Understanding Negation in Positive Terms

Using Syntactic Dependencies (Published in EMNLP 2016)

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Motivation

Negation often conveys positive meaning.

- Most jobs now don’t last for decades.
  - Few jobs now last for decades.
  - Most jobs in the past lasted for decades.
  - Most jobs now last for a few years.

In this work we present a methodology to extract positive interpretations from a negative sentence, as intuitively done by human.

Main Objectives

1. Create a corpus of negation and their positive interpretations
   (a) Automatic generation of potential positive interpretations
   (b) Manual validation
2. Learning to score potential positive interpretations

Corpus Creation

- Two steps:
  1. Generate potential positive interpretations automatically using syntactic dependencies
  2. Validate potential positive interpretations (manual annotations)

Step 1. Generating Potential Positive Interpretations

- Selecting negation
  - select 8,165 verbal negations from OntoNotes
  - verbal negation: tokens whose syntactic head is a verb and dependency type neg

Converting negations into their positive counterparts

1. Remove the negation mark
2. Remove auxiliaries, expand contractions, and rewrite third-person singular and past tense
3. Rewrite negatively-oriented polarity-sensitive items

Selecting relevant tokens

- Simplify the original statement by including only the negated verb and all tokens reachable from the negated verb traversing dependencies.

Learning to Score Potential Interpretations

- Standard supervised machine learning
  - Each potential positive interpretation along with their scores becomes an instance (1,700 instances)
  - 80/20 split (train / test)
  - all interpretations from a negation are either in the train or test split
- SVM for regression with RBF kernel
  - tuned using 10-fold cross validation, grid search

Results

Table 4 reports Pearson correlation for 4 different feature sets. Gold data set contains 379 test instances (20% of all annotations), however in the Predicted data some test instances are missing because the potential interpretations could not be generated.

Conclusions

- Humans intuitively understand negated statements in positive terms
- This paper presents a methodology to:
  - generate potential positive interpretations from verbal negation and
  - score them
- The procedure is grounded on syntactic dependencies

Forthcoming Research

We are increasing the number of negations and their probable positive interpretations, and apply a sequence to sequence deep learning models to generate them automatically.