

[< Back](#)

Advertise

[Information Visualization for Intelligent Systems](#)

Chapter 22

Early Schizophrenia Prediction Using Wearable Devices and Machine Learning

R. Deepa, A. Packialatha

Book Editor(s): Premanand Singh Chauhan, Rajesh Arya, Rajesh Kumar Chakrawarti, Elammaran Jayamani, Neelam Sharma, Romil Rawat

First published: 28 February 2025

<https://doi.org/10.1002/9781394305810.ch22>

Summary

Wearable technology and machine learning algorithms are harnessed to advance early prediction and diagnosis of schizophrenia. Different machine learning algorithms were tested for their capability to categorize people at risk of or diagnosed with schizophrenia using a dataset made up of physiological and behavioral data gathered via wearable devices. Notably, K-nearest neighbors and random forest came up as the top-performing models, attaining high F1-scores, demonstrating their capacity to balance accuracy and recall. Support vector machine (SVM), AdaBoost, and gradient boosting all displayed competitive performance. The study emphasizes the value of feature selection and data preparation in improving model performance. By enabling early detection and customized treatment approaches, these findings show promise for revolutionizing schizophrenia diagnosis and intervention. Nevertheless, the selection of a machine learning algorithm should be in line with particular clinical aims, whether that means putting a focus on precision to cut down on false positives or recall to minimize missing instances. Although this study offers insightful information, additional validation on various datasets is necessary to see whether these models are generalizable.

References

[< Back](#)

Assessment of community functioning in people with schizophrenia and other severe mental illnesses. a white paper based on an NIMH-sponsored workshop . *Schizophr. Bull.* , **33** , 3 , 805 – 822 , 2007 .

[PubMed](#) | [Web of Science®](#) | [Google Scholar](#)

Laursen , T.M. , Nordentoft , M. , Mortensen , P.B. , Excess early mortality in schizophrenia . *Annu. Rev. Clin. Psychol.* , **10** , 425 – 448 , 2014 .

[PubMed](#) | [Web of Science®](#) | [Google Scholar](#)

Fonseka , L.N. and Woo , B.K. , Wearables in Schizophrenia: Update on Current and Future Clinical Applications . *JMIR mHealth uHealth* , **10** , 4 , e35600 , 2022 .

[PubMed](#) | [Web of Science®](#) | [Google Scholar](#)

Niknejad , N. , Ismail , W.B. , Mardani , A. , Liao , H. , Ghani , I. , A comprehensive overview of smart wearables: The state of the art literature, recent advances, and future challenges . *Eng. Appl. Artif. Intell.* , **90** , 103529 , 2020 .

[Web of Science®](#) | [Google Scholar](#)

Amjad , A. , Kordel , P. , Fernandes , G. , A Review on Innovation in Healthcare Sector (Telehealth) through Artificial Intelligence . *Sustainability* , **15** , 8 , 6655 , 2023 .

[Google Scholar](#)

Elman , J.P. , “Find Your Fit”: Wearable technology and the cultural politics of disability . *New Media Soc.* , **20** , 10 , 3760 – 3777 , 2018 .

[Google Scholar](#)

Alex David , S. , Varsha , V. , Ravali , Y. , Naga Amrutha Saranya , N. , Comparative Analysis of Diabetes Prediction Using Machine Learning , in: *Soft Computing for Security Applications: Proceedings of ICSCS 2022* , pp. 155 – 163 , Springer Nature Singapore , Singapore , 2022 .

[Google Scholar](#)

[Back](#)[Google Scholar](#)

Gold , M. , Amatniek , J. , Carrillo , M.C. , Cedarbaum , J.M. , Hendrix , J.A. , Miller , B.B. , Robillard , J.M. , Rice , J.J. , Soares , H. , Tome , M.B. , Tarnanas , I. , Digital technologies as biomarkers, clinical outcomes assessment, and recruitment tools in Alzheimer's disease clinical trials . *Alzheimers Dement. Trans. Res. Clin. Interventions* , 4 , 234 – 242 , 2018 .

[PubMed](#) [Google Scholar](#)

Charlson , F.J. , Ferrari , A.J. , Santomauro , D.F. , Diminic , S. , Stockings , E. , Scott , J.G. , McGrath , J.J. , Whiteford , H.A. , Global epidemiology and burden of schizophrenia: findings from the global burden of disease study 2016 . *Schizophr. Bull.* , 44 , 6 , 1195 – 1203 , 2018 .

[PubMed](#) [Web of Science®](#) [Google Scholar](#)

Teixeira , E. , Fonseca , H. , Diniz-Sousa , F. , Veras , L. , Boppre , G. , Oliveira , J. , Pinto , D. , Alves , A.J. , Barbosa , A. , Mendes , R. , Marques-Aleixo , I. , Wearable devices for physical activity and healthcare monitoring in elderly people: A critical review . *Geriatrics* , 6 , 2 , 38 , 2021 .

[PubMed](#) [Google Scholar](#)

Axelsen , M.C. , Bak , N. , Hansen , L.K. , Testing Multimodal Integration Hypotheses with Application to Schizophrenia Data . *2015 International Workshop on Pattern Recognition in NeuroImaging* , Stanford, CA, USA , pp. 37 – 40 , 2015 , doi: [10.1109/PRNI.2015.20](#) .

[Google Scholar](#)

Luo , Y. , Tian , Q. , Wang , C. , Zhang , K. , Wang , C. , Zhang , J. , Biomarkers for Prediction of Schizophrenia: Insights From Resting-State EEG Microstates . *IEEE Access* , 8 , 213078 – 213093 , 2020 , doi: [10.1109/ACCESS.2020.3037658](#) .

[Google Scholar](#)

Anjomshoa , A. , Dolatshahi , M. , Amirkhani , F. , Rahmani , F. , Mirbagheri , M.M. , Aarabi , M.H. , Structural brain network analysis in schizophrenia using minimum spanning tree . *2016 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* , Orlando, FL, USA , pp. 4075 – 4078 , 2016 , doi: [10.1109/EMBC.2016.7591622](#) .

[< Back](#)

Du , Y. , Hao , H. , Xing , Y. , Niu , J. , Calhoun , V.D. , A Transdiagnostic Biotype Detection Method for Schizophrenia and Autism Spectrum Disorder Based on Graph Kernel . *2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)* , Mexico , pp. 3241 – 3244 , 2021 , doi: [10.1109/EMBC46164.2021.9629618](https://doi.org/10.1109/EMBC46164.2021.9629618) .

[Google Scholar](#)

Kim , D.-W. , Lee , S.-H. , Im , C.-H. , Source activation during facial emotion perception correlates with positive and negative symptoms scores of schizophrenia . *2013 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* , Osaka, Japan , pp. 6325 – 6328 , 2013 , doi: [10.1109/EMBC.2013.6611000](https://doi.org/10.1109/EMBC.2013.6611000) .

[Google Scholar](#)

Xu , T. , Stephane , M. , Parhi , K.K. , Schizophrenia classification with single-trial MEG during language processing . *2013 Asilomar Conference on Signals, Systems and Computers* , Pacific Grove, CA, USA , pp. 354 – 357 , 2013 , doi: [10.1109/ACSSC.2013.6810294](https://doi.org/10.1109/ACSSC.2013.6810294) .

[Google Scholar](#)

Jakobsen , P. , et al. , PSYKOSE: A Motor Activity Database of Patients with Schizophrenia . *2020 IEEE 33rd International Symposium on Computer-Based Medical Systems (CBMS)* , Rochester, MN, USA , pp. 303 – 308 , 2020 , doi: [10.1109/CBMS49503.2020.00064](https://doi.org/10.1109/CBMS49503.2020.00064) .

[Google Scholar](#)

Ravikumar , S. , Kumar , K.A. , Koteeswaran , S. , Dismemberment of Metaphors with Grid Scratch via Kernel k-Means . *J. Comput. Theor. Nanosci.* , **15** , 11–12 , 3533 – 3537 , 2018 .

[CAS](#) [Google Scholar](#)

Begum , A. , Alex David , S. , Hemalatha , D. , Kollipara , L.S.S. , Deep Learning-Based Lung Cancer Classification: Recent Developments and Future Prospects . *2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI)* , Chennai, India , pp. 1 – 8 , 2023 , doi: [10.1109/ACCAI58221.2023.10200967](https://doi.org/10.1109/ACCAI58221.2023.10200967) .

[Google Scholar](#)

[< Back](#)

schizophrenia . 2020 *IEEE 33rd International Symposium on Computer-Based Medical Systems (CBMS)* , 2020 , July, pp. 303 – 308 , IEEE .

[Google Scholar](#)

ABOUT WILEY ONLINE LIBRARY

[Privacy Policy](#)

[Terms of Use](#)

[About Cookies](#)

[Manage Cookies](#)

[Accessibility](#)

[Wiley Research DE&I Statement and Publishing Policies](#)

[Developing World Access](#)

HELP & SUPPORT

[Contact Us](#)

[Training and Support](#)

[DMCA & Reporting Piracy](#)

OPPORTUNITIES

[Subscription Agents](#)

[Advertisers & Corporate Partners](#)

CONNECT WITH WILEY

[The Wiley Network](#)

[Wiley Press Room](#)

Copyright © 1999-2025 John Wiley & Sons, Inc or related companies. All rights reserved, including rights for text and data mining and training of artificial intelligence technologies or similar technologies.

< Back

