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A Survey on ADHD using Data Mining Techniques

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Abstract— The thriving medical applications of Data mining in the field of medicine and public health led to the popularity of its use in KDD (Knowledge Discovery in Data Mining.). Disease diagnosis is one of the applications in the medical field. Data Mining tools are establishing the successful result in ADHD. This survey paper reveals Attention Deficit Hyper Active Disorder (ADHD) is a pattern of behaviour that affects approximately 3 to 5% of school going population. This paper surveys on implementation methods by using well known Data Mining techniques. Data Mining provides the methodology and technology to transform these mounds of data into useful information for decision making. The aim of this survey is to predict ADHD problems using Data Mining techniques like classification, Clustering, AI Neural networks, Bayesian Classifiers and Decision Trees. To implement these classification techniques different sources and methods of data collection, data set, data distribution and normalization are required .Therefore this paper aims to understand about Mining and its importance in Psychology.

Keywords—KDD,ADHD,DataNormalization,Datamining,Classification

I. INTRODUCTION

Data Mining is the process of sorting through large data sets to identify patterns and establish relationships to solve problems through data analysis. Data mining tools allows us to predict future trends. This paper presents selected problems and remains mutual relationship between Psychology and Computer Science. Information technology tools and Computer Science methods can be used for improving Psychological therapy. ADHD is one of the well studied childhood Psychiatric disorder. When a child's impulse control, sustained attention and general self-regulation lag far behind expectation level they are likely to be diagnosed as having ADHD. One of the reason of ADHD is due to pregnancy time stress, Genetics, easily distracted by external stimuli. ADHD is developed at the earlier stage of 3 to 7 years mainly it is identified by teachers. A Child diagnosed by ADHD is over hyperactive, carelessness, focusing attention on one thing. These symptoms are reduced by giving continuous treatment, and Behavioural treatment are recommended for preschool-aged children and may be helpful at older ages. Effective behavioural therapies include parent training, classroom management, and peer interventions. Medications are recommended as first-line therapy for older children. The aim of this survey is to predict basic mental health problems using data mining techniques

II. RELATED WORK

(Anjume S, Amandeep K, Aijaz Ah M, Kulsum 2017) Mental disorders are quite common in children. The commonly found childhood mental disorders are anxiety disorders; depression and attention deficit disorder. Diagnosis of these problems at early stage helps the professionals in treating it at beginning stage and to improve the patient's health. Therefore the need to treat common mental health disorders that are found in children which lead to complicated problems, if ignored at early stage. Machine learning Techniques can be applied for analyzing patient's history to diagnose the problem. In this research three machine learning techniques have been identified and compared based on their performances on several scales of accuracy on selected attributes to diagnose five basic mental health disorders. The basic aim is to find the technique which is most accurate.

(Margaret Mary T,Hanumathappa. M)
In this paper, surveys on implementation methods are using difference well know artificial intelligence techniques like Support Vector Machine, Neural Network and Decision tree. SVM algorithm for the diagnosis of the disorder. The major advantage of using SVM is that it helps in controlling the complexity of the problem of diagnosing. Neural network method is used for classification, clustering, feature mining, prediction and pattern recognition. Decision tree are powerful and popular tool for classification and prediction [3]. These techniques are emphasis on application of data mining, and playing vital role for classification, analysis and solving the design of an LD prediction tool based on machine learning technique.

(Michelle kilpatrick demaray,katherine schaefer,lauren k. Delong)

The problem of diagnosing basic mental health was identified and an Interview was held with a clinical psychologist to identify the mental health problems that occur more often among children. Then, observation was made on how the diagnoses were performed by the professionals. A model was built that uses machine learning techniques to diagnose five common mental health problems effectively. This model assists the professionals to identify the problem if the known evidences of the patient are given as input. The data set for predicting mental health problem is taken from a clinical psychologist. The dataset has 60 instances in text document format. From the documents, 25 attributes including the class label have been identified manually and checked with the psychologist. The "Feature selection" technique searches the In the proposed ADHD diagnosis scheme the BCGA has been combined with the Extreme Learning Machine. The efficiency of the ADHD classification mostly depends on the chosen features. Sets of chosen features which produce better accuracy in ADHD diagnosis are used again to generate other, slightly different sets of features with even better accuracy in ADHD diagnosis. Sets of chosen features which produce low accuracy in ADHD diagnosis are discarded.

(Miller AM, Pople HE, Myers JD) The research on applying machine learning techniques in mental health diagnosis has started in nineteen eighties. INTERNIST/AUTOSCID [2] is a computerized Structured Clinical interview for DSM-IV Axis II personality disorders. Data-mining and classification of mental disorder using Brain Imaging data.

(Yap, R. H., & Clarke, D. M. 1996) To implement NN as a classifier for the prediction of learning disability problem, the main concept of Multi- layer perception with back propagation is implemented using weka tool. Back propagation is the most widely used learning method. The method of learning involves modifying the weights and biases of the network in order to minimize a cost function.[3]

(Dabek, Filip, and Jesus J. Caban) developed a Neural Network (NN) Model with an accuracy of 82.35% for predicting the likelihood of developing psychological conditions such as anxiety, behavioural disorders, depression and post- traumatic stress disorders.

(Tawseef Ayoub Shaikh) compared the performance of Artificial Neural Networks, Decision Tree and Naïve Bayes in predicting Parkinson's disease and Primary Tumour Disease and found that the accuracy is high in ANN for predicting Parkinson's disease and Naïve Bayes for Primary Tumour Disease. Accuracy of Decision Tree and Naïve Bayes have further improved after reducing the size of feature set by applying Genetic Algorithm to the actual data set.

(Amos Fleischmann, Erez C.Miller) This study systematically analyzed life stories of adults with attention-deficit hyperactivity disorder (ADHD) who were diagnosed in adulthood, using an adapted version of Labov's textual-analysis method. These life stories provided an opportunity to examine the processes experienced by these individuals before and after the diagnosis of ADHD, from their perspective. The results indicate that the narrators experienced repeated failures in many aspects of life. Many of them internalized negative views to which they have been subjected to in their social environment. Consequently, they developed self-blame that subsequently further hampered their functioning. Once diagnosed with ADHD, these adults were able to construct a more coherent view of their life and of their difficulties, move beyond guilt, and understand that they could overcome their challenges.

III. METHODOLOGY

Data mining techniques for predicting basic mental health problems

Data mining techniques are used in many research areas including Mathematics, Cybernetics, genetics, marketing and Psychology. It plays major role in predicting mental health problems. The mental health problems are identified using data mining techniques they are neural networks, decision Trees, genetic Algorithm.

Neural networks

Neural Network is a natural system that detects patterns and makes predictions. The utmost breakthroughs in neural network in recent years are in their application to real world problems like customer reaction prediction, fraud finding etc. Data mining techniques such as neural networks are able to model the relationships that exist in data collections and can therefore be used for increasing business intelligence across a variety of business applications. This powerful analytical modelling technique creates very composite models that are really difficult to understand by even experts. Neural Networks are used in a variety of applications. Artificial neural network have become a powerful tool in tasks like Genetics, Early environment like prenatal and postnatal is the cause of ADHD, family and social environment is also the causes of ADHD. ANN is an adaptive, non linear system that learns to perform a function from data and that adaptive phase is normally training phase where system parameter is change during operations. Parameters are fixed after the completion of training. Using ANN model the problem is reduced using data sets, the non linear types of ANN provide it lots of give to achieve input output map. Artificial Neural Networks, provide user the capabilities to select the network topology, performance parameter, learning rule and stopping criteria.

Decision Trees.

Kannan Balakrishnan et al [5] proposed Implementation on classification method such as Decision Tree machine. Decision tree builds classification or regression models in the form of a tree structure. It breaks down a data set into smaller and smaller subsets while at the same time an associated decision tree is incrementally developed. The final result is a tree with decision nodes and leaf nodes.[6] A decision node – specifies some test to be accepted out on a single attribute-with one branch and sub tree for each possible outcome of the test., where each inner node denotes a test on an attribute, each branch of the tree represents an outcome of the test The topmost node in a tree is the root node class label represents a classification otherwise assessment. The key needs to do mining with decision tree are: element value explanation, predefined module, distinct classes and adequate data. Data mining techniques are useful for predicting and accepting the frequent signs and symptoms of performance of ADHD. If study the attributes of ADHD, they can easily predict which attribute is from the data sets more related to ADHD.

Genetic Algorithm

Genetic Algorithm challenge to incorporate ideas of natural evaluation. The general idea behind GAs is that we can build a better solution if we somehow combine the "good" parts of other solutions .Genetic Algorithm is basically used as a problem solving scheme in order to provide with a best clarification. They are the most excellent way to solve the problem for which little is known. They will work well in any search space because they form a very general algorithm. The only thing to be known is what the particular situation is where the solution performs very well, and a genetic algorithm will generate a high quality solution. Genetic algorithms use the principles of selection and evolution to produce a number of solutions to a given problem. Genetic algorithms (GAs) [8] are based on a biological applications; it depends on theory of development. When GAs is used for problem solving, the solution has three distinct stages: The solutions of the problem are encoded into representations that support the necessary variation and selection operations.

IV. RESULTS AND DISCUSSION

Firstly the problem, the diagnosis of basic mental health was recognized followed by knowing the mental health disorders that are often found in children. A list of machine learning techniques for diagnosis of five most common mental health disorders effectively if the symptoms of the patient are provided as input. The data sets of 25 attributes containing the class type labels that are found. The set includes these attributes: Age, Family, History, Pregnancy Complication, Delayed Speech, Under Medication, Academic Performance, Relationship Formation, Behavioural Problem, Concentration, Restless, Seizures, Learning Difficulty, Attention Aroused, Attention Sustained, CBCL Score, IQ Test Score, ADHD Positive, ODD Positive, Manic Episode Test Score, Major Depressive Episode, General Anxiety Disorder, CDI Score, PDD Score, Autism Score and Problem Since only few attributes are relevant to classify and predict the problem[13].The data mining techniques are very useful for identifying ADHD Disorder.

V. CONCLUSION

At the present time, a number of expert systems are developed in medical domain to forecast diseases accurately at an early stage that treatment can be made successfully and powerfully. Also expert systems are developed in mental health domain to guess the mental health problem at an earlier stage. As a number of Data Mining techniques are available to build expert system. This Survey paper has reviewed ADHD symptoms in children's using data mining techniques. Before implementing these techniques in real prediction the trainer has to train in proper way.

REFERENCES

[1] Buchanan BG, Shortliffe EH. Rule-based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project. Addison- Wesley, Reading, MA, 1984.

[2] Miller AM, Pople HE, Myers JD. "INTERNIST-I, an experimental computer-based diagnostic consultant for general internal medicine", New England Journal of Medicine, 1982:307:468-476.

[3] Yap, R. H., & Clarke, D. M. (1996). An expert system for psychiatric diagnosis using the DSM-III-R, DSM-IV and ICD-10 classifications. Proceedings of the AMIA Annual Fall Symposium, 229–233. 556 | Page www.ijacsa.thesai.org (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 7, No. 1, 2016

[5]Julie m. David Statistical machine learning techniques For the prediction of learning disabilities In school-age children (Final Thesis) [4] Kipli, Kuryati, Abbas Z. Kouzani, and Isredza Rahmi A. Hamid. "Investigating machine learning techniques for detection of depression using structural MRI volumetric features." International journal of bioscience, biochemistry and bioinformatics 3.5 (2013): 444-448.

[6]Pang-Ning, T., Michael, S., Vipin, K: Introduction to Data Mining,Low price edn. Pearson Education, Inc., London, 2008.

[7]Crealock Carol, Kronick Doree: Children and Young People with Specific Learning Disabilities, Guides for Special Education, No. 9, UNESCO, 1993

[8]Li Lin, Longbing Cao, Jiaqi Wang, Chengqi Zhang, "The Applications of Genetic Algorithms in Stock Market Data Mining Optimisation", Proceedings of Fifth International Conference on Data Mining, Text Mining and their Business Applications,pp- 593-604,sept 2005.

[9]Dabek, Filip, and Jesus J. Caban. "A Neural Network Based Model for Predicting Psychological Conditions." Brain Informatics and Health. Springer International Publishing, 2015. 252-261.

[10] Tawseef Ayoub Shaikh.,"A Prototype of Parkinson's and primary tumor disease prediction using data mining techniques", International Journal of Engineering Science Invention, vol 3,Issue:4, April 2014.

[11]"Prediction of Mental Health Problems Among Children Using Machine Learning Techniques".Ms. Sumathi M.R., Research Scholar, Dept. of Computer Science, Bharathiar University, Coimbatore, India.Dr. B. Poorna, Principal, S.S.S. Jain College,

T.Nagar, Chennai, India. (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 7, No. 1, 2016.

[12] An ADHD Diagnostic Approach Based on Binary-Coded Genetic Algorithm and Extreme Learning Machine Vasily Sachnev* School of Information, Communication and Electronics Engineering, The Catholic University of Korea, Bucheon, Korea bassvasys@hotmail.com Sundaram Suresh School of Computer Engineering, Nanyang Technological University, Singapore ssundaram@ntu.edu.sg. Journal of Computing Science and Engineering, Vol. 10, No. 4, December 2016, pp. 111-117

[13]Performance Analysis of Machine Learning Techniques to Predict Mental Health Disorders in Children Anjume S1*, Amandeep K1, Aijaz Ah M2, Kulsum F3 Department of Computer Science and Engineering, Desh Bhagat University, Punjab, India1 Department of Mathematics, Higher Education J&K, India2 Data Storage Engineer, CSC Pvt. Ltd, Hyderabad, India3 . International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol. 5, Issue 5, May 2017

[14] Amos Fleischmann, Erez C.Miller Online Narratives by Adults with ADHD who were Diagnosed in Adulthood.

