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Fine Tuning of the Model by using Gradient Descent and Evolutionary Algorithms

Akshitha Reddy[1], Yeshwanth Roy[2]

B.Tech Student, IIT, India[1]

B.Tech Student, IIT, India[2]

ABSTRACT: The target approach of deep learning is to resolve the sophisticated aspects of the input by using multiple levels of representation. This new approach to machine learning has already been doing wonders in the applications like face, speech, images, handwriting recognition system, natural language processing, medical sciences, and many more. Its latest researches involve revealing the optimization and fine tuning of the model by using gradient descent and evolutionary algorithms.

KEYWORDS: deep learning, classification, NLP

I. BIOLOGICAL IMAGE CLASSIFICATION

[2] contributed the analysis of the classification and peculiarity of wood boards by considering the images. For their experiment, they used decision tree induction algorithms, CNN, Neural Network, Nearest Neighbor and support vector machine on the used dataset. The team successfully achieved very promising results and concluded that the deep learning when applied to image processing tasks accomplished predictive performance accuracy. The accuracy also depends on the nature of the image dataset.

- Data Flow Graphs

[3] put forward a TensorFlow Graph that is a part of the TensorFlow machine intelligence structure that help in understanding the machine learning architecture based on the data flow graph. They applied serial transformations for designing the standard layout for the interactive diagram. They developed the coupling on the non-critical nodes and built a clustered graph by taking the stepwise structure from the source code. They also performed edge bundling to make the expansion responsive and stable and focused on the modular composition. [5] proposed a new screening method based on deep neural net- work. The method was developed to assess whether a patient from the emergency should shift to cardiology. The method was studied on 1320 patients that took raw ECG signals without annotation. The team also worked on the library that exhibit batch form implementation for number of models.

- Deep Vision System

[7] presented a new approach for the autonomous navigation using machine learning techniques. They used CNN to identify marker from the images and also developed a robot operating system and discovered a system based on the position of the object to orient to the marker. They also evaluated the distance and navigation towards these markers with the help of depth camera. [8] proposed powerful models of deep learning that helps in implementing the real time video processing applications. They explained that in the technological era, with the powerful facilities of deep learning techniques, the real time video processing applications e.g. video entity detection, tracing and identification can be made possible with great accuracy. Their architecture and novel approach solved the problems of computational cost, number of layers, precision and accuracy. They used deep learning algorithms that give robust powerful architecture with many layers of neurons and the efficient manipulation of big video data. [10] presented a framework for visual similarities with the unsupervised deep learning. They employed weak calculations of local similarities and proposed a new optimized problem for extracting batch of samples with mutual relations. The conflicting relations were distributing over different batches and similar samples are arranged in a separate group. Convolutional neural network was used to build up relations within and between the groups and create a single representation for all the samples without labels. For the posture analysis and the classification of objects, the proposed method shows competitive performance.

- Document Analysis & Recognition

[12] presented a new approach for the visual and speech recognition. They proposed an R-CNN called relaxation convolutional neural network based visual and speech recognition system used to regularize CNN for the fully

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interlinked layers. They do not need neurons in a map to share the kernel. This architecture requires another architecture which is called alternately trained relaxation called ATR-CNN. The R-CNN increased the total number of parameters, so they used ATR-CNN for regularizing the neural network during training procedure and got the accuracy with an error rate of 3.94%. In R-CNN, neurons do not share the same convolutional kernel and ATR-CNN also used an alternative strategy for the training. For the working of ATR-CNN, they required handwritten digit dataset MNIST and ICDAR'13 competition dataset. [14] presented a review on the deep learning and its applicability for the optical character recognition on the Tamil script. They presented a survey on the studies done by the experts on the Tamil script. They also mentioned the steps required for better OCR development using deep learning technology with the big data analysis. [15] also proposed an explanation for the handwritten ZIP code identification. They employed the back-propagation algorithm into a deep neural network with expanded training time. [18] used deep neural nets for identifying online hand- written mathematical symbols. Here they used max out dependent CNN and bidirectional long short term memory to the image patterns. These image patterns have been created from online patterns. The experiment was conducted on the CHROME database. They concluded that as compared with MQDF, the CNN network produces improved results to identify the mathematical symbols offline. BLSTM also worked better than MRF in case of online patterns. By integrating both online and offline integration methods, classification performance was improved.

[19] proposed a d. Experiment was carried out in the IAM and HWDB datasets and proved the success with the accuracy rates of nearly 99%. [22] developed a method to solve the issues for understanding the images of a handwritten word. They used CNN to evaluate its n-gram frequency profile, which is the set of n-grams contained in the word. Frequencies for unigrams, bigrams and trigrams were estimated for the entire word. Canonical correlation analysis was used for the comparison of profiles of all words. CNN used multiple fully connected branches. After going through this process, they got more accurate results without applying much effort in atomic tasks like an image binarization and the letter segmentation.

[24] presented an original work on the deep learning for identifying numerals in handwritten Arabic. They used Multilayer Perceptron method of Rectified Linear Unit (ReLu) for the stimulation of neurons in the input and the hidden layer, and the softmax function was used for the classification in the outer layer. They selected CNN architecture with the activation function and the regularization layer to increase the accuracy. The proposed approach proved 97.4% accuracy rate. [25] proposed three most commonly used NN approaches which are deep neural network (DNN), deep belief network (DBN) and convolutional neural network (CNN). They performed the comparison on the networks by considering the factors like recognition rate, execution time and the performance. For conducting the experiment, they used random and standard dataset of handwritten digits. The results proved that out of these three NN approaches, DNN provided promising accuracy of 98.08% and the execution time of DNN is comparable with the other two algorithms. They also reported that the new approach generated an error rate of only one to two percent because of the similarity in digit shapes. [28] presented a unique approach for the recognition of the Devanagari script. They used a deep learning approach for the feature extraction process. They used raw pixel values for the selection of features and used unsupervised restricted Boltzmann machine with deep belief network to improve the performance and the accuracy of the system. The method was suited for the character, numerals, vowels and compound characters. Experiment revealed 83.44% accuracy with unsupervised method and with the supervised method, the accuracy of 91.81% was reported.

II. CONCLUSION

Learning machines, k-Nearest neighbor and classification algorithms were used. For the experiment, they selected Support vector machines with Gaussian kernel and got accuracy of 84%, sensitivity of 94% and specificity of 73%. A technique known as dynamic batching which combined the diverse input graphs with dissimilar shapes but with also different nodes that were present in single input graph. The technique helped to create static graphs that follow dynamic computation graph with different size and shapes.

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