



Special issue on deep learning for natural language processing

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Making a computer to understand, analyze and interpret the meaning for human communication language is Natural Language Processing (NLP). Language in general has been defined as the means of communication between two or more individuals to share their ideologies and feelings. Traditionally, the communication between human is realized through various natural languages. However, when this is extended to human computer interaction, the scenario changes distinctly with human communicating in their own natural language and this communication should be interpreted such that the computer understands the appropriate meaning communicated through the natural language with an eye on not losing some essential properties such as emotions, feelings and context. This aspect of training the computer system to understand and learn natural languages has made NLP an interesting, challenging and demanding research area especially when it comes to artificial intelligence and human computer interaction. Algorithms of NLP are basically derived from machine learning approaches, where it uses the machine learning approaches to learn the rules automatically for analyzing large volume of data. A fast-automatic processing for natural languages is very impossible by machine learning approaches. Hence, it is very necessary to find a more advanced approach to replace machine learning for providing fast-automatic NLP in various real time applications.

Deep learning is one of the more advanced machine learning approaches that extends the features of artificial neural networks. Deep learning can extract and classify features automatically and fast. The primary objective of deep learning is to classify and analyze the different patterns generated out of natural languages. Deep learning provides a multi-layer abstraction approach towards non-linear feature and pattern

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analysis in the field of NLP, and it can able to obtain hidden features on large volume of data automatically.

Therefore, this special issue is important to provide a platform to present various advancements in NLP using deep learning. The special issue has received 19 papers, of which 8 paper were selected for publication after a strict peer review. Details of these selected papers are as follows.

The paper entitled “*Automatic Hate Speech Detection using Killer Natural Language Processing Optimizing Ensemble Deep Learning Approach*” provided by Al-Makhadmeh et al. introduces a method for using a hybrid of NLP and deep learning approaches to predict hate speech from social media websites. This method detects hate speech on social media websites using an effective learning process that classifies the text into neutral, offensive and hate language. The experimental results prove the method has a high accuracy and reliability.

The paper entitled “*An Optimized Cognitive-Assisted Machine Translation Approach for Natural Language Processing*” provided by Alarifi et al. uses a more advanced technique for NLP that is intended to translate phrases with a higher degree of precision than other Support Vector Machine (SVM), Linear Regression (LR), Decision Trees (DT), Naïve Bayes (NB), and K-Nearest Neighbor (KNN) techniques. The efficiency of this approach is evaluated using the bilingual evaluation understudy (BLEU) and Better Evaluation as Ranking (BEER) metrics for English language phrase datasets in English language. This ensures the high precision while performing the machine translation process.

The paper entitled “*Study on Text Representation Method Based on Deep Learning and Topic Information*” provided by Jiang et al. studies the strategy of fusing global and local context information, and proposed a continuous bag of words model CBOWT that integrates deep neural network, topic information and word order information. Then, based on the word distributed representation obtained by CBOWT, a short text representation method with TF-IWF-weighted pooling is proposed. Finally, the performance of the CBOWT model and the short text representation are compared with the baseline models, and it is found that the proposed method improves the quality of the word distributed representation.

The paper entitled “*Research on Statistical Machine Translation Model based on Deep Neural Network*” provided by Xia et al. proposes a novel deep learning approach DNNAPM to study the statistical machine translation. Then, the proposed model is compared with some baseline methods. The experimental results show that the statistical machine translation model based on DNNAPM has a better effect, faster convergence and high reliability.

The paper entitled “*English Speech Recognition Based on Deep Learning with Multiple Features*” provided by Song et al. takes English speech as the studied object, and proposes a deep learning speech recognition algorithm that combines speech features and speech attributes. The experimental results prove that the proposed English speech recognition algorithm based on deep learning with multiple features can directly and effectively recognize the English speech, when it is compared with some traditional methods.

The paper entitled “*Chinese Text Classification based on Attention Mechanism and Feature-Enhanced Fusion Neural Network*” provided by Xie et al. proposes a feature-

enhanced fusion model based on attention mechanism for Chinese text classification, a Long Short-term Memory (LSTM) Network, a Convolutional Neural Network (CNN), and a Feature-difference Enhancement Attention Algorithm Model. The text classification experiments are conducted based on the Chinese text corpus. The experimental results show that compared with the contrast model, the proposed algorithm can significantly improve the recognition ability of Chinese text features.

The paper entitled “*Incorporating Feature Representation into BiLSTM for Deceptive Review Detection*” provided by Liu et al. designs a neural network method with bidirectional long short-term memory (BiLSTM) and feature combination to learn the representation of deceptive reviews. A large amount of experiments are conducted to demonstrate the effectiveness of the proposed method. Specifically, in the mixed-domain detection experiment, the results prove that the proposed model is effective by making comparisons with other neural network-based methods.

Finally, the paper entitled “*A Survey of Word Embeddings based on Deep Learning*” provided by Wang et al. finishes a review on the word embeddings based on deep learning. It concludes the word embeddings approaches, represented by deep learning, has attracted extensive attention and widely used in many tasks, such as text classification, knowledge mining, question-answering, smart Internet of Things (IoT) systems and so on. Meanwhile, the paper has concluded the key challenges and existing solutions in field of the word embeddings. An outlook regarding the study has been presented. Generally speaking, the work in this paper can provide a direction for studying the word embeddings.

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