
Review on Advanced Machine Learning Techniques for Solving Problem of Dyslexia in children

Geeta Atkar, Dr. Priyadarshini J., Maya Rathnasabapathy
VIT, Chennai

ABSTRACT

Dyslexia is nothing but disorder in children which occurs because of learning disability. The children facing the challenges with dyslexia are taken for research study in this paper. This paper mainly focuses on a design technique which will help those children for easy reading, writing and learning. This paper focuses on the students who are facing problem to learn hindi language as compared to normal student. Previous techniques are compared and then Dataset of two, three letters word is made in hindi. Children are allowed to talk words in hindi language and check accuracy with database. Speech Processing Technique is required to compare words spoken by child and word in database. Artificial Neural Network technique is used for classifying normal and dyslexic children .Accuracy is measured with Precision, recall and F-Measure

Keywords: Artificial Neural Network, Natural Language Processing, Human Markov Model, F-Measure

1. INTRODUCTION:

Here learning disability means reading, writing disability, means students who are having this disability are having lesser speed of reading and writing as compared to normal children. Here, as some other types of disability is considered like some students are unable to recognize the words like b and d, w and m that is these student will read “was “m” or “m” as” w” also “b” as “d” and “d” as “b” They are unable to find out difference between above letters. Some students are having problem of literacy like they will require to grasp new word .Dyslexia is also found in some students whose learning language is different and mother tongue is different. Suppose some children are having learning language as English and mother tongue as Kannada, they will be having problem to learn English words fast.

2. LITERATURE REVIEW :

AlexFrid and ZviaBreznitz , has worked with 50 young adults in which 20 are dyslexia diagnosed and 30 are skilled readers. The activities were recorded by using ERP tool and then feature extraction was done by using Support Vector Machines. Ensemble classifiers were used for classification and the final decision was made by using voting method. The main advantage of this method was each feature was separated by using SVM. Sensitivity and specificity was calculated to judge the result. The main drawback of this system is that the accuracy of the developed system is not calculated.

Daniel Mpia Ndombo.et.al, proposed a evidence of Phonological Dyslexia and Technology Intervention: Preliminary Study in Special Schools in South Africa where he took children of age 10-19 years and gave them input as image, picture and games to recognize letter. HMM(Hidden Markov Models) algorithm of machine learning was used. The main advantage of this developed system was that the image and games were easy way to get accurate results as it improves concentration, confidence and interest among the children. The drawback is that small database was used

SalwaniMohdDaud and Hafiza Abasbraught brought Mobile App named as Dyslexia baca. The technique which was specially designed for alphabet recognition. Children which were having problem of distinguishing some letters like b,d,w,m,p,q. This technique has proposed app that will help to solve above problem. Main

aim of this app was to help the children to read and recycling them .The app is available in MALAY language. Two versions of dyslexia baca were come into picture, one alpha version and second one is beta version. Alpha version was used to assist alphabet recognition, Second version were based on alphabet that confuses to children App consist of balloons come and some letters are written on that balloons .When child recognizes the letter claps sound came at last. This motivated the children to study and understand letters. This app is compatible with ipad .Disadvantage of this app is that this app is available in MALAY language. But it is user friendly and can be used anytime.

Luz Rello Yolanda Otal Martin Pielotdiscovered a Computer-Based Method to improve the Spelling of Children with Dyslexia. Total 48 students were taken as an input. The main goal was to improve spelling skills of children having dyslexia. This technique is available in Spanish language. It was presented in the form of tablet game on ipad. Game is called as Dysegxia or word search. Mainly game consist of adding, removing of letter, change of letter. Here knowledge and natural language processing techniques are used. Results are measured by rate of words with error, rate of error with words, rate of error with wrong word, Rate of reading words. Important advantage is Game is simple and effective, currently in kannada and german language game development is going on. Drawback of this technique is, it is used for writing only not reading.

Thomas Cuschieri, RillaKhaled, Vincent E. Farrugia, H´ector P. Mart´inez, Georgios N. Yannakakis , invented the iLearnRW Game which Support Students with Dyslexia in Class and at Home.It is helpful for variety of literacy related difficulties. Suppose letters are new to student, they are used by those students then that word will become friend of him. When number of words gets added, it becomes friend list of that student. It consists of two modules one is student and other one is lesser planner Student module consist of difficulties from dyslexia expert. Whereas lesson planner keeps students motivated and engage. Disadvantage of this technique is it is used for only learning new words ,but technique can not differentiate between normal and dyslexic children. Positive point is that this technique is used for easy learning and grasping new words for students having dyslexia.

Anusha Joshi et al. had worked on Text To Speech System for Kannada Language. The work converts language into speech. Kannada language is converted into English initially.Segmentation, concatenation and speech extraction is applied on English language. The main advantage of this method was that it reduced eye strain and paper use. The main limitation on this paper was that it did not use any machine learning techniques.

Stavros I. Dimitriadis, PanagiotisSimos, Nikolaos A. Laskaris, Spiros Fotopoulos, Jack M. Fletcher, David Linden, Andrew C. Papanicolaou shown Classification of Children with Reading Difficulties from Non-Impaired Readers .Input was taken as 27 reading disabled and 27 non impaired readers. Two techniques were used LZW (Limpelziv Complexity) and NG (Natural gas) .By using these complexity index is found out. Performance of complexity index was found out by using k-nearest neighbor and support vector machine. Then accuracy, sensitivity and specificity was calculated to check results efficiency. After comparing it was found out that LZW is having less accuracy as compared to NG.

V.Thulasibai, et.al,Dr.P.M.BeulahDevamalar, Dr.B.Senthil Kumar , Mr.Arun Marx developed an Empirical Study of the Impact of E-Learning Tool developed for Dyslexic Children with Special Reference to Selective Schools in Tamil Nadu, South India, 180 students database was used of age group 5-12 years is used .Questionnaires were asked to students to decide child is having dyslexia or not. Mean, standard deviation are used as comparative analysis .Advantages of this method is specific disability is learnt and disadvantages is Sensitivity, specificity and accuracy is not used to judge results

3. PROPOSED WORK :

Children with reading difficulty (dyslexia) are mainly focused in this paper. This paper proposes interdisciplinary mode of research to help out children. The main objective of this paper is to train the system with the phonetics (sounds of each alphabet) and how to utter the words. Once the system is trained the children are given training with the system. The developed system trains the children for the phonetics. The

system should be able to recognize what the child says and correct the children by repeating the words with correct phonetics. Only when the child says the word correctly, the system will go for the next word. By doing this, the children will be able to learn the words more effectively. The system will be developed based on one-one system and so each child will be given a separate trainer kind, so that more concentration can be given for each and every child. On the other hand, simultaneously, each and every child brain activities will be monitored to see which part of their brain is getting active by doing this sort of learning. By performing this action, we can monitor and physiologically train them for more brain activation, thereby, reduce the difficulty in learning.

To develop this system it is needed that the system to be an expert system in Machine learning, Image processing, Speech recognition and Natural Language Processing

3.1 Machine Learning

The system is needed to be trained for the phonetics of each alphabet. As per previous studies there are very less techniques are available in Hindi language .Therefore, It is possible to train system with all hindi alphabets, two letters and three letters words. Here children of age less than 10 years will be taken as an input .Whenever child will speak any word; it will be checked by trained database , whether child is speaking correct word or not. Child has to speak word till that word is not matched with word in database. Here Speech recognition technique is used. ANN (Artificial Neural Network) is used for classification of dyslexic and non dyslexic children. Along with it, child's Brain activities can be recorded by using ERP tool to differentiate normal and dyslexic child. Precision, Recall, F-measure and Accuracy are used to check accuracy of classifier

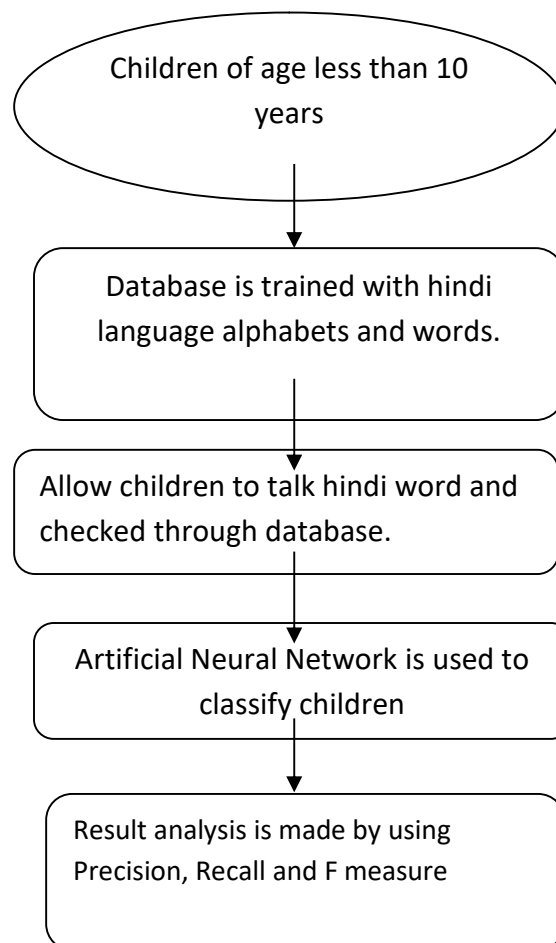


Fig 1: Architecture of Proposed Technique

CONCLUSION:

As per literature review, we can apply ANN for classification. Speech recognition technique is used for checking whether child is speaking correct word or wrong word. By using NLP (Natural Language Processing) techniques database can be acquired.

At last for finding out correctness of algorithm some machine learning parameters can be used like Recall, precision Accuracy and F-measure

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