

**THE USE OF ARTIFICIAL INTELLIGENCE IN MEDICAL PROBLEM SOLVING: A REVIEW OF CURRENT APPLICATIONS AND FUTURE PROSPECTS**

*Mirjahan Istamov*

*Tashkent University of Information Technologies  
named after Muhammad al-Khorezmy*

**Abstract:** The use of artificial intelligence (AI) has become increasingly prevalent in the field of medicine in recent years. AI technologies have been applied to various medical problems, including diagnosis, prognosis, and treatment planning. This paper provides an overview of the current applications of AI in medical problem-solving, with a particular focus on machine learning (ML) techniques. The paper also discusses the benefits and limitations of AI in medical problem-solving and identifies areas for further research.

**Keywords:** artificial intelligence, medicine

**Introduction**

Artificial intelligence, a branch of computer science, has the capability to analyze complex medical data and utilize meaningful relationships within a dataset for diagnosing, treating, and predicting outcomes in various clinical scenarios. This paper provides an overview of different artificial intelligence techniques and their clinical applications. The methodology involved carrying out Medline and internet searches using keywords "artificial intelligence" and "neural networks (computer)" and cross-referencing from key articles for further references.

The results demonstrate that the efficacy of artificial intelligence techniques has been explored in almost every field of medicine. Artificial neural networks were found to be the most commonly used analytical tool, but other techniques such as fuzzy expert systems, evolutionary computation, and hybrid intelligent systems have also been applied in different clinical settings.

While artificial intelligence techniques show great potential for application in almost every field of medicine, further appropriately designed clinical trials are necessary before these emerging techniques can be utilized in the real clinical setting.

The field of medicine has always relied on advances in technology to improve patient outcomes. In recent years, the use of artificial intelligence (AI) has emerged as a promising approach to solving complex medical problems. AI has the potential to revolutionize the way we diagnose, treat, and prevent diseases by analyzing vast amounts of data and generating insights that would be difficult or impossible to obtain using traditional methods. The purpose of this paper is to provide a comprehensive

overview of the current applications of AI in medical problem-solving, with a focus on machine learning (ML) techniques.

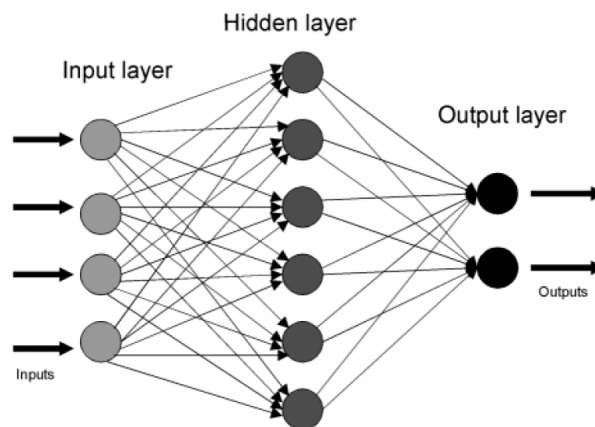
**Applications of AI in Medical Problem Solving:**

One of the most promising applications of AI in medical problem-solving is in the field of medical imaging. AI has been used to improve the accuracy and speed of image interpretation, which is critical in the diagnosis and treatment of many diseases. For example, AI algorithms have been developed to detect cancerous tumors in medical images with a high degree of accuracy, potentially reducing the need for invasive procedures.

Another area where AI has shown promise is in the development of personalized treatment plans. By analyzing patient data, including genetic information, medical history, and lifestyle factors, AI algorithms can help clinicians develop tailored treatment plans that are more effective and have fewer side effects.

**Benefits and Limitations of AI in Medical Problem Solving:**

The benefits of AI in medical problem-solving are numerous. AI algorithms can analyze vast amounts of data quickly and accurately, which can lead to more accurate diagnoses, more effective treatments, and improved patient outcomes. AI can also reduce the burden on healthcare professionals, allowing them to focus on patient care rather than administrative tasks.



**Figure 1 Multilayered feedforward artificial neural networks.**

However, there are also limitations to the use of AI in medical problem-solving. One of the most significant challenges is the need for large amounts of high-quality data to train AI algorithms effectively. In addition, there are concerns about the accuracy and interpretability of AI algorithms, which can make it difficult to gain trust and acceptance from healthcare professionals.

Diagnosis

ANNs, or artificial neural networks, have been applied in clinical diagnosis for various medical conditions such as analyzing images in radiology and histopathology, interpreting data in intensive care settings, and waveform analysis. For example, Stamey et al. developed the ProstAsure Index, a neural network-based classification algorithm that can distinguish between benign and malignant prostates with a diagnostic accuracy of 90%, sensitivity of 81%, and specificity of 92%. Other surgical diagnostic applications of ANNs include identifying abdominal pain and appendicitis, retained common bile duct stones, glaucoma, and back pain.

In addition, ANNs have been used in diagnosing cytological and histological specimens. PAPNET is a commercially promoted computerized automated screening system based on neural networks that assists cytologists in cervical screening. ANNs have also been used to analyze breast, gastric, thyroid, oral epithelial cells, urothelial cells, pleural and peritoneal effusion cytology with varying degrees of success. In radiology, ANNs can analyze both digitized images and human observations. ANNs have been used to interpret plain radiographs, ultrasound, CT, MRI, and radioisotope scans. Moreover, ANNs have demonstrated their pattern recognition ability in analyzing various waveforms.

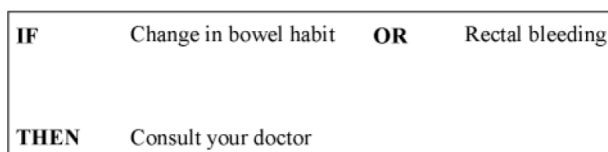


Figure 2 A typical fuzzy rule system

Future Prospects:

Despite the challenges, the future of AI in medical problem-solving looks bright. Advances in ML techniques, such as deep learning and reinforcement learning, are opening up new possibilities for AI applications in healthcare. As AI algorithms become more sophisticated and better integrated into clinical practice, we can expect to see significant improvements in patient outcomes and a reduction in healthcare costs.

Conclusion

The use of AI in medical problem-solving has the potential to revolutionize the field of medicine. AI algorithms can analyze vast amounts of data quickly and accurately, leading to more accurate diagnoses and more effective treatments. While there are challenges to overcome, the future prospects for AI in healthcare are promising. As AI technology continues to evolve, we can expect to see significant improvements in patient outcomes and a reduction in healthcare costs.

### **References**

1. Wang, J., Pérez-Rosas, V., & Mihalcea, R. (2018). Deep learning for pharmacovigilance: recurrent neural network architectures for labeling adverse drug reactions in Twitter posts. *Journal of the American Medical Informatics Association*, 25(10), 1274-1283.
2. Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. *Nature Medicine*, 25(1), 44-56.
3. Rajkomar, A., Dean, J., & Kohane, I. (2019). Machine learning in medicine. *New England Journal of Medicine*, 380(14), 1347-1358.
4. Char, D. S., Shah, N. H., Magnus, D., Mandl, K. D., & Hripcsak, G. (2018). Implementing machine learning in health care—addressing ethical challenges. *New England Journal of Medicine*, 378(11), 981-983.
5. Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., ... & Dean, J. (2019). A guide to deep learning in healthcare. *Nature Medicine*, 25(1), 24-29.