International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 6 ǁ 2022 ǁ PP. 1813-1817

Bipolar Classification Methodology Deep Learning

Divya M, Prashant Ankalkoti
[*1]*PG Student MCA, JNN College of Engineering, Shimoga, India*
[2]*Assistant Professor MCA,JNN College of Engineering, Shimoga, India*

Abstract
Data analysis is critical for dealing with vast amount of data in healthcare industry. In previous medical studies relied on the management of substantial quantity of hospital data rather than prediction. As the healthcare fields grows exponentially, accurate medical data analysis becomes important for illness identification and patient treatment. When medical data is inadequate, accuracy suffers. The data cleaning and imputation used to convert incomplete data into complete data to solve the problem of missing medical data. Here the Nave Bayes and Decision Tree algorithms are used for working on predicting bipolar disorder based on the dataset. Deployment of a unimodel disease risk prediction technique based on convolutional neural networks. The CNN algorithm gives the prediction accuracy of higher than 95%. This system provides answers to questions about diseases that people experience in their daily lives.

Keywords: *Nave Bayes, Decision tree, CNN, Bipolar.*

Date of Submission: 14-06-2022 Date of acceptance: 29-06-2022

I. INTRODUCTION

As the medical data contains guarded information, decision making becomes complicated. Machine learning is crucial for discovering the hidden patterns in medical data and also for doing data analysis. Machine learning is used in a most of fields to analyse the data, in banking, transportation, marketing and government fields. Machine learning is a datamining the vast amounts of well-formatted data. Machine learning is used in medicine for disease prediction, detection, and diagnosis. The main aim of these project is to detect Bipolar disease sooner, which helps in earlier diagnosis and better treatment of Bipolar disease. In earlier years, medical study on automatically extracted big amount of feature from structural data was conducted. Structured data, unstructured data, and semi-structured data are the three forms of data found in the database. Structured data is well-built data that includes valid patient records such as laboratory records, EHR's and data that are collected from medical tests results, among other things. The main motive for this is to deal with a large number of Bipolar disease data and, as a result, to predict the risk of Bipolar disease.Data cleaning and imputation are required when medical data isn't in the right format. Due to the poorly formatted data, illness prediction is unable to be performed which might sometimes result in erroneous disease prediction. There is already prognosis of disease based on symptoms. With the use of structured data, operating the naive bayes algorithm to forecast sickness. execute operations on medical structured data in this paper. Deep learning concept like convolutional neural network, that extracts feature from a big dataset automatically and gives the desired result. For structured data, CNN was utilised to extract the essential feature values from the dataset and to make disease predictions based on that dataset. The major goal of this research is to use structured data to predict Bipolar disease as well as Bipolar disease risk.

II. LITERATURE SURVEY

Health care has enormous data of information, processing of the data by different techniques, processing of data is one in all techniques that are used in machine learning algorithms. By the machine learning techniques, the prediction of the disease in the earlier stages. The dataset that are used are classified in terms of medical field of attributes like input and output data. The dataset is used for predicting the output using python programming. Now a days the people facing various diseases that are related to the person's daily lifestyle and it will be difficult to predict whether the person is in the initial or in the final stage.

By using the machine learning algorithms, it is easy to predict the disease. Bipolar disorder is classified by occurrence of one manic or mixed manic episode during the lifetime of the person who is suffering the bipolar. Bipolar is cyclic or periodic illness which patients will have different mood swing like manic or hyper active and suddenly becomes low or depressed. Bipolar is the 6th leading cause of disability in the world among 15 and 44 age group people. By using machine learning we can decide whether the person is suffering from bipolar 1 or bipolar 2 based on the dataset which has the attributes like face and body videos which are recorded by the doctors while interacting with the patients. Machine learning provides various advanced methods to diagnose bipolar at the initial level to achieve better clinical results.

III. PROPOSED METHODOLOGY

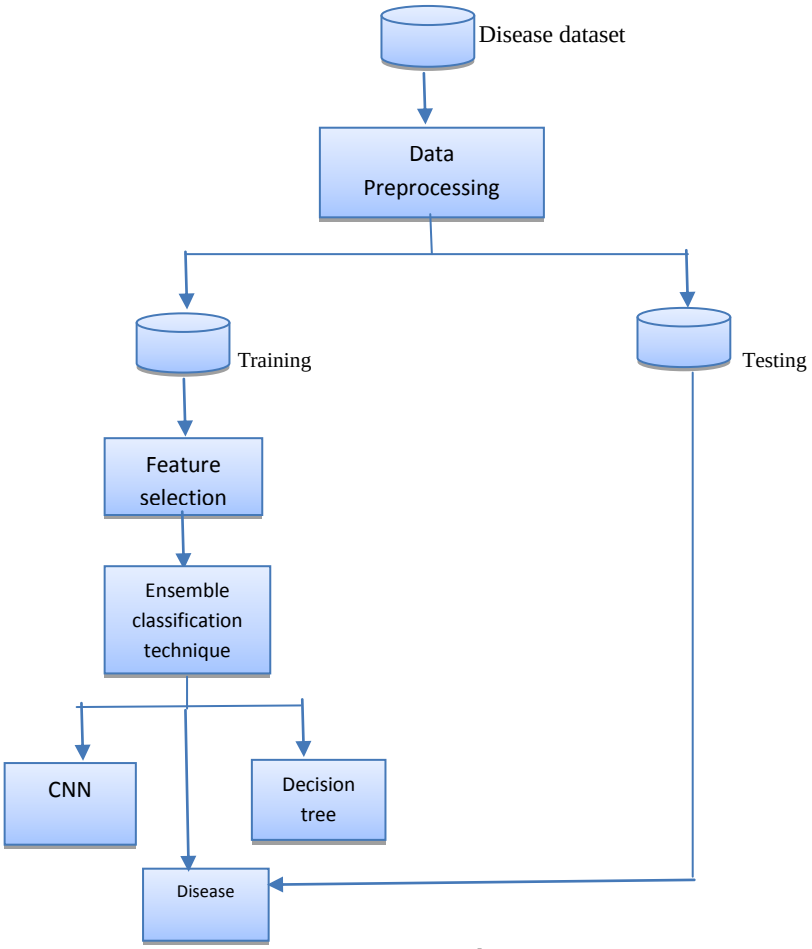

Fig. 1 System architecture

In this project the trained dataset is used to predict the disease using machine learning algorithm it will take steps feature selection and classification technique for testing data

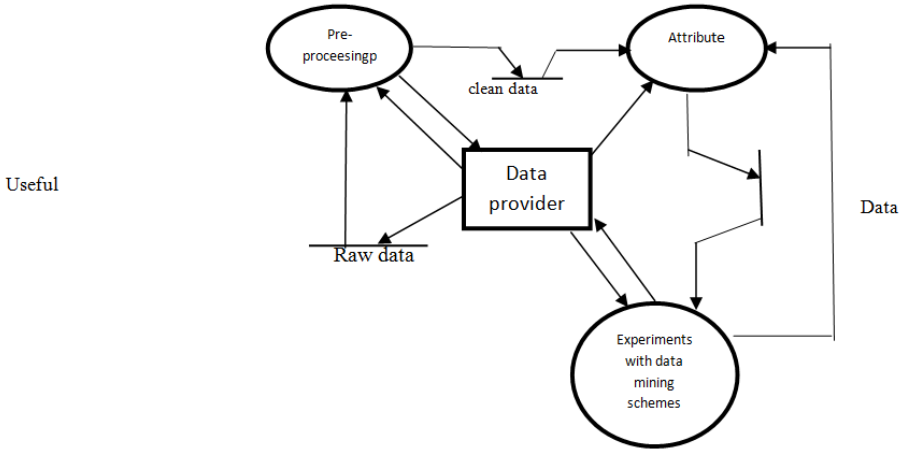

Fig. 2 Data flow diagram

In this diagram the first step is dataset analyse process using pandas library packages after analysis, they need to do pre-processing technique for cleaning up the data and by the use of model selection concepts the checking of the test data and train data for predicting the final result.

IV. EXPERIMENTAL RESULTS:

Methods	Dataset accuracy	Review
SVM kernel classification of EEG power spectra	76%	SVM does not perform fast, when there is large dataset and noise in the data set also make SVM work slow
Random forest VBM based	84%	Due to the ensemble of decision trees, it suffers interpretability and it is not able to determine the significance of each variable
Linear regression	86%	The assumption of linearity between dependent and independent variables
CNN	95%	Network implementation in large scale is much easier with CNN than with other neural networks.

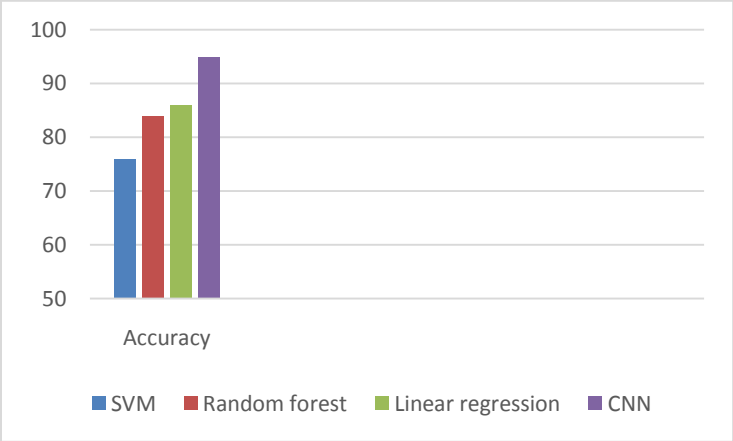

Fig 3: Accuracy of different algorithm

Result snapshot:
The following snapshot defines the results or the output of the project after executing the project step by step

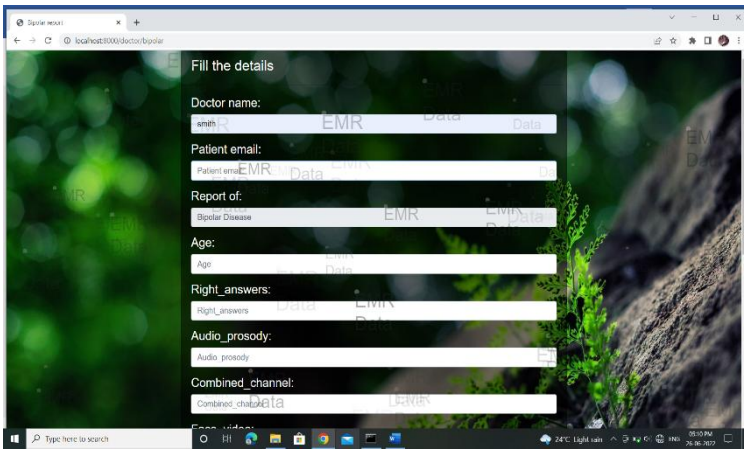

Fig 4: Doctor entering bipolar patient details

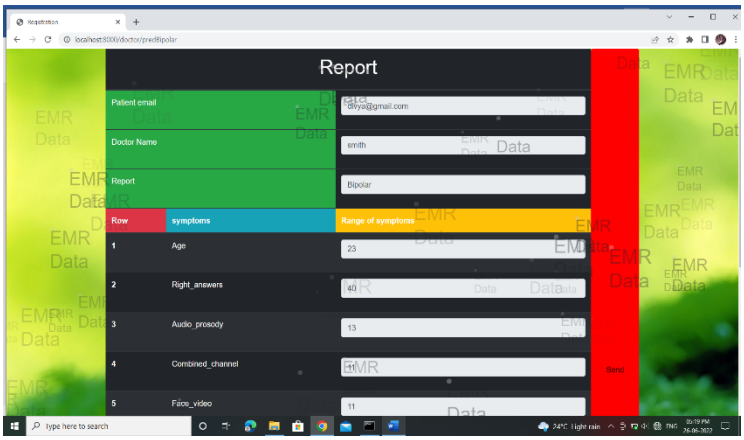

Fig 5: Classification of bipolar disease based on inputs

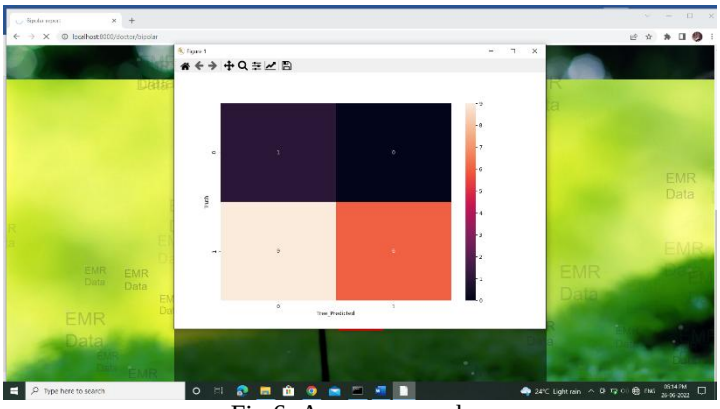

Fig 6: Accuracy graph

V. CONCLUSION

Here the CNN algorithm used for illness risk prediction using structured data in this research. The nave bayes algorithm and the decision tree method to predict bipolar disease. The comparison of these two outcomes of nave bayes and the decision tree algorithm, the nave bayes algorithm gives the 82% of the accuracy. With the use of structured data, were able to predict the risk of the disease with an accuracy of about 95%. By inserting the input as a accurate illness risk prediction as an output, By which understanding the level of disease risk prediction. Bipolar disorder is classified as having a low or high or medium risk. Because of this machine learning algorithms, the risk prediction of the disease is done in short period of time and in the low cost. In the upcoming days this will add a greater number of diseases and predict the likelihood that a patient will develop a given condition.

REFERENCES

[1]. Dome P, Rihmer Z, Gonda X. Suicide risk in bipolar disorder: a brief review. *Medicina (Kaunas)* 2019 Jul 24;55(8):403.doi: 10.3390/medicina55080403. https://www.mdpi.com/resolver?pii=medicina55080403 .medicina55080403 [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[2]. Malhi G, Bell E. Prepubertal bipolar disorder: a diagnostic quandary? *Int J Bipolar Disord.* 2020 Apr 20;8(1):20. doi: 10.1186/s40345-020-00187-0. http://europepmc.org/abstract/MED/32307595 .10.1186/s40345-020-00187-0 [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[3]. Chuang L, Kuo P. Building a genetic risk model for bipolar disorder from genome-wide association data with random forest algorithm. *Sci Rep.* 2017 Jan 03;7:39943. doi: 10.1038/srep39943. doi: 10.1038/srep39943.srep39943 [PMC free article] [PubMed] [CrossRef] [CrossRef] [Google Scholar]

[4]. Sundaram Laksshman, Bhat RR, Viswanath V, Li X. DeepBipolar: Identifying genomic mutations for bipolardisorderviadeeplearning. *HumMutat.* 2017Sep23;38(9):12171224.doi: 10.1002/humu.23272. http://europepmc.org/abstract/MED/28600868 . [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[5]. Saylan C, Yilancioglu K. Classification of schizophrenia and bipolar disorder by using machine learning algorithms. *J Neurobehav Sci.* 2016;3(3):92. doi: 10.5455/jnbs.1471026038. [CrossRef] [Google Scholar]

[6]. Dwyer DB, Falkai P, Koutsouleris N. Machine learning approaches for clinical psychology and psychiatry. *Annu Rev Clin Psychol.* 2018 May 07;14(1):91–118. doi: 10.1146/annurev-clinpsy-032816-045037. [PubMed] [CrossRef] [Google Scholar]

[7]. Suen PJC, Goerigk S, Razza LB, Padberg F, Passos IC, Brunoni AR. Classification of unipolar and bipolar depression using machine learning techniques. *Psychiatry Res.* 2021 Jan;295:113624. doi: 10.1016/j.psychres.2020.113624.S0165-1781(20)33285-6 [PubMed] [CrossRef] [Google Scholar]

[8]. Jakobsen P, Garcia-Ceja E, Riegler M, Stabell L, Nordgreen T, Torresen J, Fasmer O, Oedegaard K. Applying machine learning in motor activity time series of depressed bipolar and unipolar patients compared to healthy controls. *PLoSOne.* 2020;15(8):e0231995.doi: 10.1371/journal.pone.0231995. https://dx.plos.org/10.1371/journal.pone.0231995 .PONE-D-20-09443 [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[9]. Wu M, Passos IC, Bauer IE, Lavagnino L, Cao B, Zunta-Soares GB, Kapczinski F, Mwangi B, Soares JC. Individualized identification of euthymic bipolar disorder using the Cambridge Neuropsychological Test Automated Battery (CANTAB) and machine learning. *J Affect Disord.* 2016 Mar 01;192:219–25. doi: 10.1016/j.jad.2015.12.053. http://europepmc.org/abstract/MED/26748737 .S0165-0327(15)31001-6 [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[10]. Mothi SS, Sudarshan M, Tandon N, Tamminga C, Pearlson G, Sweeney J, Clementz B, Keshavan MS. Machine learning improved classification of psychoses using clinical and biological stratification: update from the bipolar-schizophrenia network for intermediate phenotypes (B-SNIP) *Schizophr Res.* 2019 Dec;214:60–69. doi: 10.1016/j.schres.2018.04.037. doi: 10.1016/j.schres.2018.04.037.S0920-9964(18)30250-0 [PubMed] [CrossRef] [CrossRef] [Google Scholar]

[11]. Perez Arribas I, Goodwin GM, Geddes JR, Lyons T, Saunders KEA. A signature-based machine learning model for distinguishing bipolar disorder and borderline personality disorder. *Transl Psychiatry.* 2018 Dec 13;8(1):274–7. doi: 10.1038/s41398-018-0334-0.doi: 10.1038/s41398-018-0334-0.10.1038/s41398-018-0334-0 [PMCfree article] [PubMed] [CrossRef] [CrossRef] [Google Scholar]

[12]. Sawalha J, Cao L, Chen J, Selvitella A, Liu Y, Yang C, Li X, Zhang X, Sun J, Zhang Y, Zhao L, Cui Liqian, Zhang Yizhi, Sui Jie, Greiner Russell, Li Xin-Min, Greenshaw Andrew, Li Tao, Cao Bo. Individualized identification of first-episode bipolar disorder using machine learning and cognitive tests. *J Affect Disord.* 2021 Mar 01;282:662–668. doi: 10.1016/j.jad.2020.12.046. doi: 10.1016/j.jad.2020.12.046.S0165-0327(20)33136-0 [PubMed] [CrossRef] [CrossRef] [Google Scholar]

[13]. Fernandes BS, Karmakar C, Tamouza R, Tran T, Yearwood J, Hamdani N, Laouamri H, Richard J, Yolken R, Berk M, Venkatesh S, Leboyer M. Precision psychiatry with immunological and cognitive biomarkers: a multi-domain prediction for the diagnosis of bipolar disorder or schizophrenia using machine learning. *Transl Psychiatry.* 2020 May 24;10(1):162–1. doi: 10.1038/s41398-020-0836-4. doi: 10.1038/s41398-020-0836-4.10.1038/s41398-020-0836-4 [PMC free article] [PubMed] [CrossRef] [CrossRef] [Google Scholar]

[14]. Schwarz E, Doan N, Pergola G, Westlye L, Kaufmann T, Wolfers T, Brecheisen R, Quarto T, Ing A, Di Carlo Pasquale, Gurholt T, Harms Robbert L, Noirhomme Quentin, Moberget Torgeir, Agartz Ingrid, Andreassen Ole A, Bellani Marcella, Bertolino Alessandro, Blasi Giuseppe, Brambilla Paolo, Buitelaar Jan K, Cervenka Simon, Flyckt Lena, Frangou Sophia, Franke Barbara, Hall Jeremy, Heslenfeld Dirk J, Kirsch Peter, McIntosh Andrew M, Nöthen Markus M, Papassotiropoulos Andreas, de Quervain Dominique J-F, Rietschel Marcella, Schumann Gunter, Tost Heike, Witt Stephanie H, Zink Mathias, Meyer-Lindenberg Andreas, IMAGEMEND Consortium, Karolinska Schizophrenia Project (KaSP) Consortium Reproducible grey matter patterns index a multivariate, global alteration of brain structure in schizophrenia and bipolar disorder. *Transl Psychiatry.* 2019 Jan 17;9(1):12–3. doi: 10.1038/s41398-018-0225-4. doi: 10.1038/s41398-018-0225-4.10.1038/s41398-018-0225-4 [PMC free article] [PubMed] [CrossRef] [CrossRef] [Google Scholar]

[15]. Librenza-Garcia D, Kotzian BJ, Yang J, Mwangi B, Cao B, Pereira Lima LN, Bermudez MB, Boeira MV, Kapczinski F, Passos IC. The impact of machine learning techniques in the study of bipolar disorder: a systematic review. *Neurosci Biobehav Rev.* 2017 Sep;80:538–554. doi: 10.1016/j.neubiorev.2017.07.004.S0149-7634(17)30033-7 [PubMed] [CrossRef] [Google Scholar]

[16]. Kessing LV, Andersen PK, Vinberg M. Risk of recurrence after a single manic or mixed episode - a systematic review and meta-analysis. *Bipolar Disord.* 2018 Feb 14;20(1):9–17. doi: 10.1111/bdi.12593. [PubMed] [CrossRef] [Google Scholar]