NOUNS ARE BETTER THAN N-GRAMS

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About Me

- Lots of database design and architecture experience
- Text analytics class during my Master's degree in Predictive Analytics
- Preparing text for analysis has been a theme of just about every project I've been involved in for the last 4+ years

Agenda

- Overview of using part-of-speech tagging to extract tokens from text
- Python notebooks showing some different extraction approaches
  - Comparison of standard pipeline tokens to noun phrase extraction
- Pseudo code example of scaling the method to a Spark cluster
- Q&A

Begin With the End in Mind

- A part-of-speech based token extraction pipeline for text:
  - Can be straightforward to implement
  - Generates tokens that are more human readable
  - Can find phrases naturally (replacement for n-grams generation)
  - Removes many stopwords “for free”
- Lemmatizing or singularizing terms can collapse terms that are different because of plural / singular differences

Typical pipeline

- Tokenize the text
- Convert all tokens to lower case
- Apply a stemmer to reduce tokens to common roots
  - E.g. boil, boils, boiler, boiled, boiling → boil
- Remove stop words
  - Common English words (the, of, to, in, and, or, which)
- Might also include n-gram generation

Challenge

- Standard pipeline for preparing text for analysis yields tokens that can be of low value
- These tokens can be difficult to explain to business users – what do the tokens mean?
- Uses many rules for handling text, and text (nearly) always has exceptions to each rule.

Solution

- Replace the standard tokenize-stem-stop-n_gram pipeline with a part-of-speech based pipeline
- Extract words and phrases with the desired parts-of-speech
- Use singularization as a different approach to stemming to bring singular and plural forms of words together

Result is not perfect, but better quality than the tokenization approach.

Benefit

The resulting tokens naturally:

- Include phrases (n-gram replacement)
- Remove the standard English stop words. They have a part-of-speech that isn't typically used in analysis
- Supports readability and don't need stemming to collapse similar words to a common root

DEMO

Resources and Links

- Pattern
  - For Python* 3 compatibility, I had to install a development branch of the library. See (link) for details
    - Something like:
      git clone –b development https://github.com/clips/pattern
      cd pattern
      sudo python setup.py install
- NLTK
- Penn-Treebank (on Wikipedia) and Tags
- Intel® Distribution for Python* (link)
- Others: RDRPOSTagger, spaCy, rakutenma, TextBlob

Q&A

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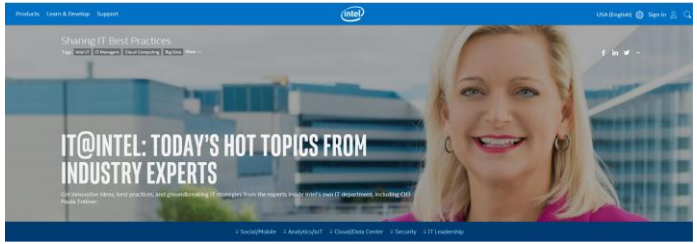

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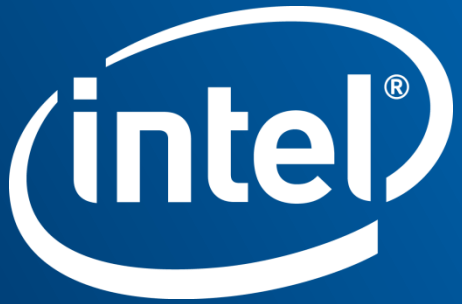
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