Word-Based Partial Annotation for Efficient Corpus Construction

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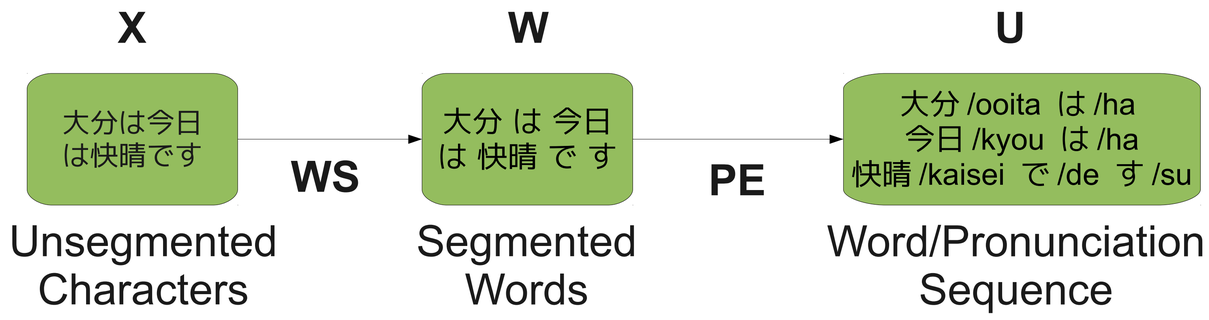
Overview

- **Objective:** Minimize the amount of effort required for domain adaptation
- **Approach:** A word-based partial annotation strategy, and a machine-learning strategy that can utilize partially annotated data
- **Details:**
  - *Use a point-wise classifier* to allow for learning from partially annotated data
  - Introduce a strategy to pick annotation segments based on *character bi-gram diversity*
- **Evaluation** on word segmentation and pronunciation estimation for Japanese shows improvement over full annotation

Japanese Pronunciation Estimation

- Consists of two elements
  - **Word segmentation (WS)** that divides unsegmented characters into words
  - **Pronunciation Estimation (PE)** that finds the appropriate pronunciation for each word



- Previously proposed methods use sequence-based estimation (e.g. *n*-gram models)

Language Resources

General Domain

- **Balanced Corpus of Contemporary Written Japanese (BCCWJ):** 898k words fully annotated with pronunciations and word boundaries
- **UniDic:** 212k word dictionary annotated with 1.05 pronunciations/word
- **Number Dictionary:** Dictionary of 2 and 4-digit numbers with pronunciations for use in years

Target Domain

- Creating language resources in the target domain will increase accuracy
  - *Difficult and time consuming!*

Partial Annotation

- Most target domain sentences only contain a few points not covered by the general domain resources

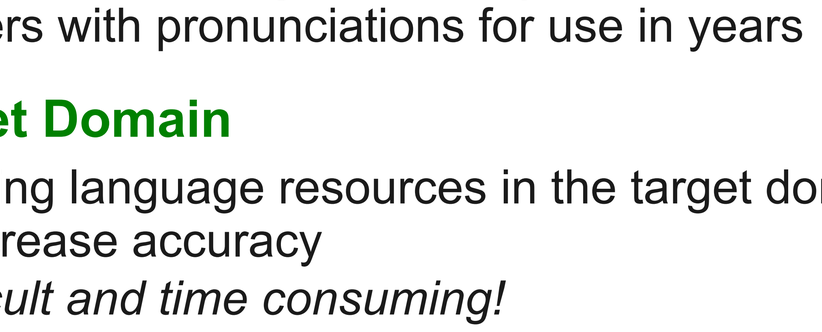
- *Full annotation wastes time on well covered points!*
- **Solution:** Only annotate points that are not well covered in the general domain

大分 /ooita は今日は快晴です

- Character bigrams that exist in the target corpus but not the general corpus were selected (in order of frequency)

Point-Wise Estimation

- *Traditional sequence-based (n-gram) methods cannot learn from partial annotation!*
- **Solution:** Use point-wise estimation, which estimates each word boundary or pronunciation independently of the others



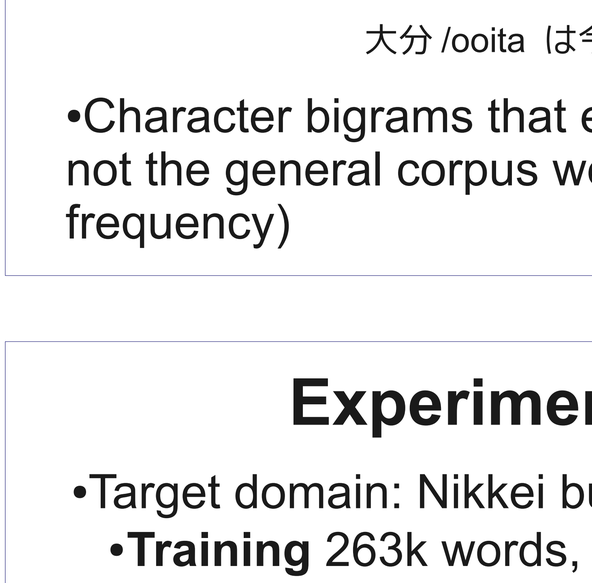
- Estimation is performed using linear SVMs or logistic regression
- Features used:
  - Character n-gram, character type n-gram, dictionary words

Available open-source: http://www.phontron.com/kytea

Experimental Results

- Target domain: Nikkei business newspaper
  - **Training** 263k words, **Test** 29k words
- Estimation strategy: **Tri-gram** vs. **Point-wise**
- Annotation strategies: **Full** vs. **Partial** annotation
- Results: **Point-wise partial** approach most effective

Word Segmentation



Pronunciation Estimation