Debate Stance Classification

The task of determining which of the two sides (i.e., for or against) an author takes in her post written for a two-sided topic (e.g., "Should abortion be allowed?") in an online debate forum.

A Sample Debate

<table>
<thead>
<tr>
<th>Should abortion be allowed?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women should have the ability to choose what they do with their bodies. The government should not be allowed to force women to continue a pregnancy against their will.</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Technically abortion is murder. They are killing the baby without a justified motive. Simply because having a baby would be an inconvenience is the same as killing your parents simply because their existence would be inconvenient.

Aim

Aim: to improve the classification of a post by exploiting information from other posts that are likely to have the same stance during testing. 

\[ P_1 = \text{Pro-abortion} \]

What will you do if a woman's life is in danger while she's pregnant? 

\[ P_2 = \text{Anti-abortion} \]

Method 1: Using same-author information (M) 

To classify a test post \( p \): 

\[ \text{Find the set of test posts} \ S_p \text{ written by the same author as} \ p \]

Create all possible subsets of the test posts in \( S_p \) 

For each subset, create one pseudo test instance whose features are computed over \( p \) and all the test posts in the subset 

Classify each pseudo test instance separately using a stance classifier 

\[ \text{Classify} \ p \text{ by summing the signed SVM confidences of the pseudo instances} \]

Potential weakness of \( M_1 \): Not enough combinations when an author has few posts

Method 2: Using similar-minded authors (M) 

Addresses \( M_1 \)'s weakness by finding similar-minded authors (i.e., other authors whose posts are likely to have the same stance). How?

\[ \text{Train a pairwise author-agreement classifier} \]

\[ \text{Given a pair of authors} \ (i.e., \text{their posts merged together}), \text{determine whether they agree or disagree.} \]

\[ \text{Two types of features for representing an instance} \]

\[ \text{Features obtained by taking the difference of the feature vectors corresponding to the two authors} \]

\[ \text{Three binary features encoding author interaction information:} \]

\[ \text{whether two authors posted in the same debate, same thread, and whether one author replied to the other} \]

\[ \text{To classify a test post} \ p \]: 

\[ \text{Use the classifier to find the} \ k \text{ authors in the test set most similar to the author of} \ p \]

\[ \text{Create all possible subsets of the test posts written by} \ p \text{ and its} \ k \text{ nearest authors} \]

\[ \text{Create a pseudo test instance from each subset; classify using a stance classifier} \]

\[ \text{Classify} \ p \text{ by summing the signed SVM confidences of the pseudo instances} \]

Results

<table>
<thead>
<tr>
<th>System</th>
<th>ABO</th>
<th>GAY</th>
<th>OBA</th>
<th>MAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_1 )</td>
<td>22.9</td>
<td>18.5</td>
<td>24.1</td>
<td>9.6</td>
</tr>
<tr>
<td>( C_2 )</td>
<td>17.6</td>
<td>14.3</td>
<td>19.4</td>
<td>7.2</td>
</tr>
</tbody>
</table>

| Rule 1: If \( C_1 \) can classify a test post \( p \) confidently, then use \( C_2 \)'s prediction. |
| Rule 2: If \( C_1 \) can classify \( p \) confidently, use \( C_2 \)'s prediction. |
| Rule 3: use \( C_2 \)'s prediction. |

Note: The rules favor \( C_2 \) than \( C_1 \) because \( \text{Accuracy}(C_2) > \text{Accuracy}(C_1) \)

Two Baseline Systems

- \( C_1 \): Anand et al.'s (2011) supervised system using n-grams, document statistics, punctuations, syntactic dependencies, and parent post features.

- \( C_1 + AC \): An improved version of Anand et al.'s (2011) approach, obtained by applying author constraints (i.e., posts written by the same author have the same stance) to \( C_1 \) output.

Two Extensions to the Baselines

- Linguistics: induce semantic frame and syntactic dependency-based patterns that aim to capture the meaning of a sentence and use them as features

- Extra-linguistic: improve the classification of a test post by exploiting the information in other test posts that are likely to have the same stance

Frame Semantics for Stance Classification

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