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Citation for published version (APA):

Document status and date:
Published: 01/02/2017

Document Version:
Publisher’s PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:
• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher’s website.
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Modernizing historical Dutch: the UU system

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Summary

- **Goal:** modernize 17th century Dutch text to allow use of modern NLP resources and tools
- **Method:** combine expert rules, translation pairs from aligned parallel text, existing SMT frameworks
- **Data:** parallel translation of the Bible, 1637/1888
- **Results:** the proposed vocabulary-based method shows promising results on an in-domain test set, performance is impaired for unrelated domains
- **Future work:** refinement of current method, shift to character-based methods

Introduction

- Modernization of spelling and grammar allows use of tools for modern Dutch on historical text
- **Note:** some features (e.g., negative concord and case marking) are lost after modernization
- Quantitative methods can be trained using parallel text, e.g., diachronic translations of the Bible

Method

The Bible text is split into a training set (32235 sentences) and a test set (5000 sentences). The following steps are incrementally applied, with associated BLEU scores [1] on the test set ($n = 4$):

- (BLEU: 0.134) No translation.
- (0.507) Baseline: construct 1-to-1 translation lexicon on training data, using sentences of equal length.
- (0.530) Perform alignment to handle sentences of unequal length, extract additional translation pairs.
  - custom alignment algorithm using fixed anchor tokens
- (0.581) Compile a set of manual modernization rules.
  - e.g., strip case markers
- (0.600) Construct many-to-1 translation lexicon using aligned sentences.
- (0.619) Use POS-information for already modernized words to choose the right alternative for historical words.
  - haer + V → hen
  - haer + N → hun
- Selection for many-to-1 and POS rules: hill-climbing optimization on BLEU score on training data.
- (0.627) Compile rules to address punctuation differences between Bible translations.


- (0.597) Moses with basic training settings.
- (0.616) Apply MERT tuning.
- (0.639) Post-processing of incorrect output of trained Moses capitalization model.
- (0.644) Manual modernization rules on Moses output.
- (0.647) Moses with manual rules, multi-alignment, and POS patterns.
- (0.653) As above, with punctuation rules.

CLIN Shared Task test set results

- Additional phonetic rewriting rules to address OOV issues

Discussion and future work

- Vocabulary-based method not highly suitable for unrelated texts
- Diachronic differences: e.g., en translated as negation, but used in later texts only as conjunction
- Overtranslation, i.e., arguably correct results not present in the reference translation
  - oft-e-of, der-van de, hare-hun, ’t-het, zo als-zoals, hebbe-heb, ...
- The current method can be refined for in-domain texts
- Character-based methods may offer wider applicability

References
