ABSTRACT

Learning Disability (LD) is a general term that describes specific kinds of learning problems. It is a neurological condition that affects a child's brain and impairs his ability to carry out one or many specific tasks. The learning disabled children are neither slow nor mentally retarded. This disorder can make it problematic for a child to learn as quickly or in the same way as some child who isn't affected by a learning disability. An affected child can have normal or above average intelligence. They may have difficulty paying attention, with reading or letter recognition, or with mathematics. It does not mean that children who have learning disabilities are less intelligent. In fact, many children who have learning disabilities are more intelligent than an average child. Learning disabilities vary from child to child. One child with LD may not have the same kind of learning problems as another child with LD. There is no cure for learning disabilities and they are life-long. However, children with LD can be high achievers and can be taught ways to get around the learning disability.

The problems of children with specific learning disabilities have been a cause of concern to parents and teachers for some time. With the right help, children with LD can and do learn successfully. Mental retardation, emotional disorders and poor socioeconomic status are not considered learning disabilities. Learning disabilities have been recognized in some countries for much of the 20th century, in other countries only in the latter half of the century and yet not at all in other places. The concept is still new in many developing countries. In India, the research conducted in learning disability has been primarily done over the last two decades and is today comparable with the research carried out in west nearly half a century ago. About 10% children enrolled in schools having LD. When a LD is suspected based on parent and/or teacher observations, a formal evaluation of the child is necessary. A parent can request this evaluation, or the school might advise it. Many types of assessment tests are available. Just as there are many different
types of LDs, there are a variety of tests that may be done to pinpoint the problem. Many professionals can be involved in the testing process. The purpose of LD assessment is to determine child's strengths and weaknesses and to understand how he or she best learns and where they have difficulty.

In this research work, data mining using machine learning techniques are used to analyze the symptoms of LD, establish interrelationships between them and evaluate the relative importance of these symptoms. To increase the diagnostic accuracy of learning disability prediction, a knowledge based tool based on statistical machine learning or data mining techniques, with high accuracy, according to the knowledge obtained from the clinical information, is proposed. The basic idea of the developed knowledge based tool is to increase the accuracy of the learning disability assessment and reduce the time used for the same. Different statistical machine learning techniques in data mining are used in the study. Identifying the important parameters of LD prediction using the data mining techniques, identifying the hidden relationship between the symptoms of LD and estimating the relative significance of each symptoms of LD are also the parts of the objectives of this research work. The developed tool has many advantages compared to the traditional methods of using check lists in determination of learning disabilities.

For improving the performance of various classifiers, we developed some pre-processing methods for the LD prediction system. A new system based on fuzzy and rough set models are also developed for LD prediction. Here also the importance of pre-processing is studied. A Graphical User Interface (GUI) is designed for developing an integrated knowledge based tool for prediction of LD as well as its degree. The designed tool stores the details of the children in the student database and retrieves their LD report as and when required.

The developed tool is very user friendly and it not only predicts the LD but also its class like low, minor or major with percentage of LD in each class.
Depending upon the degree of LD, the school authorities/parents can recommend the child for further treatment with councilors/special educators/LD clinics, for proper remedial solutions. Thus the developed tool is helpful in finding the LD at an early stage. With the right help and intervention at proper time, children with LD can succeed in school and go on to be successful later in life, where the research work is found much relevant as early detection of developmental differences is an early signal of a learning disability and thus the problems that are spotted early can be easier to correct.

The present study undoubtedly proves the effectiveness of the tool developed based on various machine learning techniques. It also identifies the important parameters of LD and accurately predicts the learning disability in school age children. This thesis makes several major contributions in technical, general and social areas. The results are found very beneficial to the parents, teachers and the institutions. They are able to diagnose the child’s problem at an early stage and can go for the proper treatments/counseling at the correct time so as to avoid the academic and social losses.