

Practice 8

Deep learning models

The DNNs consist of artificial neural networks that simulate the human brain to automatically learn high-level features from data, getting better results than traditional models in speech recognition, image processing, and text understanding. Input datasets should be analyzed to classify the data, such as a single-label, multi-label, unsupervised, unbalanced dataset. According to the trait of the dataset, the input word vectors are sent into the DNN for training until the termination condition is reached.

The performance of the training model is verified by the downstream task, such as sentiment classification, question answering, and event prediction. We show some DNNs over the years in Table 1, including designs that are different from the corresponding basic models, evaluation metrics, and experimental datasets. Numerous deep learning models have been proposed in the past few decades for text classification, as shown in Table 1. We tabulate primary information – including publication years, venues, applications, code links, evaluation metrics, and experiment datasets – of main deep learning models for text classification. The applications in this table include Sentiment Analysis (SA), Topic Labeling (TL), News Classification (NC), Question Answering (QA), Dialog Act Classification (DAC), Natural Language Inference (NLI) and Relation Classification (RC). The multilayer perceptron and the recursive neural network are the first two deep learning approaches used for the text classification task, which improve performance compared with traditional models. Then, CNNs, Recurrent Neural Networks (RNNs), and attention mechanisms are used for text classification. Many researchers advance text classification performance for different tasks by improving CNN, RNN, and attention, or model fusion and multi-task methods [<https://arxiv.org/pdf/2008.00364.pdf>].

Among Deep Learning Models are spreadly used:

1. Shallow Neural Network
2. Deep neural network (and 2 variations)
3. Recurrent Neural Network (RNN)
4. Long Short Term Memory (LSTM)
5. Convolutional Neural Network (CNN)
6. Gated Recurrent Unit (GRU)
7. CNN+LSTM
8. CNN+GRU
9. Bidirectional RNN
10. Bidirectional LSTM
11. Bidirectional GRU
12. Recurrent Convolutional Neural Network (RCNN)

Task 1: choose 1 NN algorithm, make a report with code examples (5-10 pages) and presentation for 10-15 minutes.

Task 2: apply the chosen algorithm for true-fake news classification.