NLP Assignment 1 Report

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1 Overall Accuracy

HMM Viterbi Symbolic: 95.2095%
HMM Viterbi Vector: 95.2093%

2 Accuracy for each Tag

Tag	HMM Symbolic	HMM Vector
.	98.89%	98.83%
PRT	98.9190%	99.6561%
PRON	99.3694%	99.0120%
NUM	99.7174%	99.4779%
ADV	98.9417%	99.2483%
CONJ	99.0966%	99.3204%
VERB	98.9417%	98.8895%
X	99.4866%	99.3055%
DET	99.1638%	99.2157%
NOUN	99.1428%	99.3725%
ADP	99.1294%	99.3614%
ADJ	98.9946%	98.7218%

Table 1: Accuracy for each Tag

3 Confusion Matrix

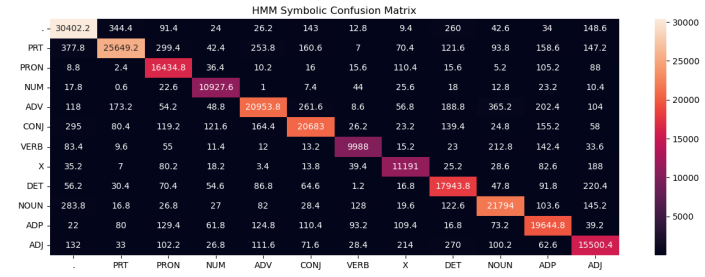

Figure 1: Confusion Matrix for HMM Symbolic

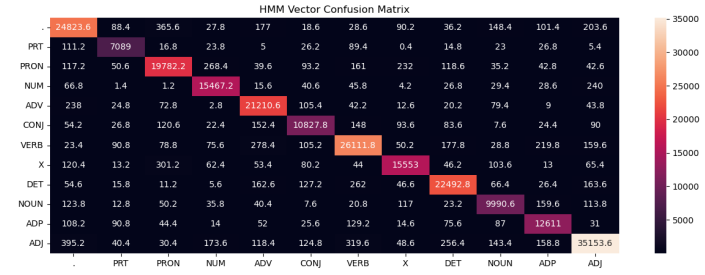

Figure 2: Confusion Matrix for HMM Vector

4 Scores for each Tag

4.1 Accuracy

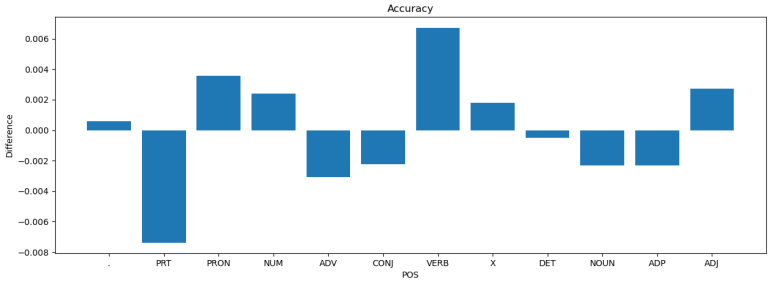

Figure 3: Accuracy for HMM Symbolic and HMM Vector

4.2 Precision

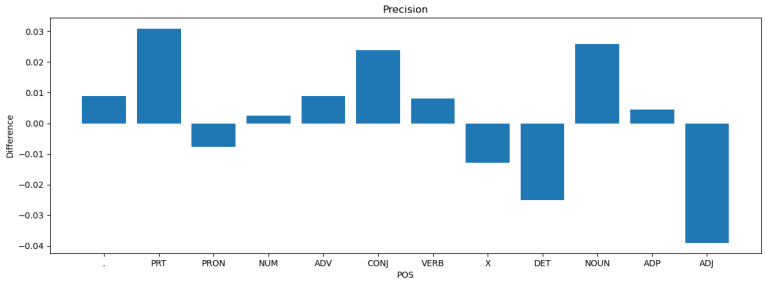

Figure 4: Precision for HMM Symbolic and HMM Vector

4.3 Recall

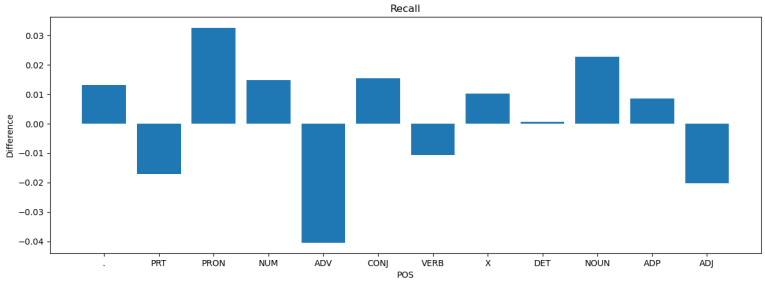

Figure 5: Recall for HMM Symbolic and HMM Vector

4.4 F1 Score

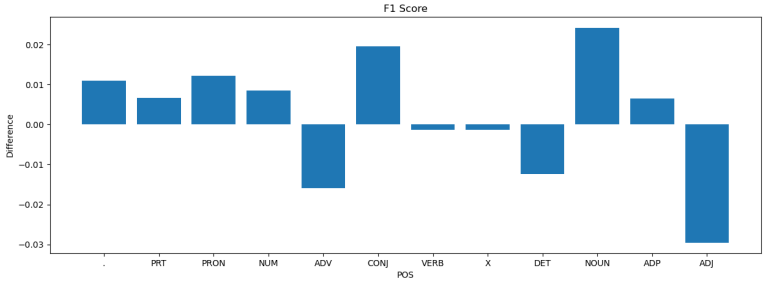

Figure 6: F1 Score for HMM Symbolic and HMM Vector

4.5 F2 Score

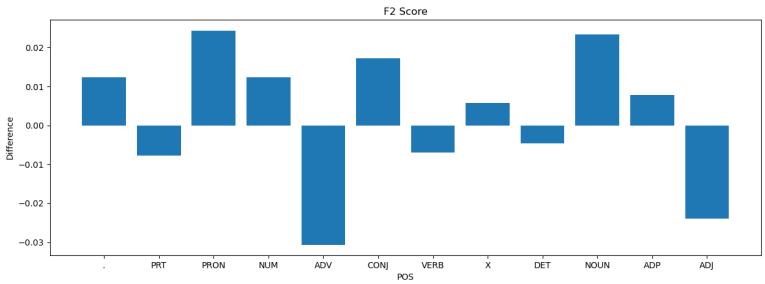

Figure 7: F2 Score for HMM Symbolic and HMM Vector

4.6 F0.5 Score

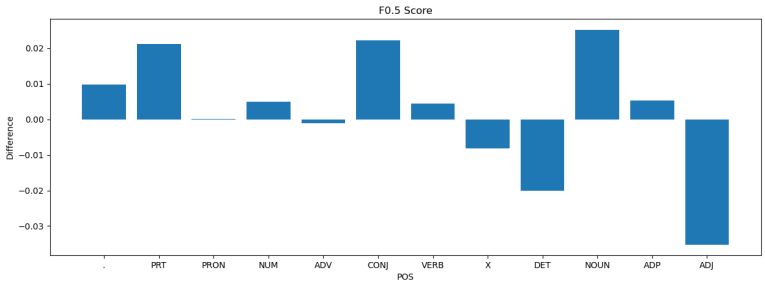

Figure 8: F0.5 Score for HMM Symbolic and HMM Vector

5 Observations

- HMM Viterbi Symbolic has slightly better accuracy than HMM Viterbi Vector.
- In almost all metrics except accuracy, HMM Viterbi Symbolic performs better in case of adjectives and determiners.
- For nouns,conjunctions and adpositions (post and prepositions) the HMM Vector performs better in almost all metrics, except accuracy.
- The HMM Vector performs better throughout for numbers and punctuation marks.
- For other tags, the scores do not show any consistent trend.

6 Learning from the results

- The overall accuracy is almost same for both the models, this may be atrributed to the fact that in the code, the out-of-vocabulary (OOV) words corresponding to which there were no embeddings, were handled in a similar way as that of HMM Symbolic.
- One of the ways to rectify this is to train the embeddings on a larger dataset (something which was not feasible because of the storage and computational constraints).
- From the observations, we can say that HMM-Viterbi-Vector would perform slightly better in those documents which have numbers, punctuations, nouns, conjunctions and adpositions. For example, an article related to science or mathematics.