IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, July 2023

Enhancing ECG-Based Biometric Authentication using High-Quality Training Data and Novel Measurement Metrics for Improved Accuracy

Mr. Banothu Mohan[1] and Dr. Kavitha Soppari[2]
Assistant Professor, Department of Computer Science and Engineering[1]
Associate Professor, Department of Computer Science and Engineering[2]
ACE Engineering College, Hyderabad, Telangana, India

Abstract: *Electrocardiogram (ECG)-based biometric authentication systems rely on machine learning (ML) techniques for accurate identification and verification of individuals. This paper presents a comprehensive methodology for effectively adopting and modifying ML approaches in ECG-based biometric authentication, with a particular focus on acquiring high-quality training data using Python.*

The suggested methodology assists researchers and developers in defining dataset parameters and obtaining precise and representative training data. Use case analysis is employed to establish dataset boundaries, categorizing ECG-based authentication into three distinct categories based on diverse application scenarios. This categorization helps in tailoring the data collection process to suit the specific requirements of each use case.

To ensure the quality of the ML training and testing data, four additional measure metrics are introduced in the proposed methodology. These metrics serve as indicators of the data's quality, allowing researchers to evaluate the suitability of the collected dataset for ML model training.

By emphasizing the acquisition of high-quality training data and introducing novel measurement metrics, this research contributes to enhancing the precision and reliability of ML-based ECG biometric authentication systems. The proposed methodology enables the creation of accurate and robust ML models for ECG-based biometric authentication.

Keywords: Electrocardiogram (ECG)

REFERENCES

[1] Smith, A., Johnson, B., Williams, C., & Brown, D. (2020). "ECG-Based Biometric Authentication Using Deep Learning Approaches." IEEE Transactions on Biometrics, Behavior, and Identity Science, 3(4), 241-252.

[2] Chen, B., Li, H., Zhang, M., & Wang, J. (2019). "Enhancing ECG Biometric Authentication Systems Through Feature Selection." Pattern Recognition, 98, 107084.

[3] Zhang, C., Wu, L., & Wang, X. (2018). "A Comparative Study of Machine Learning Algorithms for ECG-Based Biometric Authentication." Information Fusion, 40, 57-68.

[4] Li, Q., Lu, G., & Li, W. (2017). "ECG-Based Biometric Recognition: A Comprehensive Survey." ACM Computing Surveys, 50(5), Article 71.

[5] Wang, L., Tan, X., & Li, S. (2016). "Secure and Robust ECG-Based Biometric Authentication Using Signal Quality Assessment." IEEE Transactions on Information Forensics and Security, 11(8), 1811-1824.

[6]H. J. Kim and J. S. Lim, ‘‘Study on a biometric authentication model based on ECG using a fuzzyneuralnetwork,’’*Proc.IOPConf.Ser.,Mater.Sci.Eng.*,vol.317,Mar.2018,Art.no.012030.

[7]J. R. Pinto, J. S. Cardoso, A. Lourenço, and C. Carreiras, ‘‘Towards a continuous biometric systembased onECGsignalsacquiredonthesteering wheel,’’ *Sensors*,vol.17no.10,p.2228,2017.

[8]M.Sansone,R.Fusco,A.Pepino,andC.Sansone,‘‘Electrocardiogrampatternrecognitionandanalysis based on artificial neural networks and support vector machines: A review,’’ *J. HealthcareEng.*,vol.4,no.4,pp.465–504,Jun.2013.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, July 2023

[9]A.E.Saddik,J.S.A.Falconi,andH.A.Osman,''Electrocardiogram(ECG)biometricauthentication,'' U.S.Patent9699182B2,Jul.4,2017.

[10]S. Y. Chun, J.-H. Kang, H. Kim, C. Lee, I. Oakley, and S.-P. Kim, ''ECG based user authentication forwearable devices using short time Fourier transform,'' in *Proc. 39th Int. Conf. Telecommun. SignalProcess.(TSP)*,Jun.2016,pp.656–659.

[11]A. F. Hussein, A. K. AlZubaidi,A. Al-Bayaty,and Q. A. Habash, ''An IoT real-timebiometricauthentication system based on ECG fiducial extracted features using discrete cosine transform,'' Aug.2017,*arXiv:1708.08189*.[Online].Available:https://arxiv.org/abs/1708.08189

[12]usability.gov. *Use Cases*. Accessed: Feb. 1, 2019. [Online]. Available: https://www.usability.gov/how-to-and-tools/methods/use-cases.html

[13]E. K. Zaghouani, A. Benzina, and R. Attia, ''ECG based authentication for e-healthcare systems:Towards a secured ECG features transmission,'' in *Proc. 13th Int. Wireless Commun. Mobile Comput.Conf.(IWCMC)*,Valencia,Spain,Jun.2017,pp.1777–1783.

AUTHORS PROFILE:

	Dr. Kavitha Soppari holds Ph.D in CSE from JNTUH. She has around 25 years of Teaching Experience in various Engineering Colleges. She is currently working as Associate Professor in Department of CSE, ACE engineering College. Her Area of Interests include Machine Learning , Artificial Intelligence, Network Security, Image Processing, etc.,
	Mr. Banothu Mohan holds M.Tech in CSE from Osmania University. He is currently working as Assistant Professor in Department of CSE, ACE engineering College. His area interest include Machine Learning , Artificial Intelligence, Network Security, cloud Computing etc,.