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Various Ways of Using Recurrent Neural Networks

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ABSTRACT: They worked on such applications of acoustic modeling where multiple layers of features were pretrained. They explicitly exemplary the covariance structure of the input features. They were trying to reveal alternative representations of the input that helps deep neural networks to gather the relevant information in the sound-wave. They also explored various ways of using recurrent neural networks for increasing the amount of past detailed information that helps in the interpretation of the future.

KEYWORDS: modeling, neural networks, AI

I. HEALTHCARE

[2] proposed a new approach for heart diagnosis and management, in context with rural healthcare, and also discussed the benefits, issues and solutions for implementing deep learning algorithms. The development of rural healthcare services such as telemedicine and health applications were really required. Different solutions such as portable medical equipment and mobile technologies have been developed to find out the deficiencies present in the remote settings. Additionally, computer aided designed systems have also been used for assistive interpretation and diagnosis of medical imagery. The implementation of machine and deep learning algorithms would bring numerous benefits to both physicians and patients. The advancement of mobile technologies would expedite the proliferation of healthcare services to those residing in impoverished regions. [4] proposed a framework for the healthcare application and to reduce the heavy workload of doctors and nurses by employing the advantages of the technologies of artificial intelligence. They considered that the methods of pattern recognition and the deep recognition module were sufficient enough to diagnose the health status based on deep neural networks (DNNs). They also worked on the action evaluation module, which is based on the Bayesian inference graphs and then developed a simulation environment which includes a body simulator to prepare the body for the treatments, and the health state of the simulated patient will be changed by different interventions.

- Human Activity Recognition

[6] proposed human activity recognition systems for the continuous monitoring of human behaviors in the environment. For the mobile and wearable sensor- based human activity recognition pipeline, they extracted the relevant features that will influence the performance and reduced the computation time and complexity. The combination of mobile or wearable sensors and deep learning methods for feature learning really proved diversity, higher generalization, and resolved all challenging issues in human activity recognition. They presented the review on the in- depth summaries of deep learning methods for mobile and wearable sensor-based human activity recognition and presented the methods, their uniqueness, advantages and their limitations. They categorized the studies into generative, discriminative and hybrid methods and also highlighted their important advantages. The review presented classification and evaluation procedures and discussed publicly available datasets for mobile sensor human activity recognition. They reviewed the training and optimization strategies for mobile and wearable based human activity recognition. They also tested some of the publicly available benchmark datasets such as Skoda, and PAMAP2. [7] presented an online human activity recognition and classification system based on the accelerometer. They used CNN for the implementation of the method for extracting local and statistical features. They focused the use of time series length for examining the activities. The experiment was conducted on the WISDM and UCI datasets and used 36 and 30 users respectively with labeled data. Proposed model achieved good results with less computational cost and without manual feature engineering.

- Medical Applications

[8] presented how deep convolutional neural network (DCNN) based classifier can be used to deal with small and unbalanced medical data set. They used data augmentation schemes, the inclusion of the third class of lesion patterns

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and an awareness of diversity in committee formation. The study validates the accuracy of the technique developed. [9] proposed a deep learning method in the regularized ensemble framework. It was used to handle the multi class and imbalanced problems. They used stratified sampling for the balancing of the classes and concentrate on the un-prediction caused by the base learners through regularization. For the data distribution, sampling procedure selected examples randomly and the regularization process updates the loss of function to penalize the classifiers. It also adjusts the error boundaries keeping in view the performance of the classifier. For their experiment, they used eleven dissimilar synthetic as well as real-world data sets. Their new method had successfully got the highest accuracies for the minority classes with the ensemble stability. Experimental results proved that the proposed method achieved the best accuracy and also explains the dissimilarity of the base classifiers present in the ensemble. They explained that there is also significant reduction in the computational cost. But as the volume of training data increases, the efficiency of their method increases. [11] proposed stimulating solutions and reported with very good accuracy for the health care applications such as medical imaging, image interpretation, health sector, computer-aided diagnosis, medical image processing, image fusion, image registration and image segmentation. The machine learn- ing and artificial intelligence methods provided assistance to the doctors to diagnose and predict the disease and its risk and prevent them in time. The method helped the doctors in understanding the generic variations that lead to the occurrence of the disease. These techniques were made up of both conventional algorithms and deep learning algorithms such as Support Vector Machine (SVM), Neural Network (NN), KNN and Convolutional Neural Network (CNN), Extreme Learning Model (ELM), Generative Adversarial Networks (GANs), Recur-rent Neural Network (RNN), Long Short term Memory (LSTM), etc.

- Mobile Multimedia

[14] proposed a survey on the deep learning for mobile multimedia. They concluded that less complex deep learning algorithms, the software frameworks, and specialized hardware helped in the processing of deep neural network. They presented applications of deep learning in mobile multimedia with the different possibilities for real- life use of this technology. Multimedia processing and deep learning can be integrated to work with mobile devices. The earlier approach of using mobile devices just as sensor and actuator devices and the main processing and data storage services for deep learning located in servers would definitely support some applications. As mobile devices were more dominant, more applications running deep learning engines reduced the overhead of maintaining internet connectivity and also the complex server infrastructure.

- Parking System

[17] presented a mobile cloud computing architecture based on the deep learning that used training process and the repository in the clouds. The communication was possible with the Git protocol that helps in transmission of the data even in the unstable environment. During the driving, smart cameras in the car recorded the videos and the implementation was done on the NVIDIA Jetson TK1. Results of the experiment proved that detection rate was improved to four frames per second as compared to R-CNN. For detecting parking lot occupation, [19] proposed a new decentralized solution for the classification of images of a parking space when occupied directly on the smart cameras. It is built on deep convolutional neural net- work (CNN) suited for the smart cameras. The experiment is implemented on the two visual datasets such as PKLot and CNRPark-EXT. Actually they required a dataset that contains the images of a real parking and is collected by nine smart cameras. The images were captured on different days under in diverse weather and light conditions. They also employed a training and validation dataset for the detection of parking occupancy and performed the task in real-time directly on the smart cameras. They did not employ a central server for the experiment. The method used Raspberry Ri platform equipped with camera module. For implementing the proposed method, the server needs the binary output of the classification. They concluded that CNN received very high accuracy with the light condition variations, partial occlusions, shadows and noise.

- Person Re-identification

22. proposed the method for visual recognition, especially for person re-identification (Re-Id). They used distance metric between pairs of examples and pro- posed contrastive and triplet loss to enhance the discriminating power of the features with great success. They proposed a structured graph Laplacian embedding method, which can be formed and evaluated all the structured distance links into the graph Laplacian form. By integrating the proposed technique with the softmax loss required for the CNN training, the proposed method produced specific deep features by maintaining inter-personal dispersion and intra-personal compactness, which were the requirement of personal Re-Id. They used the most common and popular networks such as AlexNet, DGDNet and ResNet50. They concluded that the proposed structure graph Laplacian embedding technique was very effective for the person re-identification.

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[28] put forward a new multiple levels strategy for feature extraction to integrate coarse and fine information coming from different layers. They also developed a multilevel triplet deep learning model called MT-net to extract multilevel features systematically. The results of the experiment, on popular datasets it was proved that the method was the most effective and robust.

II. CONCLUSION

The team worked on the body simulation module, a deep recognition module used to diagnose the bodily features and an action evaluation module used Bayesian inference graphs to maintain the record and calculate the statistical evidence. Experiment proved to be the most efficient with the increasing statistical data. For the experiment they used the dataset consisting of health state representation space of 9 body constitutional types.

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