Review Article

Evolution of Tools for Scientific Validation of Ayurveda in Amalgamation with Artificial Intelligence – A Review

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Abstract

Ayurveda is a science of life that emphasizes a holistic approach to health and individualized treatment. It is commonly recognized that Ayurveda has a lot of potential for treating chronic illnesses that contemporary medicine is unable to heal. Despite the enormous potential of Ayurvedic medications, the science is still not favoured to be accepted as conventional wisdom. The reason for this is a dearth of new research in the field of Ayurveda; also, there is a disconnect between cutting-edge technical developments and the development of methods to be incorporated into Ayurveda. World Health Organization estimates that 70–80% of the world's population uses alternative treatments, mainly herbal remedies. Artificial intelligence (AI) systems can analyze a person's inherited, physiological, and life data to establish their specific Ayurvedic constitution, or "Prakriti." Using this knowledge, interpreters can create personalized treatment strategies that promote a long and healthy life. Machine learning models can spot trends in Ayurvedic diagnoses and therapies, forecasting age-related decreases and suggesting countermeasures.

Combining complementary and modern medicines can improve patient issues and treatment strategies. This study investigates the application of machine learning to Ayurveda, an ancient Indian medical system that is gaining recognition and acceptance on a global scale. Ayurveda is currently not exposed in terms of various concepts and ideologies. To decrease the lacunae in the current availability, the agglomeration of Ayurvedic sciences with modern technologies such as artificial intelligence and machine learning is essential. However, one of the issues with Ayurvedic medicine is the lack of standardization in diagnosis, which can lead to inconsistent and erroneous treatment. Machine learning can identify medical problems objectively and consistently. The study results indicated that machine learning algorithms could be used successfully for Ayurveda.

Keywords

Ayurveda; Ayurveda Diagnosis; Research Methodology; Artificial Intelligence; Ayurveda Pharmacognosy.

Introduction

Ayurveda is the science of life, with a holistic approach towards health and personalized medicine/care. It is very well known that Ayurveda has great potential to treat chronic diseases, which are untreatable in modern medicine. Unfortunately, for many decades, this science has been underrated and ignored. The reason behind this is the lack of further research in this system and the gap between technological advancements and their amalgamation in Ayurveda. According to WHO, 70-80% of the world population relies on modern medicines, especially herbal ones. Though highly effective, Ayurvedic treatments are still under-explored and not popular among the communities.

Now, the world is stepping towards Artificial intelligence (AI), which can most easily be referred to as the making of intelligent machines, especially computer programs. Although for the classical mindset, it may seem unfair to develop (or modify) the ancient system of medicine by amalgamating it with

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current advanced technology, i.e., Artificial Intelligence, it is not impractical. Furthermore, despite challenges, the blend of Ayurveda and Artificial Intelligence can bring about many advancements in science and healthcare, thereby benefiting mankind.

Aims and Objectives

The current article is aimed at reviewing the evolution of Ayurveda in amalgamation with Artificial Intelligence.

Materials and Methods

This research is a conceptual one. As source materials, the classical Ayurveda texts, along with the commentaries available in the library of Ch. Brahm Prakash Ayurved Charak Sansthan, Delhi, is referred. Other than this, various related research article published has also been studied. All the relevant matter is further compiled and analyzed for the discussion and attempts to conclude the scientific potential of fundamental concepts of Rachana Sharir.

Discussion

Need of the hour

Ayurveda is regarded as a thousand-year-old science. This system of medicine has been time-proven and beneficial not just for the individual's health but also in ensuring their (holistic) well-being. However, this discipline has not been further developed for decades. Lack of research, public awareness, Ayurveda lagging in scientific advancement, lack of popularity, etc., are the reasons behind this downfall. Now that Ayurveda is regaining its popularity worldwide, it is essential to keep it at a pace & sync with the growing technologies.

Why is it essential?

Ayurveda is being revolutionary in the field of health sciences. Now that most of the world's population mainly depends on machines for their actions, bringing the health system in that direction is impressive. It is also important to be accurate, practical, and parallel to the direction of community orientation. The amalgamation of Ayurveda and Artificial intelligence can potentially provide solutions to most problems by helping in the early detection of diseases, making accurate diagnoses and outlining prognoses and personalized medicines, and enhancing the community's health literacy. This amalgamation will also aid individuals' educational skills and learning in the context of health sciences. The amalgamation can build better relations and effective communication between patient and physician; the latter will also help improve the digital identity of the individual. AI can change the history of Ayurveda. Possibilities for multidisciplinary AI research and Ayurveda information base can produce ground-breaking results in terms of disease prediction, prevention, and providing tailored therapy.[1]

What are the benefits?

Today, Ayurveda has started to use modern state-of-the-art techniques to prove the scientific explanation behind the concepts written in ancient manuscripts. Artificial intelligence would be helpful in different aspects to enhance the pace of research on Ayurveda and its worldwide recognition. Development of tools for better scientific validation and increase the penetration of concepts to the community, re-development of manuscripts for better understanding and approach in context to today's era. It will also improve the infrastructure for Ayurveda and the health industry in general. AI in Ayurveda will bring the concepts among the young generation so that they can understand the golden connection of a healthy and happy life. It can make the treatment personalized for everyone as furnished by the elaborate range of herbs in Ayurveda. Furthermore, AI can help improve patient care by prompting effective communication between patients and physicians and supporting physicians to provide better care.

Above, we have highlighted just a few benefits; there could be an endless list of advances one can have with this amalgamation.

Artificial Intelligence has grown exceptionally recently, particularly in the healthcare system. Machine learning and deep learning are capable of pattern recognition, developing predictive models, and performing classification tasks through artificial neural networks. These capabilities have led to significant advancements in various healthcare domains, from early disease detection to personalized treatment plans. [1]

Artificial intelligence is being used in the field of complementary and alternative medicine. Various researches have been conducted for Ayurveda-based disease diagnosis using machine learning. One such example is Nadi-pariksha or pulse diagnosis.

In the current phase of globalization, the world is not turning up on India; Ayurveda, our soft power, is not being accepted worldwide. To match the frequency of globalization, Ayurveda has to be integrated with artificial intelligence.[2]

Merging Ayurveda and Artificial intelligence can provide a unique opportunity to blend ancient wisdom with modern technology, leading to better healthcare outcomes. The area of such synergy may include Personalised diagnosis, Predictive analytics for functional aging, and decoding ancient texts.

AI algorithms can dissect an existent's inheritable, physiological, and life data to determine their unique Ayurvedic constitution or "Prakriti." This information helps interpreters develop customized treatment plans that support a long and healthy life. Similarly, Machine learning models can identify patterns in Ayurvedic judgments and treatments, prognosticating age-related decline and recommending preventative measures.

This information refines treatment plans and optimizes the health issues of the patient. AI-powered natural language processing (NLP) can decrypt and assay ancient Ayurvedic textbooks, making this knowledge more accessible to experimenters, interpreters, and the population. This renewed science can lead to a better understanding of Ayurveda's principles and their operations in promoting life and graceful aging.[3]

Indeed, AI is being actively applied in complementary and alternative medicine, so it is necessary to elaborate and utilize the database of traditional medicinal pharmacology to be used in ethnopharmacology. This work can help drug investment in the field of network pharmacology. To help the practitioners prescribe medicines, AI and ethnopharmacology in traditional medicines are required to be integrated.[4]

With the increasing use of AI in the field of Ayurveda, Ayurveda diagnostics is also emerging as a potential market. It is not only specialized to assist physicians but also assists the public by encouraging them to mobilize toward holistic health without any extra effort.

Applications frequently use artificial intelligence models, such as analyzing herbal components, patient clinical data, and forecasting prescriptions and pathways. Ontology-based AI models are reported for predicting side effects[6] and algorithms assessing herb-induced liver toxicity[7]. Herbs in a prescription can be captured using the hierarchical alternative neural network model to determine their efficacy[8]. By examining massive data sources, deep learning techniques have been utilized to define patterns of qi-enriching and blood-enriching herbs to recommend prescriptions[9]. Such AI findings could be used in research and development to create new foods or phytomedicines.

Optimizing AI to deal effectively with the challenges faced by the Ayurveda Pharma industry, such as large-scale availability of drugs, quality assurance, and standardization, which makes them palatable, dosage fixing for multiple formulations, increased shelf life, uniform supply of medicine safety and efficacy, can be achieved.[10]

Conclusion

Ayurveda, stated as the science of longevity, is one of the oldest holistic health systems. The amalgamation of Ayurved and artificial intelligence can provide a unique opportunity to lead by merging ancient wisdom with modern technology. Ayurveda and AI are a testament to the enduring applicability of ancient wisdom and the transformative eventuality of ultramodern technology. As we explore this dynamic crossroad, the hunt for life and graceful aging will profit from the critical combination of time-tested principles and cutting-edge invention. In the ever-changing world of heartiness, the ancient wisdom of Ayurveda and the ultramodern phenomenon of AI prove that the stylish results can be set up where the history and the future collide.

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