Intermediate Project Report – Aspect Based Sentiment Analysis

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LING 575

**Project goals:**

The task we have chosen for our project is Aspect-Based Sentiment Analysis (ABSA). ABSA is essentially fine-grained sentiment analysis where the goal is to identify the polarity of an aspect, where an aspect is essentially any part of an entity that an opinion is being expressed about. We will be attempt a three-way classification of aspect sentiment where the labels consist of positive, neutral, and negative.

ABSA is typically at least a two-stage process where the first step is identifying and extracting the aspects and the second step is classifying the sentiment of those aspects. The data we will be using is from SemEval 2014, Task 4, which is actually broken into 4 subtasks. The first subtask is aspect extraction and the second task is classifying aspect term polarity. Both of these are fairly intuitive. The third subtask is aspect category detection, where previous extracted aspects are conflated into coarser categories, and the fourth subtask is classifying the sentiment of those coarse aspect categories.

For this project, we intend to focus primarily on the classification of aspect sentiment (subtask 2). Time permitting, we are also interested in aspect extraction (subtask 1).

**Major challenges:**

There are several substantial challenges involved in ABSA, which we will illustrate with three examples.

1. The bread was as stale as the ambience.
2. The bread was stale, the ambience was not.
3. The ambience was as stale as week-old bread.

The first obstacle is that the data are quite limited in size. All of these examples contain 8ish words, though for example 2, the span in which the opinion about the bread is being expressed is really only 4 words. The scarcity of the data makes it more challenging for both rule-based and data driven techniques.

Furthermore, multiple aspects can each be described by their own sentiment clue or both by a single a single sentiment clue: in the first example, the sentiment clue *stale* describes both aspects (bread and ambience). As with other sentiment tasks, valence shifters (e.g. intensifiers and diminishers) and negation are extremely influential in determining sentiment and need to be properly handled. In example 2, *stale* has to be connected to both *not* and *ambience.*

Other obstacles include the difficulty in distinguishing between entities, aspects and general opinions, the fact that aspects and be single or multi-word units and they also range in terms of specificity (*features* can be an aspect, as in “I like the features on this laptop.”)

Current approaches:

**Our work:**

Our basic plan is to employ a data-driven approach and generate features by starting shallow and move toward the deep end. Initially, we will implement a simple baseline using unigrams in a certain range. Next, we will scale up to higher order n-grams and include some element of back-off to sentiment terms to deal with the increased dimensionality. From there we will build features incorporating some syntactic element, though we are not exactly sure what this will look like at this point. The final step would be to include semantic features, likely MRS-based features extracted vie the ERG. We also hope to use a variety of learning methods.

If we are able, to also hope to explore the aspect extraction subtask. Our approach here would be to create some sort of baseline (likely noun-driven), and the see if we can improve using distributional similarity. The intuition here is that is we a given word is distributionally similar to a known aspect, it too is likely an aspect.

**Project resources:**

As mentioned above, our dataset comes from SemEval 2014 Task 4. This is a specially created dataset that includes training and test data for two domains: laptops and restaurants. The data is annotated for all four subtasks: aspect, aspect sentiment, aspect category and aspect category sentiment, though we will be focusing on the first two subtasks. This data set also comes with an evaluation script.

We plan on using coreNLP for the syntactic feature generation, the ERG and ACE for MRS-based feature generation, and Mallet for classification. If we are able to include aspect extraction, we will use DISCO to determine distributional similarity. The polarity lexicon we will use is Senti-Strength.

**Project plans:**

At this point, we have code to extract the sentences and aspects from the training data into objects. Soon, we will have our unigram baseline working.

There may be an aspect extraction portion to this project where we use distributional similarity to build upon a simple NP or head noun baseline

Proximity to adjectives or other sentiment clues

ML ideas:

Shallow: n-grams within a distance of an aspect, can employ backoff

Slightly deeper: include syntactic relationships via coreNLP

Deep: Same MRS features as previous class

Use variety of learning methods:

Adaboost – has Java API

This would give us a sort of comparison against the contextual polarity paper

Split into clauses, assume one aspect per clause

Rule-based ideas:

Look for the sentiment clue nearest aspect, distance defined in terms of either surface string or in dependency parse or MRS, assign polarity of clue word