Towards Automatically Annotating Textual Resources with Human Intentions

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Problem Statement

How and to what extent is it feasible to automatically annotate textual resources with human intentions?

Motivation

- Intent plays a fundamental role in user interactions on the web, including interpreting and understanding resources.
- We introduce Human Intentions as new and interesting annotation dimension.
- In contrast to traditional annotations such as topic or quality, intent annotations focus on future states of affairs.
- Example: While a particular blog post might focus on the topics "cars" and "automobiles", the underlying intention of the author might be to "achieve mobility" or to "reduce ecological footprint".
- Potential benefits: (i) to quickly grasp the main aspirations implicitly addressed by resources or (ii) to enable goal-oriented navigation of resources, such as blogs, on the web.

Intent Annotation

- Intent Annotation can be understood as the problem of automatically identifying a set of adequate intent annotations for textual resources.
- Intent Annotation approximates the unknown function $f: S \times C_I \rightarrow \{True, False\}$, where $C_I = \{c_{I1}, c_{I2}, \ldots, c_{In}\}$ is the set of predefined intent categories, $D$ is a domain of text documents and each document $d_i$ consists of a sequence of sentences $S = \{s_1, s_2, \ldots, s_m\}$.
- Observation: people rarely state their intentions explicitly in text, which makes the task of Intent Annotation an especially challenging endeavor.
- Example: consider the human religious intention to "Achieve Salvation" (taken from [1]): Although this is an activity pursued by many, it is extremely rare to find someone who states their plan on how to accomplish this goal. However, people are quite prolific in writing about the actions and activities they participate in, such as "convert to Christianity". Such a text can be assumed to indirectly contribute to "Achieve Salvation".
- We explore indicative actions as a proxy for inferring intentions from textual resources.

Approach: iTAG Automatic Prototype

1.) Enriching a Taxonomy of Human Goals: We employed the social-psychological theoretical framework [1] that organizes high-level goals of people into 135 categories of human intent, including "Achieve a good marriage", "Getting an education" and "Taking care of family". We compiled a set of descriptive phrases for each category. To give an example: Descriptive phrases for the category "Achieve Salvation" included "to reach spiritual enlightenment" or "to get into heaven".

2.) Construction of the Knowledge Base: We attempted to acquire indicative actions by searching for sentences on the web (cf. [2]). We constructed a series of query strings by concatenating each descriptive phrase with causal relation phrases, e.g. "in order to". Then, exact phrase searches were issued to the web using Yahoo! BOSS. We identified ~169,000 sentences that contained the query phrases along with indicative actions. These sentences were stored in our knowledge base, an Apache Lucene index.

3.) Matching Sentences to Intent Categories: We first segment the document into a set of sentences. Each sentence in the document is issued as a query to the knowledge base to identify the most similar sentence in our knowledge base.

Results & Evaluation: Automatically Annotating B. Obama’s and J. McCain’s US Presidential Election Speeches

We applied our approach to the textual resources of 44 transcripts of political speeches given by the two American presidential candidates in 2008. Figure 2 provides a visual comparison between traditional and intent tag clouds. To evaluate the quality of automatic intent annotations, we compared annotations produced by iTAG with the annotations produced in a human subject study. Moreover, a precision/recall curve was calculated to contrast iTAG against a random approach (see Figure 3).

- Out of the top 25 intent categories produced by iTAG, 31 categories (44%) are shared with the human annotations (ground truth).
- Our iTAG prototype outperforms a simple baseline approach for recall levels of up to 70%.
- Our iTAG prototype achieves a precision of 50% and above for 40% recall (10 relevant annotations).

Conclusions

- This work adds a novel dimension to the set of tag dimensions: Human Intentions.
- Expands the repertoire of existing automatic tag generation techniques [3].

Further Questions

1) How can we employ this new dimension to aid navigating and to browsing textual resources on the web?
2) To what extent is our approach agnostic to other textual corpora such as weblogs?

Check out our online demonstrator:
http://webdev.know-center.tugraz.at:8080/awm09/index.jsp