Machine Learning Algorithm that Uses Multiple Layers to Progressively work on Complex Datasets

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Abstract
Deep Learning architectures have the capability to generalize in non-local and global ways, generating learning patterns and relationships beyond immediate neighbors in the data. The successful design of a pattern analysis system for machine olfaction requires a careful consideration of the various issues involved in processing multivariate data: signal-preprocessing, feature extraction, feature selection, classification, regression, clustering, and validation. A considerable number of methods from statistical pattern recognition, neural networks, chemo metrics, machine learning, and biological cybernetics have been used to process electronic nose data, these algorithms are largely motivated by the field of artificial intelligence, which has the general goal of emulating the human brain's ability to observe, analyze, learn, and make decisions, especially for extremely complex problems.

1.0 INTRODUCTION

In many domains, data now arrives faster than we are able to learn from it. Our ultimate goal is to develop a set of primitives (or, more generally, a language) such that any learning algorithm built using those scales automatically to arbitrarily large data streams. Deep learning is a class of machine learning algorithms that uses multiple layers to progressively extract higher level features from the raw input. For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits or letters or faces.

Deep learning is a subset of machine learning where artificial neural networks, algorithms inspired by the human brain, learn from large amounts of data.
Deep learning allows machines to solve complex problems even when using a data set that is very diverse, unstructured and inter-connected.

2.0 PROBLEM STATEMENT

The main concept in deep leaning algorithms is automating the extraction of representations (abstractions) from the data [1],[2],[3]. Deep learning algorithms use a huge amount of unsupervised data to automatically extract complex representation. These algorithms are largely motivated by the field of artificial intelligence, which has the general goal of emulating the human brain's ability to observe, analyze, learn, and make decisions, especially for extremely complex problems. Deep Learning architectures have the capability to generalize in non-local and global ways, generating learning patterns and relationships beyond immediate neighbors in the data [4]. Deep learning is in fact an important step toward artificial intelligence. It not only provides complex representations of data which are suitable for AI tasks but also makes the machines

independent of human knowledge which is the ultimate goal of AI. It extracts representations directly from unsupervised data without human interference.

3.0 LITERATURE REVIEW

Geoffrey Hinton [5] trained deep belief networks by stacking Restricted Boltzman Machines (RBMs) on top of one another as deep belief network. The Deep Belief Networks use RBMs for unsupervised learning of representation at each layer.

The Bengio [6] paper explores and compares RBMs and auto-encoders. The Ranzato [7] et al paper uses sparse auto-encoder in the context of a convolutional architecture. Recently notable progresses have been made to lessen the challenges related to high data volumes. When there is huge volume of data it is often impossible to train a deep learning algorithm with a central processorand storage. Hence distributed frameworks with parallelized machines are ideal.

Deng et al. [8] proposed a modified deep architecture called Deep Stacking Network (DSN), which can be parallelized. A DSN is a combination of several specialized neural networks with a single hidden layer. Stacked modules with inputs composed of raw data vector and the outputs from previous module form a DSN.A new deep architecture called Tensor Deep Stacking Network (T-DSN), which is based on the DSN, is implemented using CPU clusters for scalable parallel computing. Recent models make use of clusters of CPUs or GPUs to increase the training speed.

4.0 RESEARCH GAP

From the literature review, it is known that processing of huge and complex datasets becomes more complicated. Especially in machine learning algorithms there is the lack of processing the complex and huge datasets. In deep learning (DL), there is no need of integrating the big data to process the huge datasets. Big data is most widely used to process the large or huge datasets. But deep learning algorithms itself process the any type of data set to overcome the various issues in

machine learning. From the past many years, machine learning algorithms are successfully employed for classification, regression, clustering, or dimensional reduction tasks of large sets of especially high- dimensional input data. But still there is a lack of accuracy. With DL it can be fulfill the increase the accuracy for various complex datasets.

5.0 OBJECTIVE OF THE PROPOSEDRESEARCH

The aim of this research is to design a dynamic and efficient algorithm. The primary objectives of this research are,

- A hybrid and integrated feature based machine learning algorithm to process the complex and complicated datasets. Datasets such as Adult (ADU), Bank Marketing(BAN).

- A Dynamic and integrated feature based machine learning algorithm to process the huge complex and complicated datasets. Datasets such as Adult (ADU), Bank Marketing(BAN).

- An Ensemble integrated Big data using parallel Computation Deep Learning algorithm to process the huge complex and complicated datasets. Datasets such as Adult (ADU), Bank Marketing (BAN).

6.0 RESEARCH METHODOLOGY

In this research, dynamic and efficient deep learning approach is proposed to find the result according to the datasets selected. The implementation follows the following steps

Initializing the Dataset

In this research, the datasets such as Adult (ADU) contains census data on adults. The task is to predict whether an adult's annual income exceeds 50; 000 USD. Adults whose annual income exceeds 50; 000 USD form the positive class. In the original data set, a categorical and a continuous attribute capture the educational level of the adult. To avoid double use, we removed the categorical attribute. The data set Bank Marketing (BAN) contains information on direct marketing calls that were conducted by a Portuguese banking institution. Clients who opened up a long term deposit after being called are treated as positives.

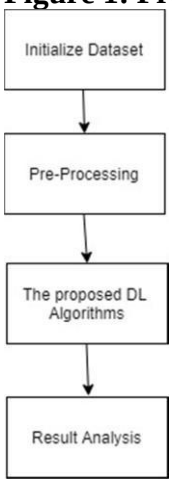
Pre-Processing

In deep learning, Pre-processing techniques are performed to clean the data and alter it to suit the format of forthcoming techniques. Any available noise will be removed and the data will be corrected for processing the given data. If there are any missing values, the rows will be deleted since they will be of no use. After pre- processing the aim of the algorithm should be given by the DL algorithm.

Feature extraction and classification

The features are now extracted in the dataset. There may be unnecessary features which may affect the classification process. In this work the unnecessary features will be removed by various feature extraction algorithms. After the removing of the various unnecessary features it is easy for the processing of complex datasets. This processed dataset will be used for the testing and training of the classifier. In DL, it is possible to process the various complex algorithms as we have already discussed.

Figure 1: Process diagram for proposed algorithms



7.0 EXPECTED OUTCOME

The expected output is based on the given dataset. The role of algorithm is process the dataset and shows the result how much it is fit for present situation. The design of every dataset will have the particular reason for the research. So, to know the reason it is very important to process the dataset with the algorithm and get the efficient output with high accuracy and less processing time.

8.0 SUMMARY

Many issues are identified with machine learning algorithms. Though ML algorithms are most efficient for classification and other intelligent system but deep learning shows the high intensity to process the various complex and huge datasets. The selected dataset Adult (ADU) and Bank Marketing (BAN) are huge and complex datasets. So the algorithms successfully going to implement on these datasets and will show the improved accuracy.

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