Assignment 1
POS Tagger

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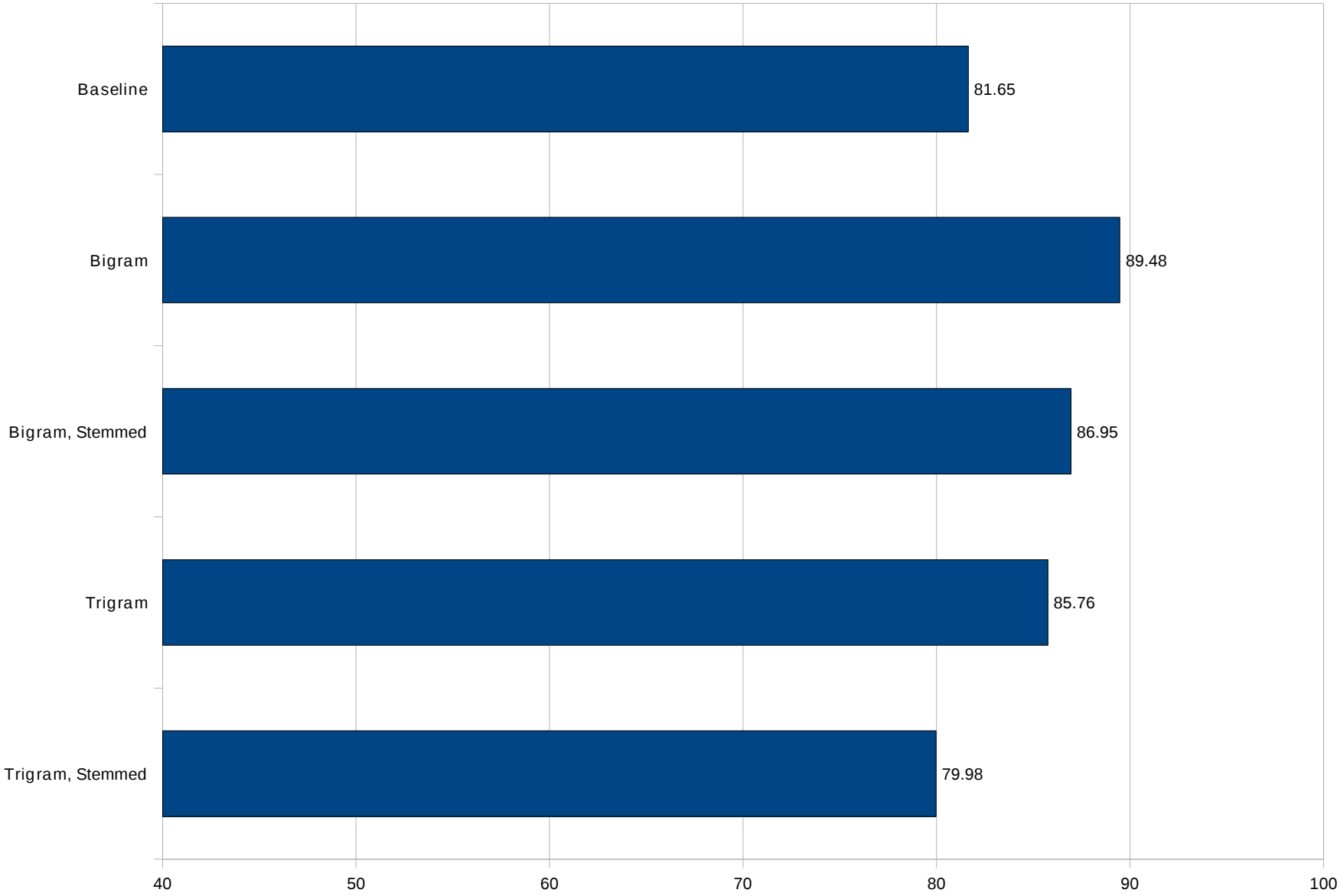
Implemented POS-Taggers

- Baseline Tagger – most frequent tag
- Bigram Tagger
  - Simple bigram tagger
  - Tagger with stemming
  - Tagger with beam search
- Trigram tagger
  - Simple bigram tagger
  - Tagger with stemming
  - Tagger with beam search

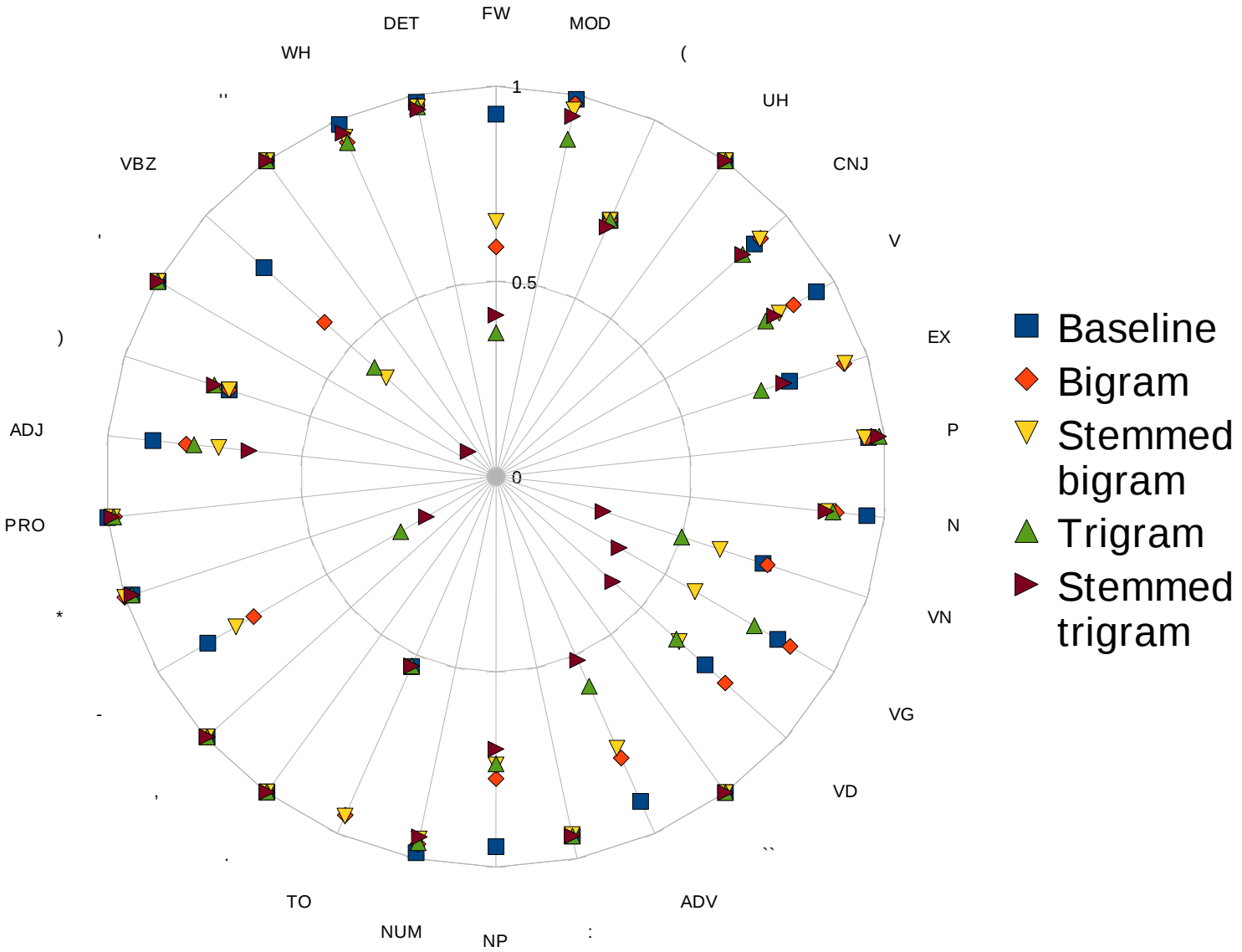
Strategy

- Training corpus: Brown-news category, simplified tags
- Viterbi and its Beam variation
- Testing using Four-fold cross-validation
- Morphology analysis: using Porter Stemmer
- Python programming language

Results


Baseline
81.65
Bigram
89.48
Bigram, Stemmed
86.95
Trigram
85.76
Trigram, Stemmed
79.98
40
50
60
70
80
90
100

Per POS tag accuracy



Challenges faced

- Unknown word handling
  - Most likely tag corresponding to 3 character suffix of unknown word
- Handling super small numbers (Underflow)
  - Convert to log space
  - e.g. log(1.0e-205) = -205
- Handling log(0)
- Handling unknown tag sequences
  - Assign equal probabilities to all possible tags

Beam search

- Restrict number of possible tags (states) at each level
- Keep a threshold probability log(0.2)
- Dynamic adjustment of Beam width
  - new_beam = old_beam + log(prev_max_prob)

References

- HMM-based Language-independent POS Tagger by *Pradeep Varma D., Rakesh M., Ratna Sanyal, Indian Institute of Information Technology, Allahabad*