Comparative Analysis of Data Mining Techniques for Diabetic Disease Prediction in Telemedicine

Sapna S Basavaraddi[1] and Dr. A.S. Raju[2]

Research Scholar, Department of Computer Science and Engineering[1]

Associate Professor and Head, Department of Medical Electronics[2]

Sri Siddhartha Institute of Technology, Sri Siddhartha Academy of Higher Education, Tumakuru, Karnataka, India

sapnasbasavaraddi@gmail.com and asraju74@gmail.com

Abstract: *Diabetes is a serious healthcare challenge, particularly in areas with poor access to healthcare, like rural India. The provision of online medical services through telemedicine is a potential strategy. In a telemedicine framework, this study contrasts five data mining methods for predicting diabetes disease: Decision Trees, Support Vector Machines (SVM), Neural Networks, Naive Bayes, and Ensemble Methods (Random Forest).Data preprocessing guarantees data quality by utilizing a varied sample of diabetic patients. Each method creates predictive models, which are then assessed using k-fold cross-validation, accuracy, precision, recall, F1-score, and ROC curves. Naive Bayes handles large feature spaces, Decision Trees provide interpretability, SVM thrives with complex data, Neural Networks capture subtle correlations, and Random Forest provides a balanced accuracy-generalization trade-off. The findings help academics and medical professionals decide on the best methods for telemedicine diabetes disease prediction.This research will help improve access to health care and decision-making by improving disease control in underserved areas. The study also highlights the potential of telemedicine and data mining to revolutionize healthcare in resource-constrained settings.*

Keywords: Diabetic disease prediction, telemedicine, data mining techniques, comparative analysis, healthcare optimization

REFERENCES

[1] J. Peral, A. Ferrandez, D. Gil, R. Munoz-Terol, and H. Mora, "An ontology-oriented architecture for dealing with heterogeneous data applied to telemedicine systems," IEEE Access, vol. 6, pp. 41118–41138, Jul. 2018, doi: 10.1109/ACCESS.2018.2857499.

[2] M. Taha Khan, S. Qamar, and R. Ranjan Sinha, "Discussing the Role of Data Mining in Development of Evidence Based Decision Support System for e-Healthcare," 2017. [Online]. Available: http://www.ripublication.com

[3] D. D. J. de Macedo, H. W. G. Perantunes, R. Andrade, A. von Wangenheim, and M. A. R. Dantas, "Asynchronous data replication: A national integration strategy for databases on telemedicine network," in Proceedings - IEEE Symposium on Computer-Based Medical Systems, 2008, pp. 638–643. doi: 10.1109/CBMS.2008.76.

[4] M. GHEORGHE and R. PETRE, "Integrating Data Mining Techniques into Telemedicine Systems," Informatica Economica, vol. 18, no. 1/2014, pp. 120–130, Mar. 2014, doi: 10.12948/issn14531305/18.1.2014.11.

[5] M. F. Rahman, Y. Wen, H. Xu, T. L. B. Tseng, and S. Akundi, "Data mining in telemedicine," in Advances in Telemedicine for Health Monitoring, Institution of Engineering and Technology, 2020, pp. 103–132. doi: 10.1049/PBHE023E_ch6.

[6] C. Ou-Yang, C. P. Wulandari, R. A. R. Hariadi, H. C. Wang, and C. Chen, "Applying sequential pattern mining to investigate cerebrovascular health outpatients' re-visit patterns," PeerJ, vol. 2018, no. 7, 2018, doi: 10.7717/peerj.5183.

[7] Amjad Zia, "Artificial Intelligence-Based Medical Data Mining," J Pers Med, Jul. 2022.

[8] S.-P. 'Judith, "Top data mining tools for the healthcare industry," Journal of King Saud University-Computer and Information Sciences, Jun. 2021.

[9] A. S. 'Raju and V. 'Udayashankara, "Multimodal Biometric Database and its Privacy Protection," International Conference on Signal, Image Processing Communication and Automation - ICSIPCA, pp. 557–564, 2017.

[10] A. S. 'Raju and V. 'Udayashankara, "Database Evaluation of ECG Fingerprint and Face Multimodal Biometric System," Grenze International Journal of Computer Theory and Engineering, vol. Vol 3, no. Issue 4, pp. 142–151, 2017.

[11] K.R. Lakshmi, "Pererformance Comparison of Data Mining Techniques for Predicting of Heart Disease Survivability," International Journal of Scientific and Research Publications, vol. 3, no. 6, 2012