natural language processing (NLP), machine translation, and knowledge representation tools, enable the digitization and dissemination of IKS with precision and accessibility. For example, AI tools analyse and interpret ancient Sanskrit texts, bridging the gap between traditional knowledge and modern applicability. Moreover, AI facilitates the global promotion of IKS by creating educational experiences through virtual techniques, building heritage sites and old practices accessible globally. The conversant relationship between AI and IKS holds huge potential to preserve cultural heritage while fostering educational research based innovation.

IKS an Overview: -

Indian Knowledge System construct a comprehensive body of knowledge that has evolved over millennia, in different fields such as arts, science, medicine, philosophy. These systems reflect India's rich intellectual traditions and their influence on global thoughts. The philosophical contributions in India include the Vedas and Upanishads, as a glorified spiritual Literatures in Hindu mythologies. Religious leaders as Adi Shankaracharya, Mahaprabhu Sri

Harivansh, and Swami Vivekananda etc forwarded these ideas, providing frameworks for understanding the self and society. Indian scientists and Mathematicians made tremendous contributions, with Aryabhata in astrology and the concept of Zero, and Varahamihira advancing meteorology and hydrology. Medical systems like Ayurveda, such as the Charaka Samhita and Sushruta Samhita, laid the foundation for holistic healthcare practices. Indian linguistic domain, particularly Panini's grammar in the Ashtadhyayi, represent one of the first time concept of a language, evolved as an advanced concepts of linguistics. The development of Sanskrit literature by Maharishi Kalidasa is also one of the heritage of India. India's contributions to art and architecture include classical music and dance forms like Bharatanatyam, Kathakali and Kathak, as well as architectural structures such as the temples of Khajuraho and the caves of Ajanta and Ellora, which reflect the supremacy of spirituality and artistic excellence. This Indian rich heritage of knowledge is incomparable contribution to the world but still the preservance and conservation of this rich source of tradition is major challenges for the future generations.

(A) Role of AI in preserving and Promoting IKS: -

Artificial Intelligence (AI) has emerged as a transformative tool for preserving and promoting Indian Knowledge Systems (IKS). Artificial Intelligence process and analyse complicated data enables the digitization, interpretation, and dissemination of ancient knowledge with unprecedented precision and reach. The key roles of AI are as follows.

Information preservation: -

2 Many traditional manuscripts are handwritten, on palm leaves, in ancient or regional languages (such as Sanskrit, Tamil, Prakrit, etc.), or they are not well maintained. They can be digitized, decoded, translated, categorized, and stored with the aid of artificial intelligence (AI) methods such as optical character recognition, natural language processing (NLP), and machine translation. For instance, AI has been employed to analyse and digitize scripts in regional and ancient languages, creating searchable databases that enhance accessibility. This effort ensures that fragile manuscripts, often written on palm leaves or parchment, are protected from physical degradation.

Natural Language Processing (NLP): -

NLP technologies are beneficial in interpreting ancient Indian texts, particularly those written in Sanskrit, Pali, Tamil or in other regional classical languages. AI can perform an important role in semantic analysis to extract the meaning of these complex texts and help in translation but side wise side maintain the conscience of original text. This NLP enhance the accessibility of data which if not processed may lose ancient scriptures with passes of time.

2 **Protection from misuse: -**

In ancient time even though Indian traditional medicine or remedies were already widely available locally, they were occasionally patented by foreign organizations claiming innovation. AI and digitization facilitate prior art searches, decreasing the likelihood of frequently patents. Here, Traditional knowledge digital Library (TKDL) plays a crucial role.

More accessibility and Education: -

People living in distant and hard places lack of transformational services having least access to sources of knowledge advocators of traditional knowledge. Chat bots, apps, and virtual learning are examples of artificial based systems that can assist in educating people in their native languages. AI in education prepare or develop automated teaching tasks, evaluate student progress, personalize instruction, and relax more time for mentoring. AI can improve education system in India to tremendous level asper studies.

Sustainability of environment with Health and agro sectors:

Traditional methods of medicine and agriculture have strong connection with environment conservation. AI can assist in climatic friendly crops, biodiversity tracking, herbal medicines, as per safety standard. Combining AI and traditional medicine (Ayurveda, homeopathic) in public health can provide diagnostics, effective care in transformation, production and supply and more.

Ethical and cultural guidance:

Indian knowledge systems are rooted in ethics, values (such as five universal values Truth, Righteous conduct, peace, Love and Non-violence), worship of nature, and Dharma based karmas. So Progress without values could not help the individual in harmonious development in life. IKS philosophy can help in human centric AI designs or systems that uphold social fairness, morality based progress in futuristic transformation of culture.

Innovative Research:

AI-driven knowledge representation systems organize IKS into structured formats such as ontologies and knowledge graphs. These tools enable researchers to connect with different aspects of IKS, such as linking Ayurveda's medicinal practices to modern pharmacy or integrating Vedic astronomy with contemporary astrophysics. These type of links help in interdisciplinary research and facilitate deeper insights into the historical and scientific relevance of IKS.

Glory to National integrity: -

India's integrity and uniqueness is rooted in its traditional wisdom. Its preservation and promotion propagates cultural diplomacy that makes India's contributions more widely known. AI can assist in the translation, interpretation, and presentation of Indian philosophy, literature, and the arts to audiences around the world.

(B) Challenges of AI with IKS: - There are a few challenges to be aware of in order to ensure that the advantages are realized:

Technology deficit: -

The gap between traditional knowledge and cutting-edge technology needs to be bridged through interdisciplinary collaboration and research. Without language support AI cannot process large amount of knowledge accurately.

Complexity of classical manuscripts: -

IKS is written in classical languages like Sanskrit, Tamil and Pali, etc. which are highly complex and context-dependent. Moreover, development of AI tools as per context and

conscience of these complex languages needs utmost precautions. For instance, Sanskrit's intricate grammar, as outlined in Panini's Ashtadhyayi, requires advanced natural language processing (NLP) strategies to interpret accurately without losing semantic meaning.

Role of Educational institutions and research: -

Educational institutions and research centres can play a crucial role in fostering this integration, encouraging a synthesis of ancient wisdom and modern scientific inquiry as government-private partnership role to enhance the AI based work. Management of fund and finance as per our necessities require accurate calculations as per population and ratio to rely on.

Ethical considerations in AI development: -

Ethical considerations in AI development must align with the values ingrained in the Indian knowledge system. Upholding traditional wisdom, AI use needs to avoid bio piracy, respect of community rights, and respecting due weightage. AI systems have the potential to distract from the original context; if they are exclusively fragmented from particular theme, they may overlook or misrepresent others. So AI must maintain the research ethics during Conversion of text.

Privacy and security in the use of AI: -

Privacy and security in the use of AI require a careful balance that reflects the societal and moral fabric of the country. A significant challenge in applying AI to IKS is the scarcity of high-quality data. Many ancient manuscripts are incomplete, fragmented, or inaccessible, making it difficult to develop robust AI models. Moreover, existing digitized content often lacks standardization, which complicates its integration into AI systems. It will create problem in integrated standard complete robust pack of module.

AI balance between traditionalism and modernism –

Government initiatives and private-sector partnerships can catalyse the fusion of traditional knowledge and AI innovation. Dependency on AI may lead us to data from conventional knowledge as focussed AI module. Further it may disturb the Mentor-disciple relationship which is deep rooted in Indian Education system.

Investment in research and development: -

Investment in research and development coupled with educational programs that blend ancient wisdom with contemporary technology, can create a conducive environment for the emergence of a uniquely Indian approach to AI.

(C) Suggestions for AI Transformations: -

Standardized Technology: -

The gap between traditional knowledge and cutting-edge technology needs to be bridged through interdisciplinary collaboration and research. Proper NLP tools for classical languages

processing must be available. Technology must be feasible as per requirement. AI must be able to access a large amount of knowledge with language support.

Maintain integrity of classical manuscript: -

To maintain the integrity of linguists, and culturally sensitive tools based on AI, it is important to collaborate the among technology, classical manuscripts, human resources and context of content. Interdisciplinary collaborations with AI must ensure the integrity of IKS.

Institutional framework for research:

As government-private partnership role to enhance the AI based work, Educational institutions and research centres can play a crucial role in fostering this integration, encouraging a synthesis of ancient wisdom and modern scientific inquiry by providing fund and finance to develop accurate tools of AI.

Ethical considerations: -

Formulate ethical guidelines and legal mechanism for digitizing and commercializing traditional knowledge will ensure that the interests of indigenous stakeholders and people are preserved and respected. Ethical considerations in AI development must align with the values ingrained in the Indian knowledge system.

Privacy and security: -

Privacy and security in the use of AI require a careful balance that reflects the societal and moral fabric of the country. A significant challenge in applying AI to IKS is the scarcity of high-quality data.

Saving Conscience of stakeholders: –

Each stakeholder must catalyse the fusion of traditional knowledge and AI innovation. To reduce the dependency on AI must work in accurate data transfer from conventional knowledge to AI module. So that it may not disturb the Mentor-disciple relationship which is deep rooted in Indian Education system.

Investment in research: -

Wisely investment in research and development for educational programs that blend ancient wisdom with contemporary technology can create a conducive environment for the emergence of a uniquely Indian approach to AI.

Conclusion:

The fusion of Indian knowledge system and artificial intelligence showcasing a must happening journey towards innovation and cultural harmony. As India is on the verge of propagation of traditional ancient wisdom with technological advancement to a leadership position in the global AI mechanism. Indian knowledge system with yogic principles, Vedic Mathematics and rich cultural diversity, we can contribute to the novel perspectives and solutions to the challenges highlighted by the AI. As India embraces the digital era, the harmony and synthesis of tradition and innovation becomes not only a strategic advantage but also testimony to the immediate realization and authentication of our knowledge system.

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