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Supporting Humans in an Intelligent Manner with Awareness of the Human's State Using Artificial Intelligence & Machine Learning

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Abstract:

The Artificial Intelligence is the modern era technology which plays a vital role in the modern engineering by using which we can enhance the technology. It not only influence the technology but also it provides a wide range of sophisticated paths for the humans to put his thoughts in terms of machine intelligence. The major factor lies in the Human learning is the decision taking ability is poor. So we are moving towards the Machine and to make a machine more interactive, we think for intelligence.

Machine learning as widely used concept in Artificial Intelligence. It is the concept which teaches machines to detect different patterns and to adapt to new circumstances. Now-a-days the concept of machine learning is used in many applications and is a core concept for intelligent systems which leads to the introduction innovative technology and more advance concepts of artificial thinking.

Machine Learning can be both experience and explanation based learning. In the field of robotics machine learning plays a vital role, it helps in taking an optimized decision for the machine which eventually increases the efficiency of the machine and more organized way of performing a particular task.

Key Words: Artificial Intelligence, Machine Learning, patterns, Deep Learning, RNN, Distributive learning.

I. INFERENCE BASED LEARNING

Learning is considered as a parameter for intelligent machines. As we know that the Deep understanding would help in taking decisions in a more optimized form and also help then to work in most efficient method. In the intelligence, the learning is also becoming a key to the study of biological and artificial vision. Instead of building heavy machines with explicit programming now different algorithms are being introduce which will help the machine to understand the virtual environment and based on their understanding the machine will take particular decision. It is a learning process which takes lots of time for understanding the facts. The machine will be able to understand the fact only when it is going to understand the steps of the algorithm. The algorithms are very useful if it is clear and unambiguous[1]. If an algorithm is effective then, this will eventually decrease the number of programming concepts and also machine will become independent and take decisions on their own.

Different algorithms are introduced for different types of machines and the decisions taken by them. Designing the algorithm and using it in most appropriate way is the real challenge for the developers and scientists learning. Most algorithms use the concept of pattern recognition to make optimized decisions. As a consequence of this new interest in learning we are experiencing a new era in statistical and functional approximation techniques and their applications to domain such as computer visions.

This research paper emphasizes on different types of machine learning algorithms and their most efficient use to make decisions more efficient and complete the task in more optimized form. Different algorithm gives machine different learning experience and adapting other things from the environment. Based on these algorithms the machine takes the decision and performs the specialized tasks. So it is very important for the algorithms to be optimized and complexity should be reduced because more the efficient algorithm more efficient decisions will the machine makes. Machine Learning algorithms do not totally

dependent on nature's bounty for both inspiration and mechanisms. Fundamentally and scientifically these algorithms depends on the data structures used as well as theories of learning cognitive and genetic structures. But still natural procedure for learning gives great exposures for understanding and good scope for variety of different types of circumstances[1, 2]. Many machine learning algorithm are generally being borrowed from current thinking in cognitive science and neural networks. Overall we can say that learning is defined in terms of improving performance based on some measure. To know whether an agent has learned, we must define a measure of success. The measure is usually not how well the agent performs on the training experiences, but how well the agent performs for new experiences. In this research paper we will consider the two main types of algorithms i.e. supervised & unsupervised learning.

II. RELATED WORKS

Sally Goldman et.al [1] proposed the practical learning scenarios where we have small amount of labeled data along with a large pool of unlabeled data and presented a "co -training" strategy for using the unlabeled data to improve the standard supervised learning algorithms. She assumed that there are two different supervised learning algorithms which both output a hypothesis that defines a partition of instance space for e.g. a decision tree partitions the instance space with one equivalent class defined per tree. She finally concluded that two supervised learning algorithms can be used successfully label data for each other. Zoubin Ghahramani et.al[2] gave a brief overview of unsupervised learning from the perspective of statistical modeling. According to him unsupervised learning can be motivated from information theoretic and Bayesian principles. He also reviewed the models in unsupervised learning. He further concluded that statistics provides a coherent framework for learning from data and for reasoning under uncertainty and also he mentioned the types of models like Graphical model which played an important role in learning systems for variety of different kinds of data. Rich Caruana et.al [3] has studied various supervised learning methods which were introduced in last decade and provide a large-scale empirical comparison between ten supervised learning methods. These methods include: SVMs, neural nets.

III. PROBLEMS FACED IN LEARNING

The most important problem arises in learning is to identify the algorithmic step. As we know that whenever a code is to be decoded, then it first converted into low level code. Here each instruction is identified by means of syntax and grammatically. But if the steps of the algorithm are complex then it is very difficult for a system to identify[3, 4]. Hence we need to have a optimal solution for learning the complex code of a program so that the machine can understand the fact and try to find the optimal steps. In some of the time the problems are very complex and cannot be easily understood by the machine. Hence to make it more sophisticated we need to have a learning strategies which are as discussed below.

IV. DEEP LEARNING

Deep learning is another machine learning process in which we are looking for the optimal solution for learning process. In this case it allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction. It is basically composed of various layers of abstraction. It uses some methods, and these methods have dramatically improved the state-of-the-art in speech recognition, visual object recognition, object detection and many other domains such as drug discovery and genomics[4]. Deep learning discovers intricate structure in large data sets by using the back propagation algorithm to indicate how a machine should change its internal parameters that are used to compute the representation in each layer from the representation in the previous layer. Deep convolution nets have brought about breakthroughs in processing images, video, speech and audio, whereas recurrent nets have shown light on sequential data such as text and speech.

To explain the concept of deep learning let us first explain the concepts of Conventional machine-learning techniques. A Conventional Machine Learning is a technique which is limited in their ability to process natural data in their raw form[2, 3]. For decades, constructing a pattern-recognition or machine-learning system required careful engineering and considerable domain expertise to design a feature extractor that transformed the raw data (such as the pixel values of an image) into a suitable internal representation or feature vector from which the learning subsystem, often a classifier, could detect or classify patterns in the input.

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A deep-learning architecture is a multilayer stack of simple modules, all (or most) of which are subject to learning, and many of which compute non-linear input–output mappings. Here each module in the stack transforms its input to increase both the selectivity and the invariance of the representation[3, 4]. With multiple non-linear layers, say a depth of 5 to 20, a system can implement extremely intricate functions of its inputs that are simultaneously sensitive to minute details — distinguishing Samoyeds from white wolves — and insensitive to large irrelevant variations such as the background, pose, lighting and surrounding objects.

V. BACKPROPAGATION TECHNIQUE

It is another form of learning process which is very popular and utilize in most of the field of Artificial Intelligence. This technique basically operates on the principle of feedback technique. Let us take the example of pattern recognition process in which the learning is too difficult for a machine when the data is more complex. In this case if we try to implement the concept of Back propagation approach then it will be more convenient for the machine to produce the desired output.

In the earliest days of pattern recognition, the aim of researchers has been to replace hand-engineered features with trainable multilayer networks, but despite its simplicity, the solution was not widely understood until the mid 1980s[4]. As it turns out, multilayer architectures can be trained by simple stochastic gradient descent. As long as the modules are relatively smooth functions of their inputs and of their internal weights, one can compute gradients using the back propagation procedure. The back propagation procedure to compute the gradient of an objective function with respect to the weights of a multilayer stack of modules is nothing more than a practical application of the chain rule for derivatives[5]. The key insight is that the derivative (or gradient) of the objective with respect to the input of a module can be computed by working backwards from the gradient with respect to the output of that module (or the input of the subsequent module) as showed in figure1.

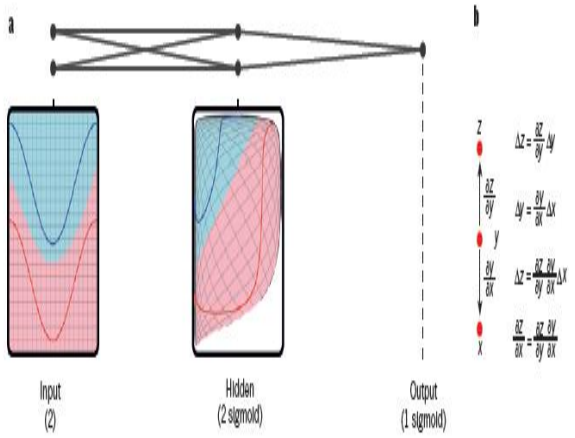

Figure-1

The back propagation equation can be applied repeatedly to propagate gradients through all modules, starting from the output at the top (where the network produces its prediction) all the way to the bottom (where the external input is fed). Once these gradients have been computed, it is straightforward to compute the gradients with respect to the weights of each module.

VI. DISTRIBUTED LANGUAGE PROCESSING

It is another learning technique in which we can compute the problems. The machine learning approach is more complex when the problem is having composite layers. No doubt Deep-learning theory shows that deep nets have two different exponential advantages over classic learning algorithms that do not use distributed representations[5, 6]. Both of these advantages arise from the power of composition and depend on the underlying data-generating distribution having an appropriate componential structure. The learning process basically operated on two approaches, such as

1. Learning distributed representations enable generalization to new combinations of the values of learned features.
2. Composing layers of representation in a deep net brings the potential for another exponential advantage70 (exponential in the depth).

The hidden layers of a multilayer neural network learn to represent the network's inputs in a way that makes it easy to predict the target outputs.

VII. RECURRENT NEURAL NETWORKS

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When back propagation was first introduced, it's most exciting use was for training recurrent neural networks (RNNs)[7, 8, 9]. For tasks that involve sequential inputs, such as speech and language, it is often better to use RNNs (Fig. 2). RNNs process an input sequence one element at a time, maintaining in their hidden units a 'state vector' that implicitly contains information about the history of all the past elements of the sequence. When we consider the outputs of the hidden units at different discrete time steps as if they were the outputs of different neurons in a deep multilayer network (Fig. 2, right), it becomes clear how we can apply back propagation to train RNNs[10, 11].

RNNs are very powerful dynamic systems, but training them has proved to be problematic because the back propagated gradients either grow or shrink at each time step, so over many time steps they typically explode or vanish.

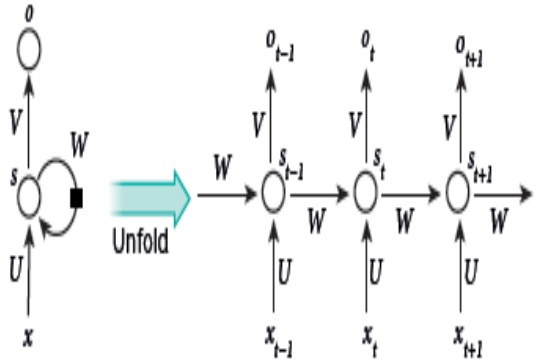

Figure-2 A recurrent neural network and the unfolding in time of the computation involved in its forward computation.

VIII. CONCLUSION

We know that the machine learning is a important aspect for which now a day we are looking for optimal solution. The Unsupervised learning had a catalytic effect in reviving interest in deep learning, but has since been overshadowed by the successes of purely supervised learning. In machine learning most of the time we expect unsupervised learning to become far more important in the longer term. Human and animal learning is largely unsupervised: we discover the structure of the world by observing it, not by being told the name of every object.

In contrast to Human vision is an active process that sequentially samples the optic array in an intelligent, task-specific way using a small, high-resolution fovea with a large, low-resolution surrounding? We expect much of the future progress in vision to come from systems that are trained end-to-end and combine with RNNs that use reinforcement learning to decide where to look. Natural language understanding is another area in which the machine uses the deep learning is poised to make a large impact over the next few years. We expect systems that use RNNs to understand sentences or whole documents will become much better when they learn strategies for selectively attending to one part at a time.

Ultimately, major progress in artificial intelligence will come about through systems that combine representation learning with complex reasoning. Although deep learning and simple reasoning have been used for speech and handwriting recognition for a long time, new paradigms are needed to replace rule-based manipulation of symbolic expressions by operations on large vectors.

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