Iranian Journal of Physics Research, Vol. 26, No. 1, 2026
DOI: 10.47176/ijpr.26.1.92194

Prediction of diabetes using classical and quantum support vector machines

Sh Shahmohamadi[1], H R Baghshahi[1*],and H Davoudi Yeganeh[2]

1. Department of Physics, Faculty of Science, Vali-e-Asr University of Rafsanjan, Rafsanjan, Iran
2. AriyaQuanta Center for Quantum Computing, Tehran, Iran

E-mail: baghshahi@vru.ac.ir

(Received 27 September 2025 ; in final form 28 December 2025)

Abstract
Blood glucose is one of the key indicators influencing the body's metabolic performance. Accurate prediction and proactive management of this parameter are of paramount clinical importance. In this context, the analysis and evaluation of quantum machine learning (QML) algorithms for processing medical data and enhancing the predictive accuracy of health-related models have emerged as cutting-edge research directions in recent studies. Leveraging the principles of quantum physics and computation, QML algorithms serve as a promising alternative to classical methods for predicting chronic diseases. By mapping classical data into a quantum feature space and exploiting intrinsic quantum properties such as superposition and entanglement, these algorithms significantly enhance the ability to detect complex and latent patterns within datasets**.** In this study, the dataset was first preprocessed using Principal Component Analysis (PCA) for dimensionality reduction and noise suppression. Subsequently, the predictive performance of two quantum machine learning models—the Quantum Support Vector Machine (QSVM) and the Variational Quantum Circuit (VQC)—was evaluated and compared with that of the classical Support Vector Machine (SVM) for blood glucose level prediction. The results indicate that the QSVM model achieves a prediction accuracy of 90%, outperforming the classical SVM, which attained an accuracy of 74.4%. Moreover, the hybrid classical–quantum VQC model demonstrated the highest predictive performance, achieving an accuracy of 94.2%, thereby establishing it as the most effective approach for blood glucose level forecasting in this experimental setting.

Keywords: Quantum Machine Learning Algorithm, Blood Glucose, Quantum Support Vector Machine, Variational Quantum Circuit.

For full article, refer to the Persian section