Artificial Neural Network Based Big Data Mining for Health Care Applications

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Abstract- Big data mining for large and complex unprocessed data is difficult and also time-consuming to process using the traditional processing methodologies. It can be characterized based on the volume variety, velocity, variability, veracity and complexity. The health sector has witnessed a great evolution following the development of new computer technologies, and that pushed this area to produce more medical data, which gave birth to multiple fields of research. Many efforts are done to cope with the explosion of medicaldata on one hand, and to obtain useful knowledge from it on the other hand.Input signals are classified based on the type of variations upon which the type of disease is recognized and care to be taken. Machine learning algorithm helps in a reliable and accurate output while processing. Artificial Neural network based disease classification makes the health care system faster for diagnosing the disease and further treatment.

Keywords- Big Data, Machine learning, Healthcare, Artificial Neural network.

I. INTRODUCTION

Big Data [7] has totally changed and revolutionized the businesses and organizations work. In this era where every aspect of our day to day life has been technologized, there is a huge volume of data that has been arising from various digital sources. We now feel it a necessity to have a tool to have this data in a systematic manner for [5] applications in various fields including government, scientific research, industry, etc. This will help in a proper study, storage and processing of the same.Inthe traditional data processing tools there were a lot of challenges in the analysis and study of such a huge volume of data. Big data mining [8] is the capability of extracting useful information from these large datasets or streams of data, which was not possible before due to data's volume, variability, and velocity. Big data is a massive volume of both structured and unstructured data which is large and difficult to process using traditional database [11] and software techniques. Big data technologies have great impacts on scientific discoveries and value creation.

The medical field has its great contribution in this deluge of data because of some technological innovations in the field like cloud computing [9] which has relocated the tests of care beyond the four walls of the hospital, and has made them available anywhere and anytime, laparoscopic surgery and robotic surgery, which replaced classical surgery, also smart homes which allow patients self-care and monitoring using simple devices that deliver results on specific physiological conditions. There are also smart applications or software that can analyze the body signals using integrated sensors with the aim of monitoring, as well as technologies that support new methods of biological, behavioral and environmental data collection. These include sensors that monitor the phenomena with a higher accuracy. All these innovations participated to the explosion of medical data, by multiplying data sources and electronic medical [1][6] records containing diagnostic Images, lab results, and biometric information that are generated and stored.

II. METHODOLOGY

Big data is generally the high volume of data available, the important features specifying the data can be refined or extracted, the extraction of these useful features for further processing with neural [10] network classifier is shown in Figure 1. The input data is preprocessed and modelled for feature extraction, the necessary features extracted through modelling is further to be classified with an artificial Neural Network algorithm. Back Propagation algorithm with Sigmoid activation function works good for handling huge volume of data, the number of nodes and layer can be defined based on the severity of the illness. Parametric and Regressive modelling technique can evaluate any form of input. In health care applications the input data is the patient medical record, the modelling coefficients gives the necessary or important coefficient related to that particular record of data. The coefficients extracted is further trained for classification by the neural network algorithm, from which the type of disease the patient is suffering is to be diagnosed and attention is to be given for further treatment.

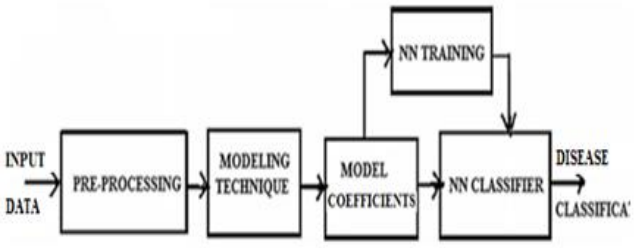

Fig.1: Block diagram for disease classification with Neural Network

III. DISCUSSION

Data mining [1] techniques plays a major role in the health care environment due to its capability to refine finer data from any amount of data that is particularly huge volume of dat. As medical field is one particular place were data keep on changing every time to time because human body does not stick to any particular conditions, these changes may take long time to analyze and evaluate which is not possible in medical field. The data in health care application relates to the patient's life it should be taken at most care and every process should be on time. An application with neural network classifier will be useful and time consuming for [4] diagnosing and treating the patient on time for saving the life.

Artificial neural networks are analytical techniques that are formed on the basis of superior learning processes in the human brain. Neural networks are groups of connected input/output units where each connection has its own weight (Figure 2).

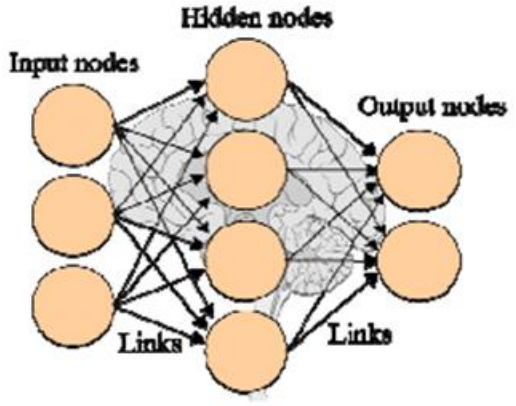

Fig.2: Artificial Neural Network Architecture

The learning process is performed by balancing the net on the basis of relations that exist between elements in the examples. Based on the importance of cause and effect between certain data, stronger or weaker connections between "neurons" are being formed. Network formed in this manner is ready for the unknown data and it will react based on previously acquired knowledge. Integration of [2] data mining in information systems, healthcare institutions reduce subjectivity in decision-making and provide a new useful medical knowledge.

IV. CONCLUSION

Data mining techniques are very useful for medical diagnoses as the use of machine learning algorithm quickens the execution process. Artificial Neural network is a classification tool and can be used in diagnosing the disease based on the classification the type of disease can be identified and attentions are given. The rapid growth of Data mining technologies helps the doctors for diagnoses and treatment in medical field.

V. REFERENCES

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