NLP Final Project Report

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# Part 1-4

## How to run

See README.txt

## Approaches

We implemented Viterbi algorithm as follows:

We implemented forward-backward algorithm as follows:

We calculated the expected count of a feature as follows:

Result

### EN part 2

**‘/EN/dev.p2.out’**

#Entity in gold data: 210

#Entity in prediction: 154

#Correct Entity : 103

Entity precision: 0.6688

Entity recall: 0.4905

Entity F: 0.5659

#Correct Sentiment : 71

Sentiment precision: 0.4610

Sentiment recall: 0.3381

Sentiment F: 0.3901

### EN part 3

Loss using features from part 1: 2050.740533835358

### EN part 4

**‘/EN/dev.p4.out’**

#Entity in gold data: 210

#Entity in prediction: 139

#Correct Entity : 104

Entity precision: 0.7482

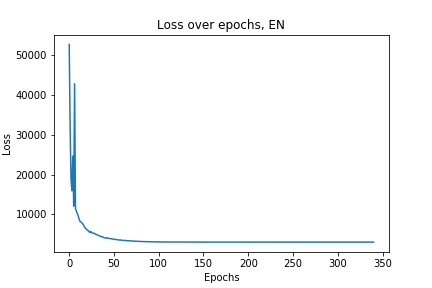
Entity recall: 0.4952

Entity F: 0.5960

#Correct Sentiment : 73

Sentiment precision: 0.5252

Sentiment recall: 0.3476

Sentiment F: 0.4183

### ES part 2

**‘/ES/dev.p2.out’**

#Entity in gold data: 235

#Entity in prediction: 177

#Correct Entity : 133

Entity precision: 0.7514

Entity recall: 0.5660

Entity F: 0.6456

#Correct Sentiment : 104

Sentiment precision: 0.5876

Sentiment recall: 0.4426

Sentiment F: 0.5049

### ES part 3

Loss using features from part 1: 2676.6770981798413

### ES part 4

**‘/ES/dev.p4.out’**

#Entity in gold data: 235

#Entity in prediction: 147

#Correct Entity : 117

Entity precision: 0.7959

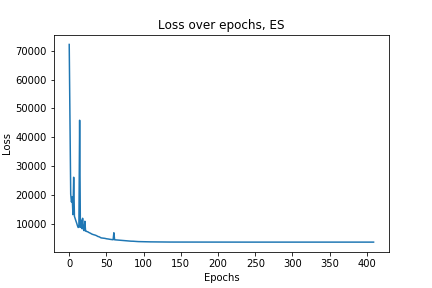
Entity recall: 0.4979

Entity F: 0.6126

#Correct Sentiment : 93

Sentiment precision: 0.6327

Sentiment recall: 0.3957

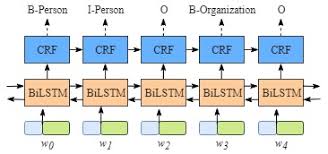
Sentiment F: 0.4869

# Part 5

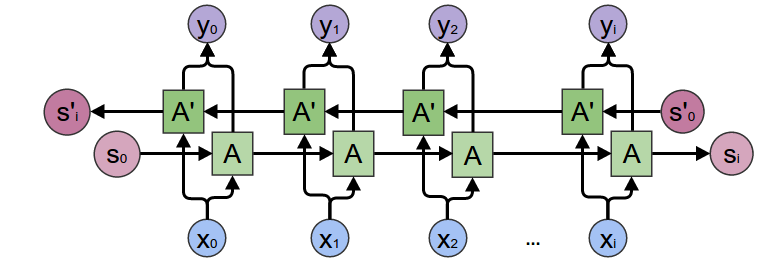
Approaches

In part 5, we use Bi-LSTM CRF. The reason why we use this model is that although LSTM is sufficient for this task, a sequence model like CRF is really essential for strong performance on the task. Following is the computation of a conditional probability for CRF.

Overall Architecture:



Bi-LSTM Cell



The score in the above equation is determined by some log potentials such as:

Since in the Bi-LSTM CRF, we have both emission and transition. We have the following actual equation for score.

Following are the results:

**EN**:

#Entity in gold data: 210

#Entity in prediction: 147

#Correct Entity : 107

Entity precision: 0.7279

Entity recall: 0.5095

Entity F: 0.5994

#Correct Sentiment : 67

Sentiment precision: 0.4558

Sentiment recall: 0.3190

Sentiment F: 0.3754

**ES**:

#Entity in gold data: 235

#Entity in prediction: 147

#Correct Entity : 117

Entity precision: 0.7959

Entity recall: 0.4979

Entity F: 0.6126

#Correct Sentiment : 93

Sentiment precision: 0.6327

Sentiment recall: 0.3957

Sentiment F: 0.4869