Unsupervised Morphology-Based Vocabulary Expansion
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**Introduction**

- **Objective**
  - Creating new words to extend vocabularies for under-resourced languages
- **Approach**
  - Using unsupervised learning of morphology and using learned affixes to generate new words
- **Tools**
  - Morfessor for unsupervised Segmentation (Creutz and Lagus, 2007)
  - WFSTs for generating new words

**Modeling Word Generation**

- **Two Word Models for Expansion**
  - **Fixed Affix**: every word is a sequence of one/zero complex (multi-morpheme) prefix, stem and one/zero complex (multi-morpheme) suffix.
  - **Bigram Affix**: every word only has one stem and zero or more morpheme affixes.

- **Reranking Models**
  - Reranking with letter trigraph probabilities
  - Reranking with letter trigraphs at morpheme boundaries only
  - No Reranking

**Experiments and Results**

- We ran Morfessor on 65K to 115K tokens from seven different languages
- We evaluated on a small-sized data set (50K to 100K tokens) measuring out-of-vocabulary reduction.
- The best results use the Fixed Affix model with trigram re-ranking.
- Word precision is still a big issue (less than 30% of the top 50K generated types could be analyzed by a Turkish morphological analyzer).

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**Flowchart of the vocabulary expansion model**

**Two models of word generation from morphologically annotated data**

**Figure 2**: Two models of word generation from morphologically annotated data. In our experiments, we ran Morfessor on 65K to 115K tokens from seven different languages. We evaluated on a small-sized data set (50K to 100K tokens) measuring out-of-vocabulary reduction. The best results use the Fixed Affix model with trigram re-ranking. Word precision is still a big issue (less than 30% of the top 50K generated types could be analyzed by a Turkish morphological analyzer).