Paper: *A Convolutional Neural Network for Modelling Sentences*

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Quote *"... We have described a dynamic convolutional neural network that uses the dynamic k-max pooling operator as a non-linear subsampling function. The feature graph induced by the network is able to capture word relations of varying size. "*

Overview Generally, a sentence modeling refers to the analysis and the representation of the semantic meaning of a given input sentence to achieve classification or text generation. In Natural Language Processing, this lies in the heart of processing human language and also the understanding of how dynamic systems could implement complex human language models. In this paper, the authors proposed a Convolutional Neural Network (CNN) architecture where the adopted the model to fit with the semantic modeling of input sentences. They call their model Dynamic Convolutional Neural Network (DCNN). As the name suggest, the researchers used a global Dynamic k-Max pooling mechanism which does its operation on linear sequences. To get the context of a sentence, a subgraph of the feature graph is described. The subgraphs contain distinct set of edges obtained from max pooling so that the higher layers can relate to input sequence far apart from that layer. K-max pooling pools the k most active features in the given sequence but reserves the order of the features. In the intermediate layers, the value of k is chosen dynamically and this dynamic value of k comes from a function which is defined by the length of the input sentence and the depth of the network. After that the authors used a non-linear feature function to obtain feature maps from the wide convolution and max pooling. The authors did four experiments of their network.

The proposed network outperformed well known classifiers like Naive Bayes, Support Vector Machine, NBoW and so on in both fine-grained and binary accuracy in movie review dataset. In sentiment analysis task, the authors used Twitter sentiment dataset and their proposed model produced the best results. The proposed model promises high performance on sentiment classification even without requiring external features.

Intellectual Merit The authors aimed to propose a dynamic model for semantic modeling of sentences. The model advanced the current benchmark of similar tasks. They have incorporated dynamic max pooling along with non-linear feature function. The research was well organized in terms of explaining the model architecture and the training method. The success of the proposed model was shown by comparing the accuracy of the tasks with different models. The authors had the access to the required data set to experiment with their model.

Broader Impact This research showed great promise in terms of increased accuracy for a given task compared to other established models. All the authors of this paper are from the University of Oxford. All the researches are experienced in the field of natural language processing with years of expertise in the field. The authors also made their code available to public access.

Keywords Natural Language Processing, DCNN, Max-pooling, Feature maps

Discussion Questions

- The authors used the cross-entropy loss function for their model. There should have been some justification to use this loss function.
- The proposed model could be improved if more attention to parallelism was given.

Table 1: Grade deductions by section

Overview	Intellectual M.	B. Impact	Keywords	Questions	Is Online?