MACHINE LEARNING

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Abstract: *Deep Learning is a method of machine learning in the field of artificial intelligence. Deep learning in a defined "machine learning" algorithm far surpasses many of its predecessors in terms of joint and image recognition. Deep learning is currently a very dynamic area of investigation in the machine learning and pattern recognition community. This has led to great achievements in a wide range of applications such as speech recognition, computer vision and natural language processing, and many industrial applications. Neural network is used to perform machine learning or design intelligent machines. This article discusses the entire paradigm of machine learning and a brief introduction to the various types of neural networks with application areas and applications of deep machine learning.*

Keywords: *Deep learning, Machine Learning, Generative Learning, Supervised Learning, active Learning, Unsupervised learning, Semi-Supervised Learning, Artificial.*

Neural Network Learning is the process of associating events with consequences. So, basically learning is a method of grounding the principle of cause and effect. The science of designing an intelligent machine is called machine learning and the tool used to design such an intelligent machine is neural networks. A neural network can be thought of as a black box that produces the desired output for a given input. This is achieved through a process called training.

Unlike most traditional learning methods, which are considered using shallow structured learning architectures, deep learning refers to machine learning techniques that use supervised and/or unsupervised strategies to automatically learn hierarchical representations in deep architectures [115] for classification. In-depth study inspired by biological observations of natural signal processing mechanisms of the human brain has attracted much attention from the academic community in recent years due to its state-of-the-art performance in many research areas such as speech recognition, collaborative filtering, and more. and computer vision. Companies such as Google, Apple and Facebook, which collect and analyze

large amounts of data on a daily basis, are actively promoting projects related to deep learning. Google applies deep learning algorithms to large chunks of random data from the Internet for Google Translate. Deep learning belongs to the class of ML techniques, where multiple layers of data processing steps in a hierarchical architecture are used for unsupervised feature learning and pattern classification. It is located at the intersections between the research areas of neural network, graphical modeling, optimization, pattern recognition and signal processing. Two important reasons for the popularity of deep learning today are the significant decrease in the cost of computing and the dramatic increase in the processing power of chips (such as GPU units). Before delving into the different machine learning paradigms, here is a brief classificatio

We use four main attributes to classify the machine learning paradigm. [116] Generative Learning and Discriminative Learning are two of the most common, adversarial ML paradigms developed and implemented in ASR (automatic speech recognition). There are two main factors that distinguish generative learning from discriminative learning: the nature of the model (hence the decision function) and the loss function (hence the key term in the learning objective). Briefly, generative learning consists of: Using a generative model and adopting a learning objective function based on the joint probability loss defined in the generative model. Discriminant learning, on the other hand, requires the use of a discriminant model or the application of a discriminant learning objective function to a generative model. takes In this section, we first provide a general discussion of discriminative models and discriminative loss functions used in training, and then consider the use of discriminative learning in ASR applications, including its successful hybridization with generative learning. Semi-Supervised and Active Learning [117], a previous overview of generative and discriminative ML paradigms, uses attributes of loss and decision functions to organize many ML techniques. In this section, we use different sets of attributes, namely the nature of the training data with respect to their class labels. Depending on how the training samples are labeled or otherwise specified, we can classify many existing ML techniques into several distinct paradigms, most of which are used in ASR practice. Supervised learning assumes that all training samples are labeled, while unsupervised learning assumes none. Semi-supervised learning, as the name suggests, implies that there are both labeled and unlabeled learning samples. Supervised, unsupervised, and semi-supervised learning typically refer to a passive learning setting in which labeled training samples are randomly generated according to an unknown probability distribution. In contrast, active learning is a situation

in which the learner can make intelligent choices about which patterns to label, as we discuss at the end of this section. In this section, we mainly focus on semi-supervised and active learning paradigms.

This is because supervised learning is very well understood, and unsupervised learning does not directly aim to predict input results (hence the focus of this article). We will cover these two topics briefly. Supervised Learning Supervised Learning is an approach to creating artificial intelligence (AI) in which a computer algorithm is trained on input data labeled for a specific output. A model is trained until it can identify key patterns and relationships between input data and output labels, allowing it to produce accurate labeling results when presented with never-before-seen data. Supervised learning is good at classification and regression problems. , for example, determining which category a news article belongs to or predicting sales volume for a certain future date. In supervised learning, the goal is to understand information in the context of a specific question. [118] Unsupervised Learning In general, unsupervised learning in ML refers to learning with only the input. This learning paradigm often focuses on creating a representation of data that can be used for prediction, decision making, or classification and data compression. For example, density estimation, clustering, principle component analysis, and independent component analysis are important forms of unsupervised learning. The use of vector quantization (VQ) to provide discrete inputs to ASR is an early successful application of unsupervised learning of ASR. Recently, unsupervised learning has been developed as a component of the stepwise hybrid generative-discriminative paradigm in ML. This emerging technique, based on a deep learning framework, is beginning to influence ASR. The learning of sparse images of speech can also be considered as unsupervised feature learning or demonstration of learning features in the absence of classification features.

Semi-Supervised Learning Semi-Supervised Learning is an approach to machine learning that combines a small amount of labeled data with a large amount of unlabeled data during the training process. Semi-supervised learning is between unsupervised learning (without labeled training data) and supervised learning (with only labeled training data). This is a special example of weak control. Active Learning Active learning is a setting similar to semi-supervised learning in which there is a large amount of unlabeled information in addition to a small amount of labeled information. [119] Artificial Neural Network An artificial neural network is a group of interconnected nodes that are remotely connected to the vast network of neurons in the brain shown in Figure 1. Here, each circular node represents an artificial neuron, and the arrow represents a neuron-to-

neuron connection from the output of one neuron. the introduction of another should (ideally) be able to resolve this. An artificial neural network consists of three types of layers: input layer, hidden layer and output layer. A hidden layer is connected between the input and output layer Figure 1 Convolutional Neural Networks CNN is a family of multilayer neural networks shown in Figure 2, especially suitable for use with two-dimensional data such as images and videos intended. CNNs are influenced by previous work in time-delay neural networks (TDNNs), which [120] reduce learning computational requirements by sharing weights in the temporal dimension and are suitable for speech and time series processing. intended.

CNN is the first truly successful deep learning approach where multiple layers of the hierarchy are successfully trained in a robust manner. A CNN is an architectural choice that exploits spatial and temporal relationships to reduce the number of parameters to be learned, thereby improving overall forward back propagation training. CNN is proposed as a deep learning framework with minimal data preprocessing requirements. In CNN, small parts of an image are treated as input to the lowest layer of the hierarchical structure. Figure 2 This article discusses machine learning techniques and their implementation in depth. It is clearly shown that different methods use different algorithms for implementation. It was also concluded that neural network and support vector machine are the most popular ways to implement the machine learning paradigm. Deep learning is an extended version of supervised learning. Finally, Convolution Neural Network and Deep Belief Network are two powerful techniques that can be used to solve a variety of complex problems using deep learning. Deep learning platforms can also take advantage of built-in features to explore more complex images that are not typically available in engineering systems. Advances in the development of deep machine learning systems will undoubtedly shape the future of machine learning and artificial intelligence systems in general.

Summary. In this topic, I studied the methods of machine learning and the application of neural networks in various fields. Deep learning in a machine learning algorithm far surpasses many of its predecessors in terms of joint and image recognition. Deep learning is currently a very dynamic area of investigation in the machine learning and pattern recognition community. . Neural network is used to perform machine learning or design intelligent machines. This article discusses the entire paradigm of machine learning and a brief introduction to the various types of neural networks with application areas and applications of deep machine learning.

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