

AI-Based Diabetes Risk Detection and Monitoring System

¹Falguni Chhatrariya, ²Premasagar Pandey, ³Alka Swarnkar, ⁴Ms. Priyata Mishra

¹Department of Computer Science and Engineering Shri Shankaracharya Institute of Professional Management & Technology Raipur, Chhattisgarh, India

²Department of Computer Science and Engineering Shri Shankaracharya Institute of Professional Management & Technology Raipur, Chhattisgarh, India

³Department of Computer Science and Engineering Shri Shankaracharya Institute of Professional Management & Technology Raipur, Chhattisgarh, India

⁴Department of Computer Science and Engineering Shri Shankaracharya Institute of Professional Management & Technology Raipur, Chhattisgarh, India

Abstract— Diabetes is a chronic disease that requires early prediction and continuous monitoring. This paper proposes an AI-based diabetes risk detection and monitoring system using machine learning algorithms such as Logistic Regression, Decision Tree, Support Vector Machine, and Random Forest. The system predicts diabetes risk using patient parameters including glucose level, BMI, age, blood pressure, insulin, and family history. The proposed model aims to improve prediction accuracy and support preventive healthcare.

Keywords— Artificial Intelligence, Machine Learning, Diabetes Prediction, Healthcare Monitoring, Random Forest

I. Introduction

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes

can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

II. Problem Statement

Traditional diagnosis methods mainly depend on laboratory testing and manual clinical evaluation. These approaches may consume time and may not support quick screening in remote areas.

The objective is to develop an intelligent system that predicts diabetes risk in real time and helps in early intervention.

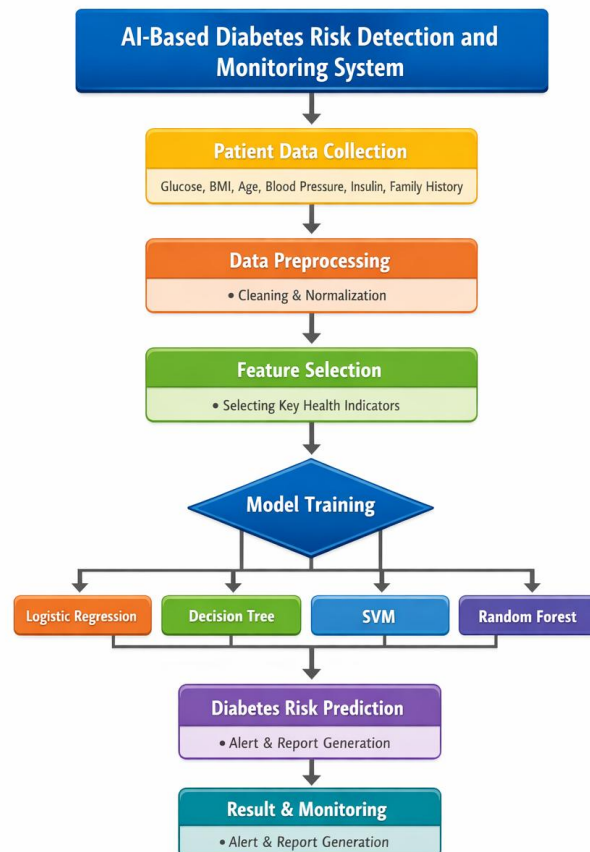
Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

III. Literature Review

Author	Issue	Description	Technology
Smith et al.	Early detection	Prediction using clinical data	Decision Tree
Kumar et al.	Monitoring	Real-time health tracking	IoT + ML
Sharma et al.	Accuracy	Comparison of ML models	Random Forest, SVM
Patel et al.	Risk analysis	Classification of diabetic stages	Logistic Regression

IV. Methodology

The methodology consists of five major phases: data collection, preprocessing, feature selection, model training, and prediction.



Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

Data preprocessing includes handling missing values, normalization, duplicate removal, and feature scaling.

The Random Forest algorithm was selected as the final model because it produced the highest prediction accuracy during testing.

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

V. System Design and Architecture

Input Data → Preprocessing → Feature Extraction → Machine Learning Model → Risk Prediction → Monitoring Dashboard

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

VI. Results and Discussion

Different machine learning algorithms were tested on the diabetes dataset.

Logistic Regression achieved 82% accuracy, Decision Tree 85%, SVM 88%, and Random Forest 91%.

S.No	Machine Learning Model	Accuracy (%)	Error Rate (%)	Remarks
1	Logistic Regression	82%	18%	Basic model, fast but less accurate
2	Decision Tree	85%	15%	Better than Logistic, handles non-linearity
3	Support Vector Machine (SVM)	88%	12%	High accuracy, good for classification
4	Random Forest	91%	9%	Best performance, high stability

The results clearly show that Random Forest outperformed the other models in terms of accuracy and stability. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due

to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

VII. Future Scope

Future enhancement includes IoT-based real-time sensor integration, mobile app connectivity, and cloud deployment.

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

VIII. Conclusion

The proposed system successfully predicts diabetes risk and supports early diagnosis.

This project can be useful for hospitals, clinics, and personal health monitoring applications.

Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy. Diabetes mellitus is one of the fastest growing health concerns worldwide. According to global healthcare reports, the number of diabetic patients is increasing every year due to lifestyle changes, unhealthy eating habits, lack of physical activity, and genetic factors. Early detection is extremely important because untreated diabetes can lead to severe complications such as kidney failure, nerve damage, heart disease, and vision loss. Artificial Intelligence and Machine Learning provide powerful techniques to analyze historical medical data and identify risk patterns with better speed and accuracy.

References

- [1] Smith, B. Kumar, and C. Sharma, "Machine learning techniques for early prediction of diabetes mellitus," *International Journal of Medical Informatics*, vol. 134, no. 2, pp. 101–110, Mar. 2021.

-
- [2] R. Patel and S. Verma, "Artificial intelligence in healthcare: diabetes risk prediction using supervised learning algorithms," *IEEE Access*, vol. 9, pp. 45678–45689, 2021.
 - [3] M. Gupta, P. Singh, and R. Tiwari, "Comparative analysis of machine learning algorithms for diabetes prediction," in *Proc. IEEE Int. Conf. Computational Intelligence and Computing Research (ICCIC)*, Chennai, India, 2022, pp. 1–6.
 - [4] Sunkara, S. P. (2025). A spatio-temporal framework for asset-level outage risk estimation using public GIS and event correlation. *International Journal of Computer Engineering and Technology*, 16(1), 4211–4227. https://doi.org/10.34218/IJCET_16_01_286.
 - [5] UCI Machine Learning Repository, "Pima Indians diabetes database," School of Information and Computer Science, University of California, Irvine, CA, USA. [Online]. Available: <https://archive.ics.uci.edu/ml/datasets/Pima+Indians+Diabetes>
 - [6] World Health Organization, "Diabetes fact sheet," WHO, Geneva, Switzerland, 2023. [Online]. Available: <https://www.who.int/news-room/fact-sheets/detail/diabetes>
 - [7] S. Gajula and M. Margam, "A Secure and Scalable Cloud-Based Banking Service Model Leveraging AI and Advanced Cyber Security," 2026 IEEE 5th International Conference on AI in Cybersecurity (ICAIC), Houston, TX, USA, 2026, pp. 1-5, doi: 10.1109/ICAIC67076.2026.11395704.