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# Neuro-Fuzzy Methodology for Diagnosis of Autism

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***Abstract* — The prediction of disorder is difficult than prediction of disease and Autism is one of the mental disorder which affect the person social life and communication. social and communication are important factor in life. This paper presented a neuro-fuzzy technique that is used to predict patient autism level based on various parameters like social levels and communications and emotional and behaviour levels. As the communication and social parameters are very important in life so this paper used the t Neuro Fuzzy soft computing techniques which is very useful in medical diagnosis. Fuzzy system is used for uncertainty as in autism for finding the level, many parameters vary**

***Keywords* –Autism, Neural Networks, Fuzzy Rules**

## I. INTRODUCTION

Autism is neurobehavioral disorder which includes the person communication, social interaction, behaviour. Autism disorder covers large spectrum of symptoms, skills and level of impairment. Children with autism disorder have communication problem, repeated body movement such as hand shaking or flapping there are also some risk factors like they are harming to themself or harming to others. They are also giving the unusual response to people also. Sometimes they may not notice the people, objects and activities around them. It's also difficult to express the feeling in verbal form or in facial expression or in body gesture. Autistic patients cannot be familiar with social environment and with friends because of their behaviour. To handle the autistic patients, the main challenge is in the form of communication problem or the social behaviour problem. Such patients cannot keep the information and cannot do the information analysis. Autistic patient troubled sometimes by sound ,touches, smells or which seems normal to others.

Autism is lifelong disability although by giving the proper support and teaching facility which can be helpful for autistic child and parents. Various games are available for autistic child. Autistic people have all or some of the following characteristics, which can vary from mild to severe, characteristics are problem in communication, difficult to adjust in changing environment, repetitive behaviours, having facing the difficulty when meeting to people, Communication problems (for example, with the use or comprehension of language).

Autism is lifelong disorder but by providing the special training and various game will help the children's to improve their skills. But before providing particular therapy, education it should be clear what type of problem is child having. There are various systems which is identifying whether the child has Autism or not based on the some parameters. In this presented work classification of autism and then finding the critical level of autistic present in the patient. By using the neural network supervised learning for classification will be done and fuzzy rules for identification of criticality level of autistic patients.

## II. RELATED WORK

Prud'hommeaux et al. [5] examines the difficulties for classification of non standardized text of machine learning techniques. Kathleen T Quach [6] said that problem through the classification problem is that ASD is a very heterogeneous disorder that may have subgroups with drastically different genetic expression signatures. To improve classification, it may be useful to stratify the ASD class into subgroups and enrich the input set with clinical measures. Alexander Genkin et al. [7] presented a simple Bayesian logistic regression approach that uses a Laplace prior to avoid over fitting and produces sparse predictive models for text data. They applied this approach to a range of document classification problems and show that it produces compact predictive models at least as effective as those produced by support vector machine classifiers or ridge logistic regression combined with feature selection.

## III. METHODS

The medical disease prediction is an application of expert system, that here work definingby using an intelligent soft-computing approach called neural network and fuzzy logic.The presented work is based on the parametric classification like environmental factor, social factor , communication factor.

Decision is depend upon these parameters.

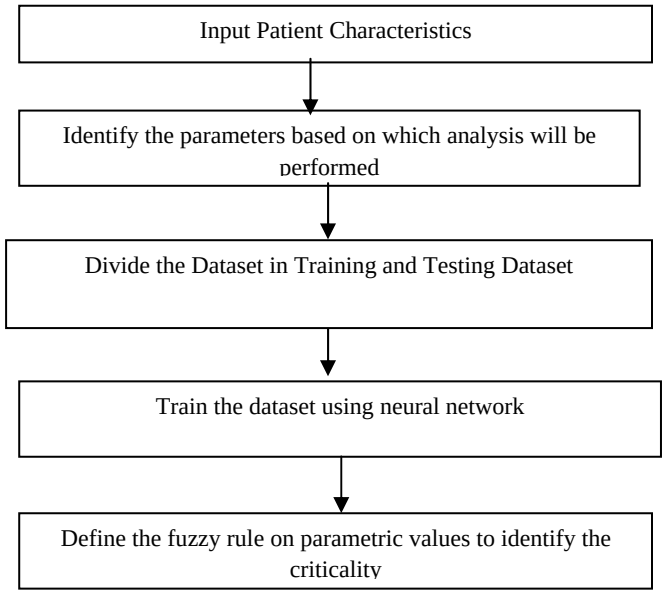


Fig 1: Flowchart of Proposed System

### *A. Neural network:*

Neural network is most effective distribution model that uses the acquired knowledge as
the input and apply some rules as the weightage elements and drive the output from the system. Knowledge is by the network from environment through the learning process. Artificial Neural network is very useful in medical diagnosis applications. Data is separated in to input and target where target is represented by 0(not infected by disease) or 1(patient infected by disease). Each patient is classified as infected or non-infected as
represented by 0 or 1. In Artificial neural network two learning categories are: Supervised learning and unsupervised learning. For supervised learning input and target (in the form of 0 and 1) both are provided.


Fig 2 Input and Output items for ANN-based diagnosis.

### B. *Fuzzy logic :*

The fuzzy logic is not only defined as a mathematical model but it is the intelligent soft computing technique that is used as the decision support system to take the membership decisions. The fuzzy logic is been used to derive more precise and accurate decision regarding the patient disease prediction. The fuzzy system can be implemented to any model where some intelligent analysis and the decision making is required. The fuzzy approach is adaptive to input and provide the effective results without getting any noise to the system. FL is defined as the intelligent methodology that provides the effective implementation to the system for different area. Many of the control system are defined under the fuzzy logic based analysis. Both the hardware and the software systems are defined under the fuzzy system analysis. Fuzzy logic start with concept of fuzzy set. Where we are not certain for any value either its 0 or 1, it may be lie between then. For example if we say Friday is weekday or weekand. we are not sure its value is 0 or 1, may be 0.8. and this type cant handled by classical sets (which either fully include or fully exclude) .fuzzy set describe the vague concepts(e.g fas runner,hot weather, weekend days) fuzzy set admit the possibility of partial membership in it. In the crisp set(nonfuzzy) each object is belong completely to set or not but I the fuzzy set object is member of fuzzy set to some degree, called a membership value. The degree an object belong to a fuzzy set is called a membership value between 0 to 1. Fuzzy set theory and fuzzy logic are highly applicable for developing the knowledge-based system in medicine.

Fuzzy rules are using for finding the levels of autism:

**Rule 1**: If (social is low) and (emotional is low) and (communication is low) and (repeat is yes) then (autism is high).

**Rule 2**: If (social is low) and (emotional is low) and (communication is high) and (repeat is yes) then (autism is low) (1)

## IV CONCLUSION

The main goal of this paper is to provide a soft computing approach which predicts the patients autism level based on the parameters that are discussed above. This paper uses the soft computing technique firstly neural technique is used for predicting whether the patient is autistic or not after than applying the fuzzy rules to find the autism level. level will describe the patient is low , medium or highly autistic. By determining the level of autism patient can be provided better treatment. In the future work can be done by taking more parameters and increase the dataset.

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