

Chapter 21

Artificial Intelligence Approaches in Diabetic Prediction

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ABSTRACT

Healthcare applications in monitoring and managing diseases have undergone rapid development in medical sectors and play an important role in observing and controlling diabetes mellitus (DM). DM is a chronic infection that is caused by extreme blood sugar level. The rapid increase of DM world-wide has the effect of gaining attention to predict DM at early stage. Consequently, various technologies have been used to diagnose diabetes at an early stage to avoid major health defects. The most satisfaction in disease prediction and classification methods has been achieved through AI techniques and algorithms in healthcare. The main objective of the study is to provide a detail review on DM, the increase of DM around world-wide, datasets used in diabetic prediction, advance techniques and methods applied for disease prediction, and applications and its limitations used in diabetic prediction. The study also provides a detailed review on recent techniques and methods used in disease prediction, which guides the evolution of AI techniques and will provide a well-grounded knowledge of existing methods.

1. INTRODUCTION

AI has witnessed a significant increase in development in the health care sector in existing years, owing to increased consideration and its significant influence on health care provision and efficiency. AI-assisted healthcare is becoming more widespread as computational technology and algorithms improve, as well as the digitalization of massive amounts of health data. AI's advancement is reshaping how health care is individualized and distributed to patients, creating unique chances and constraints in medical care. The rapid development of computer healthcare information is outperforming human capabilities to interpret and evaluate it in ordinary medical care, which is a major concern in today's modern healthcare. Developments that exist have the option to terminate this gap while also ensuring patient safety in medical care. In

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addition, healthcare systems are under strain from looming personnel shortages, ageing populations, and rising expenses in the face of shrinking finances. As a result, the healthcare industry is increasingly turning to AI to handle these issues, which is understandable. AI is now being used in a variety of areas in medical, from medical process automation to understanding of medical studies and forecast of healthcare results, reply to therapy, and ailment recurring. AI presents an opening for available and evidence-based decision making within the global health community given the rate at which AI algorithms are also being generated, upgraded, and used. In Medical Research, Big Data, and Autonomous Vehicles, AI has achieved some astonishing outcomes. ML, DL, and ANN are three fundamental AI ideas that aid in understanding the more complex concepts of driving software, data mining, and natural language processing. Instead of just replacing the work of members of the healthcare team, AI tools assist and improve it. AI assist healthcare team in jobs, like administration work, maintaining patient details, and patient's outreach. AI also help in areas like Image classification, medical equipment automation, and Observing patients (Chaki et al., 2020).

Most useful AI applications in healthcare are viewed from a variety of perspectives. In 2018 it is noted that AI played a major role in Organizational Systems, Image Analysis, Robotic Surgery, Simulated Assistants, and Clinical Decision Assistance (Atlas, 2015). Accenture identified the same themes in a 2018 report, as well as connected machines, Error reduction, and Cybersecurity (Marr, 2018).

AI widely used in diabetes treatment like retinal screening, risk stratification, patient management etc. Fitness trackers, mobile phones and additional gadgets have been introduced as a result of technical progressions that can assist in the constant monitoring and control of a patient's complaints and medical condition. For fast data processing and the availability of technical and gadgets for diabetes care, AI is a feasible and attractive option. For optimal diabetes treatment, doctors and medical workers can help clinicians select Automation care. Diabetic patients, medical providers, and medical systems are three primary categories in which AI can affect and improve diabetes care. AI has improved resources consumption in health care systems by presenting novel features of self-care for diabetic patients, introducing speedy and reliable decision making and flexible follow-ups for health care providers, and introducing new dimensions of self-care for diabetic patients. First the study explains the DM and its growth in world-wide in three different categories, like developed, developing and under developed country. AI in healthcare systems is also detailed in order to understand importance of AI and advance applications of AI used in healthcare. Nowadays DM became a life-threatening disease, so it is important to know the reason for the increase and also it is a responsibility to develop more applications and algorithms, that is used for early prediction of the DM, increasing day by day and also to provide clear understanding that, lacking of healthcare system is not only reason for the rise of the disease, but also the life style of human is one of the main reasons. The AI in healthcare and AI in diabetes prediction provides a knowledge on development of the advance techniques in the disease prediction.

The specific Objective of the study are as follows:

1. To understand the Diabetes Mellitus and its drastic increase over world-wide in three categories.
2. To gain knowledge in development of AI in Healthcare and most significantly in Diabetes prediction, the study also details the various applications that are employed as a prediction tools.
3. The various AI techniques is studied, to understand the existing methods and its performance based on the various metrics.
4. Limitations of AI techniques is also specified in order to improve the AI in Healthcare, so in future the applications can be implemented with required functions.

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