

Named Entity Recognition

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Abstract

We have build a multi-layer bi-directional LSTM Word + Char based CRF sequence model. We have used Tensorflow library to build this model. Also we have made non neural model which uses "pycrfsuite" a python wrapper library for CRF functionality. We have added different features in this model. Some features include lower,pos tag, etc.

So we have two models which were trained on same Train, Dev and Test split. For LSTM based Neural model we have got test accuracy of 92.67% accuracy and feature based model gives an accuracy of 92%

1 Model Configuration

In this section we give briefly the description of both the models. First lets discuss Deep Neural LSTM Word+Char sequence tagging model and then we'll discuss feature based model.

In Deep Neural LSTM Word+Char CRF model, for each word we build a vector $w \in R^n$ that will capture the meaning and relevant features for the task. We have build this vector as a concatenation of the word embeddings $w_{glove} \in R^{d1}$ from GloVe and a vector containing features extracted from the character level $w_{chars} \in R^{d2}$. So the char level embedding helps neural network to extract word level features automatically. We then used a bi-LSTM at the character level and Word level and concatenates the two embedding $w \in R^{d1+d2}$. To compute the scores we then used linear chain CRF.

In Feature based model, we have extracted different features like word-postag, isWordUpper, isWordLower, isWordDigit, isFirstWordCapital, etc. We then trained our model on trainset using CRF wrapper provided by pycrfsuite and test it

on test set. We have also noted different accuracy results on test set by making different combinations of hand-coded features on/off.

2 DataSet

We have trained both the models on the provided dataset as Train, Dev and Validation sets. Train - 70%, Dev - 10% and Test - 20%.

3 Results Metrics

We have used accuracy as an metric to evaluate the model and found out that deep model which automatically extracts word level features performs better than feature selection based model.

| Model Name | Accuracy |
|---|----------|
| Deep Sequence Tagging Word + Char CRF model | 92.67 |
| Feature Based CRF Model | 92.0 |

Table 1: Accuracy Results

4 Code and Output

We have saved our code on git-hub link provided, also it contains file *evaluate_test.py* which takes as input testfilepath and produces labelled test-file. This model uses deep neural model while one can also test it through feature based model using python notebook.