

Bidirectional LSTM-CRF models for Sequence Tagging for Named Entity Recognition

Input/s:

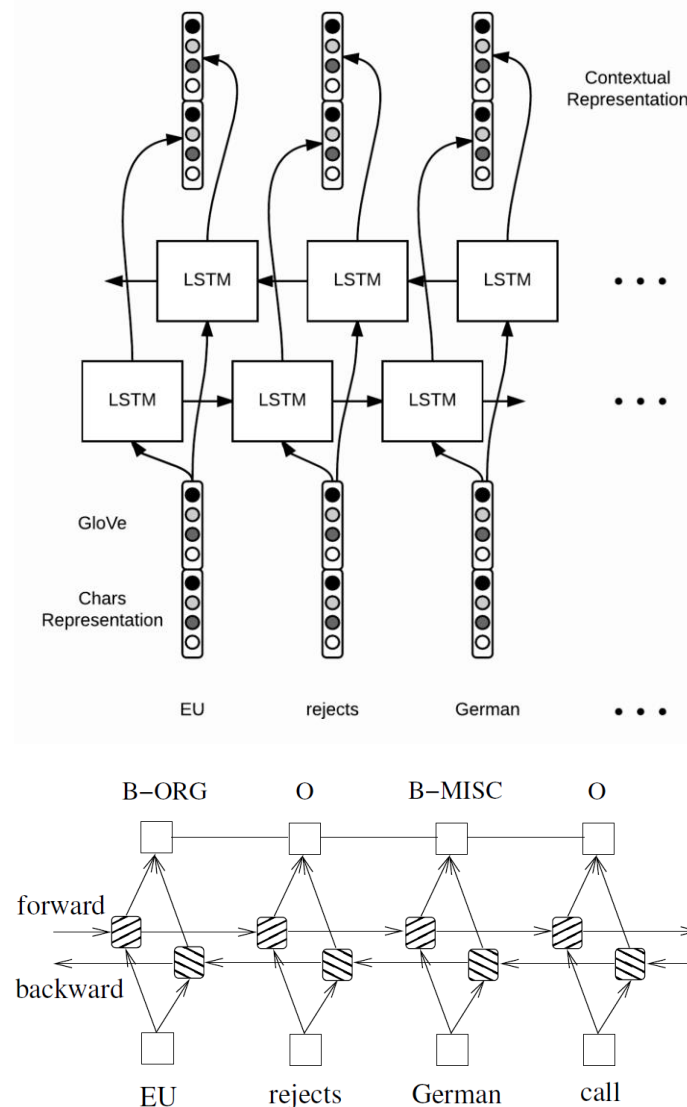
- Text as sentence or tokenized strings
- Glove - glove.840B.300d

Output/s:

- BIOESX tagged Entities

Approach:

- Tokenize the inputs and build their GloVe representations
- Perform training in batches, firstly run the BiLSTM-CRF model in forward pass for both the forward and backward state of the network and capture score for all tags at all positions
- Run CRF layer forward and backward pass and calculate the Viterbi score/sequence to find high probability candidate tags and back propagate the errors and update the network parameters



Evaluation Datasets:

Named Entity Recognition

Datasets

- CoNLL '03:
 - English Dataset contains collection of news wire articles from Reuters
 - Per-Loc-Org-Misc tagging
 - *Dataset used in the paper as well.*
- OntoNotes 5.0:
 - Includes text from various genres of text like news, weblogs, broadcast, newsgroups etc.
 - 15+ tags

Evaluation metrics:

- Precision
- Recall
- F1 Score

Table 6: Comparison of F1 scores of different models for NER.

System	accuracy
Combination of HMM, Maxent etc. (Florian et al., 2003)	88.76
MaxEnt classifier (Chieu., 2003)	88.31
Semi-supervised model combination (Ando and Zhang., 2005)	89.31
Conv-CRF (Collobert et al., 2011)	81.47
Conv-CRF (Senna + Gazetteer) (Collobert et al., 2011)	89.59
CRF with Lexicon Infused Embeddings (Passos et al., 2014)	90.90
BI-LSTM-CRF (ours)	84.26
BI-LSTM-CRF (Senna + Gazetteer) (ours)	90.10

```
[BiLSTMCRFSeqTag.py:190 - evaluate() ] {}  
[BiLSTMCRFSeqTag.py:204 - evaluate() ] Returning evaluation metrics [P, R, F1] :  
[BiLSTMCRFSeqTag.py:205 - evaluate() ] (80.0, 88.88888888888889, 84.21052631578948)
```

CoNLL '03 Dataset output

```
[BiLSTMCRFSeqTag.py:216 - evaluate() ] {}  
[BiLSTMCRFSeqTag.py:230 - evaluate() ] Returning evaluation metrics [P, R, F1] :  
[BiLSTMCRFSeqTag.py:231 - evaluate() ] (52.63157894736842, 55.55555555555556, 54.05405405405405)
```

Ontonotes 5.0 Dataset output

Dataset	Precision	Recall	F1	F1 [in paper]
CoNLL 03	80.0	88.888	84.210	84.26
OntoNotes 5.0	52.63	55.55	54.054	--

Thank You

Any Questions?