

Intelligent Predicting Learning Disabilities in School Going Children Using Fuzzy Logic K Mean Clustering in Machine Learning.



Margaret Mary. T, Hanumanthappa. M, Sangamithra A

Abstract: Learning disabilities (LD) is turning into a major issue in various nations around the globe which can even contrarily influence human common advancement. The undertaking of this work is to help the specialized programme network in their task to be with the standard. The underlying section of the paper gives a comprehensive investigation of the distinctive components of diagnosing learning disabilities. Despite the fact that LD can be analysed early - before 5 years of age, most youngsters were not determined to have LD until the age of nine on account of its unpredictable side effects and unclear indication in children disorder issue. Fuzzy logic K-means clustering has inspired a tremendous transformation in Machine learning and can take and able to resolve a variation of problems. This paper is the elaboration on the strategy for utilizing this mix to encourage the early analysis of LD. Since Fuzzy Logic clustering in Machine Learning is generally considered and connected in different areas of science, we invite all the related analysts from the fields of computer science, engineering, statistics, social sciences, healthcare, and so on, etc. The result of the paper demonstrates that the previously mentioned methodology can possibly be the potential of the supporting decision-making system in LD investigating and diagnosing.

Keyword- Machine Learning, Learning Disabilities, Fuzzy Logic clustering

I. INTRODUCTION:

Learning is obtaining of new knowledge, aptitudes or frame of mind. It is a nervous disorder that influences a kid's cerebrum and weakens his capacity to carry out one or many particular undertakings [1]. Children amid their initial year's improvement character out how to comprehend the verbally expressed language first and after then learn to speak. In this manner during their school year youngster's character out how to peruse, compose and do number according to their age and intellectual limit.

In any case, a few youngsters will most likely be unable to learn at least one of these abilities according to their age and intellectual limit. It appears that there are a few kids, who, regardless of having typical learning disorder and ordinary pictorial, hearing are unfit to procure at least one age suitable language and/or arithmetic skills, even when satisfactory open doors for learning are given. These kids have explicit learning disorder [2].

The term does exclude youngsters who have learning issues which are basically the consequence of pictorial, hearing or engine handicaps, of mental impediment,

of enthusiastic emotional disturbance, or of ecological, social or economic hindrance. Fuzzy logic k-mean clustering is a methodology of machine learning that includes computing the information dependent on the likely forecasts and clustering rather than the traditional "true or false". Algorithms that utilization Fuzzy logic k-mean clustering are progressively being connected in a few controls to help in mining of databases. One of the potential uses of Fuzzy logic k-mean clustering in machine learning algorithm is the clustering of learning inabilities in information children to empower oncologists distinguish and assess learning disabilities in child in early stage. LD is one of the significant children issues just as the machine learning source of disappointment in future consequently, early detection of LD is one of the key methods for improving the projection in child.

Significantly improve the analysis and assessment of learning disabilities risks through fuzzy logic k-mean clustering of the specific data elements [11]. The incorporation of fuzzy logic k-means clustering in Machine learning is an incredible asset that can be utilized in the extraction, clustering, evaluation and examination of the information base data in regards to the machine learning and analysis of LD. The strength also produces a huge number of children itemsets[3]. The huge number makes it difficult for a human user to analyse them. The fuzzy logic K-means clustering in machine learning is the one of the best algorithm. Such algorithms used to modelling of accurate, non-sequential data and identifying knowledge relate to LD problems. With help of fuzzy logic inference rule predicating and clustering of LD data, can voiced children LD risk.[12]. High speed inference also one of the important advantage in fuzzy logic for prediction and LD data.

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This paper proposes fuzzy k-mean clustering algorithm that can be utilized in the Machine learning of LD data and consequently in the assessment and forecast of LD chances in children with suspected Learning disabilities cases.[3]

II . LEARNING DISABILITIES

Learning disabilities are neurologically-based handling issues. These processing issues can meddle with learning essential abilities, for instance reading, writing and/ or potentially math.

They can also interfere with more elevated amount abilities, such as, organization, time arranging, dynamic thinking, long or momentary memory and consideration. LD can impact a children life beyond academics and can affect associations with family, companions and in the working environment.

Since challenges with reading, writing and /or as well as math are unmistakable issues throughout the school years, the signs and symptoms of learning inabilities are regularly analysed during that time [4]. However, some individual don't get an assessment until they are in post-optional machine learning or grown-ups in the workforce. Different people with learning incapacities may never get an assessment and experience life, never knowing why they experience issues with academics and why they might have issues in their employments or involved with family and companions.

A learning incapacity can't be relieved or fixed; it is a long lasting test. In any case, with suitable help and intervention, people with LD can make progress in school, at work, in relationship, and in the community [6].

III . DATA SETS

Machine Learning procedures are useful for forecasting and considerate the consecutive signs and symptoms of conduct of learning incapacities. There are various sorts of learning disabilities. Within the event that we expect regarding the signs and symptoms of LD, that are the properties in our investigation, we can without much of a stretch anticipate which of the qualities in the data sets are increasingly identified with the learning disabilities [9]. The Machine learning assignment to deal with learning disabilities is the development of a database comprising of the signs, qualities and dimension of troubles looked by the children. We will likely decide the significance of identifying in child LD or not. Using through the performance of a well-known classifiers, fuzzy logic K-Mean clustering. A checklist is utilized to research the nearness of learning disabilities [1]. This checklists is a progression of inquiries that are general markers of learning disabilities. It's anything but a screening action or an evaluation, yet checklists to centre our comprehension of learning disabilities. The attributes utilized in the examination are recorded in Table 1 below.

Table 1: List of Attributes.

Sl.No	Attribute	Sign and Symptom
1	Dyscalculia	Difficult in Math
2	Dysgraphia	Difficult in Writing
3	Dyslexia	Difficult in Reading
5	Language Processing disorder	Difficult in Language
4	Non-Verbal Learning Disabilities	Difficult in expression or body Language
5	ADHD	Difficult in Paying attention
6	Dyspraxia	Difficult in Muscle control
7	Executive Functioning	Difficult in Planning
8	Memory	Difficult in retrieve information
9	Apraxia of speech	Difficult in speaking

In this examination, we are utilized 620 real world datasets gathered by casual evaluation strategies. A check list which machine learning similar signs and symptoms of LD, is utilized.

IV . MACHINE LEARNING

Machine learning (ML) is a classification of algorithm that enables programming applications to turn out to be increasingly precise in anticipating results without being expressly modified. The essential reason of machine learning is to algorithm that can get input information and utilize statistical analysis to foresee a yield while updating output as new data winds up accessible.

The procedures associated with machine learning are like that of data mining and predictive displaying. Both require scanning through data to search for instances and modifying program activities in like method. This happens in light of the fact that suggestion motors use machine learning customize online [6] promotion conveyance in practically continuous. Past customized showcasing, other regular machine learning use cases incorporate fraud detection, spam sifting, network security, and thread recognition, predictive upkeep and building news sources.

Machine learning is just influencing a computer to play out an undertaking without explicitly programming it. In today's world, each system that does well has a machine learning algorithm at its heart. Take for instance Google Search Engine, Amazon, LinkedIn, Facebook and so forth Machine learning is essentially influencing a PC to play out an undertaking without explicitly programming it.[9] They are productively using data gathered from different channels and motivating them to show actual picture.[6]

Machine learning algorithms are regularly classified as supervised or unsupervised. Supervised algorithm require an data researcher or data analyst with machine learning skills to give both input and desired output, notwithstanding outfitting criticism about the prediction during algorithm training. Data researchers figure out which factors, or highlights, the model ought to examine and use to create expectations.

When preparing is complete, the algorithm will apply what was found out to new data.

Unsupervised algorithms don't should be trained with wanted outcome data. Rather, they use an iterative methodology called deep learning to figuring out how to arrive data and conclusions. Unsupervised learning algorithms- additionally called fuzzy logic are utilized for more complex processing tasks than supervised learning systems including image recognition, speech-to-text and natural language generation and foreseeing medical problems so on. Millions of instance combing and mechanical identifying indirect correlation between many variables work by fuzzy logic. [6] these algorithm have just turned out to be reasonable in the period of huge data, as they require massive measures of training data.

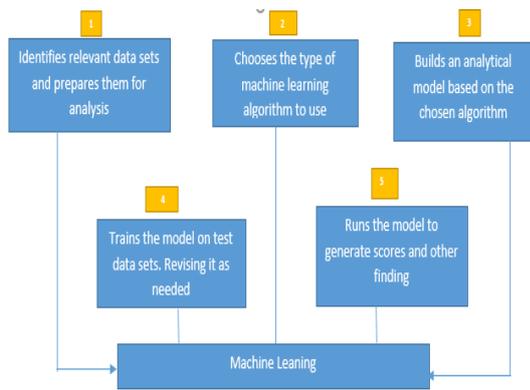


Figure: 1 The Machine Learning Process

The process of Machine learning is take to sequence order 1st stage identifies the relevant data sets and prepares them for analysis, 2nd stage choosing the type of machine learning, has this paper taken Fuzzy logic in clustering algorithm, 3rd stage building an analytical model based algorithm and 4th stage trains the model on test data sets and final stage is runs the model to generate scores or accuracy level in LD in children. Identifying in early stage is very significant, so that the children can be success in future in his life.

A. TYPES OF MACHINE LEARNING ALGORITHMS

Similarly as there are almost boundless uses of machine learning, there is no short of machine learning algorithm. They extend from the genuinely easy to the simple to the highly complex. Here are a couple of the most generally use models. This class of machine learning algorithm includes identifying a correlation - for the most part between two variable - and utilizing that correlation to make predictions about future data focuses.

• **Decision trees:** These models use perceptions about specific activities and identify an ideal way for arriving at a desired result.

• **Neural systems.** These deep learning models use a lot of training data to distinguish connections between many variable to figure out how to process approaching data later on.

• **Reinforcement learning.** This area of deep learning includes models iterating over many endeavours to finish a process. Steps that produce good results are remunerated and steps that produce undesired results are penalized until the algorithm learns the ideal procedure. [6]

V . FUZZY LOGIC K-MEAN CLUSTERING:

When dealing with uncertainties in databases, fuzzy logic clustering algorithm can be utilized to cluster distinctive components of data into different membership levels relying upon their closeness [13]. For instance, during the assessment of learning disabilities risk, sign and symptoms data may have some level of fluffiness when collecting data set such as mode of child not giving correct answer, not aware about LD, and Children of low socio-economic status and girls in general might be particularly under-enumerated by this type of general-data collection instrument. Censuses are particularly prone to underestimation [8]. In such manner, a fuzzy logic K-mean clustering algorithm can be a standout amongst the best methods for taking care of the fuzziness of data identified with learning disabilities. As an intelligent procedure, fuzzy logic K-mean clustering in machine algorithm give amazing investigation of the data as well as be utilized to create exact outcomes that are anything but difficult to execute. The accompanying Fuzzy K-Means clustering algorithms for cluster of data identified with LD risks works by separating learning disabilities data components into groups which share many similarities. Every one of the data clustering is then connected with a particular set of fuzzy logic membership function, which will show the degree of closeness between the data element and cluster [14].

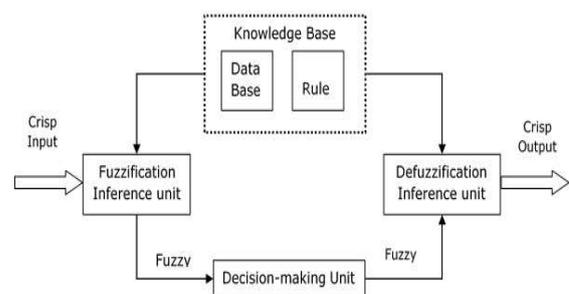


Figure 2: System Flow chart of Fuzzification of Attributes

The central notion of the fuzzy k-Mean clustering algorithm depends on the way that the participation estimations of the fuzzy sets or reality estimations of fuzzy logic ranging from 0.0 to 1.0 [15]. The significant factors in LD databases incorporates the data seeing the risk factors and just as sign and symptoms discoveries. In children are having LD or Not, assessed LD in High, Mild and Low, how much the range the child is enduring in LD, can dictated by utilizing Fuzzy logic K-Mean clustering and give precise outcome using Matlab Tool.

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But with fuzzy logic we can give a multi valued number from 0 to 1 representing, and estimating to what amount is it LD. This is the core thought behind Fuzzy logic K-Mean clustering.

Machine learning is a more extensive field of Artificial Intelligence where we really help computer to learn things and let them do undertakings. It could be administered realizing where we first know both input and output or it could be unsupervised realizing where we don't have the outputs we need to identify patterns and make groups. We can apply fuzzy logic to machine learning, as fuzzy logic gives multi esteemed answer and help recognize fuzzy logic is only approach to reach and say to the learning in multi esteemed, which is a superior way. So, we can say that actual processing and algorithms are present in machine learning and in fuzzy logic is the representation of the knowledge or to identify in early stage, so the child can take additional concentrations from teachers and parent and in future success in his life.

VI. PROPOSING DIAGNOSIS MODEL

Productive Knowledge Representation Method of Children Learning Disability Diagnosis. Knowledge representation is not only to store knowledge in a form of informational structure in the computer, moreover it is to use and manage knowledge conveniently and correctly. Rational knowledge representation can make problem solving easy and efficient, conversely, it will cause trouble and low efficiency of problem solving. There are many kinds of knowledge representation [10]. Productive representation is also called productive rule representation, first proposed by American mathematician E. Post in 1934. Because productive representation has characteristics of nature, modularity, consistency and so on, it has become the most widely used mode in machine learning as knowledge representation, especially in expert system, many successful expert systems adopt productive knowledge representation. It is expressed on base of the bulk of the existence of causal relationship in knowledge in human brain memory mode, with "IF-THEN" form, namely the productive rules. The basic structure comprises two parts: premise (IF part) describes status, conclusion (THEN par) describes some action under the condition of status existence [10].

A. Fuzzy logic rules

RULE1: IF (Dysgraphia == High) and (Dyslexia== High) and (Processing_ Disorder== High) THEN (Classification=LD)

RULE2: IF(Dysgraphia == High) and (Dyslexia==Mild) and (Processing_ Disorder== High) THEN (Classification=LD)

RULE3: IF(Dysgraphia == High) and (Dyslexia== Low) and (Processing_ Disorder== Mild) THEN (Classification=LD)

RULE4: IF(Dysgraphia ==Mild) and (Dyslexia== Low) and (Processing_ Disorder== Low) THEN (Classification=NO_LD)

RULE5: IF(Dysgraphia == Low) and (Dyslexia== Mild) and (Processing_ Disorder== Mild) THEN (Classification=NO_LD)

RULE6: IF (Dysgraphia == Low) and (Dyslexia== Mild) and (Processing_ Disorder==Low) THEN (Classification=NO_LD)

RULE7: IF (Dysgraphia == Mild) and (Dyslexia== Low) and (Processing_ Disorder==Low) THEN (Classification=NO_LD)

The rule viewer and surface viewer of LD fuzzy logic system with attributes analysis are shown in fuzzy logic rules for the LD prediction system are lists above and analysed in (Matlab).

B. FIS METHOD IN FUZZY LOGIC K-MEAN CLUSTERING IN MACHINE LEARNING

The information regarding FIS is given in Table 2. There are 3 membership functions related to every input variable. A number of the input variables of LD prediction and its collection along with the number and nature of membership functions are show within the structure of FIS give at Table 3. The visualization of FIS in LD perdition is show in

Table 2: Information about FIS

SI No	Particulars	
1	Name	New2
2	Type	Mamdani
3	Version	3.0
4	Num Inputs	9
5	Num Output	1
6	Num Rules	20
7	And Method	min
8	Or Method	max
9	ImpMethod	min
10	AggMethod	Max
11	DefuzzMethod	Centroid

C. FUZZY INFERENCE PROCESS

Fuzzy inference is that the method of formulating the mapping from a given input to associate output exhausting fuzzy logic. The mapping then provides a basis from which selection may be created, or patterns detected. The process of fuzzy inference involves all the pieces that are described in Membership Functions, Logical Operations, and If-Then Rules.

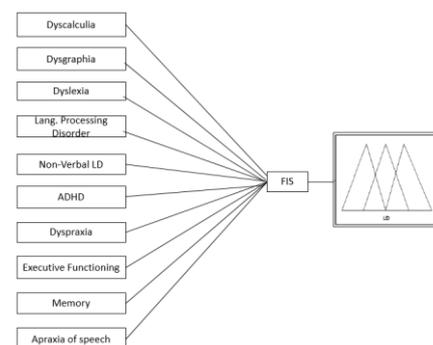


Figure-3 Systems: Prediction of Learning Disabilities in School-age Children

This section describes the fuzzy inference process and uses the Nine-input, One-output, three-rule rolling problem from the tipping issue, classify the child is having LD or not.

VII . LD PREDICTION RESULT

After computing the performance of the system supported the new fuzzy logic K-mean inference system, we tend to get the results of LD prediction in fuzzy logic k-means classification. The results show accuracy of the tune of 93.54%

Table 3: Test Result of Leaning Disabilities- Prediction – ANFIS

Sl.No	Particulars	Nos
1	Data set Used for training	450
2	Number of data set used for testing	620
3	Number of Instances correctly classified	580
4	Number of Instance incorrectly Classified	40

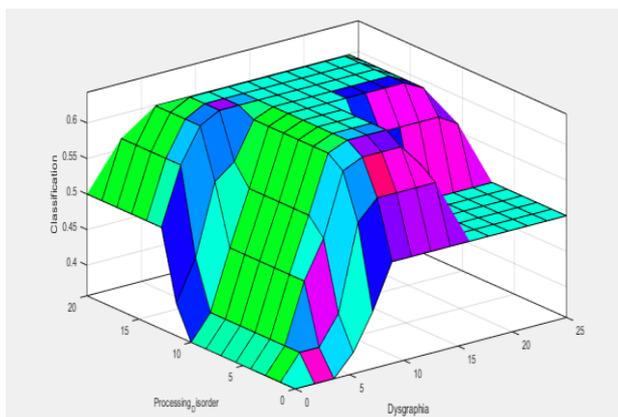


Figure. 4: Surface Viewer of Fuzzy with Attribute Reduction

VIII . CONCLUSION AND FUTURE WORKS

In this paper, we've got developed a brand new approach in fuzzy logic K-mean clustering in machine learning to effectively and accurately predict the educational inability in children. This study principally focuses on developing analysis of performance of classifiers exploitation fuzzy logic in machine learning. Whereas applying on the dataset, it shows associate degree accuracy of concerning 93.54%. This study has been administrated on 620 datasets. Additional works go to be dispensed on quantitative knowledge as that's a very important a part of any data set. In future, additional analysis is needed to use a similar approach for big data set consisting of all relevant attributes. Our future analysis work can target fuzzy logic K-mean clustering in machine learning for exploring the chances of obtaining way more insights in prediction of Learning Disabilities.

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