Language Influence 2: Argumentation

"ANALYZING WIKIPEDIA DELETION DEBATES WITH A GROUP DECISION-MAKING FORECAST MODEL."
BACKGROUND ON WIKIPEDIA

- Articles for Deletion in Wikipedia pages.
- Nomination by voting.
- Conflict between "deletionist" and "inclusionist."
A single AfD discussion Example

- Often debate for post.
- Delete and Keep.
- Keep a long period.
Research in Wikipedia deletion debates

- new model for forecasting outcomes of online group decision-making discussions.
- (1) Historical context of administrative tasks.
- (2) Exploratory data analysis in Corpus.
- (3) Forecasting methods
- (4) Results analysis
OVERALL BREAKDOWNS OF LABELS ACROSS ALL DATA.

<table>
<thead>
<tr>
<th></th>
<th>Delete</th>
<th>Keep</th>
<th>Merge</th>
<th>Redirect</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Votes (2005-2018)</td>
<td>54.9</td>
<td>28.4</td>
<td>3.6</td>
<td>3.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Outcomes (2005-2018)</td>
<td>63.9</td>
<td>20.7</td>
<td>3.2</td>
<td>6.0</td>
<td>6.2</td>
</tr>
<tr>
<td>Prior Work [60] (2003-2010)</td>
<td>63.6</td>
<td>23.6</td>
<td>3.9</td>
<td>1.9</td>
<td>7.0</td>
</tr>
</tbody>
</table>
DISTRIBUTIONS BY YEAR FOR VOTES (LEFT) AND OUTCOMES (RIGHT) OVER WIKIPEDIA’ S HISTORY.
Forecasting Methods

- Natural Language Processing (NLP)
- Machine Learning Predictive Models (ML)
NLP Methods

- Not like bag-of-word traditionally.
- Analysis surroundings context rather than single word.
- Using $BERT_{BASE}$ models by apply consecutive words.
NLP Methods

\[ \phi_d(t_i) = \sum_{j=0}^{i} \frac{\phi_j}{\ln(\text{len}(r_j))} \]

- Encode overall discussion content
- A single deletion discussion is labeled d.
- Timestamp \( t_i \), and a rationale text, \( r_i \) (which might be empty).
- The features of a single contribution \( c_i \) can be extracted using arbitrary representations of language, and represented as \( \phi_i \).
ML Methods

\[ \| \mathbf{w} \|_2 = \left( |w_1|^2 + |w_2|^2 + \ldots + |w_N|^2 \right)^{\frac{1}{2}} \]

2-norm (also known as L2 norm or Euclidean norm)

logistic(\(\eta\)) = \frac{1}{1 + \exp(-\eta)}
administrators choose Delete in 66.9% of these cases

<table>
<thead>
<tr>
<th>Representation</th>
<th>Full Debate</th>
<th>Incremental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Majority Class Baseline</td>
<td>74.0 0.00</td>
<td>62.1 0.00</td>
</tr>
<tr>
<td>GloVe</td>
<td>81.7 0.49</td>
<td>69.1 0.31</td>
</tr>
<tr>
<td>Bag-of-Words</td>
<td>84.2 0.58</td>
<td>72.4 0.39</td>
</tr>
<tr>
<td>BERT</td>
<td>85.8 0.62</td>
<td>73.4 0.41</td>
</tr>
<tr>
<td>BERT + Vote Labels</td>
<td>93.5 0.83</td>
<td>79.7 0.55</td>
</tr>
</tbody>
</table>
Forecasting models

- 10-fold cross validation (95% training data)

- 5% of the corpus (20,000 discussion) in testing data

- Logistic regression predicting outcomes (D or K)

- Measuring Forecast Shifts in predictive models
Forecasting Accuracy

- Best-performing model with 97.3% accuracy (less than 5).
- Best-performing model with 85.3% accuracy (higher than 5).
- 1.6% higher than models in other papers
Limitation

- Size of corpus for testing (5%)
- Did NOT include article texts themselves in our work.
- Unclear/insignificantly predictive results in shift change.
- Models only perform well in certain period.
- Fewer discussion in ML methods
Further Discussion

- High forecasting accuracy among other predictive models.
- Both implement NLP and ML algorithm.
- Search and analyze surrounding textural information.
- High reliability and volatility.
Q&A

- Any Questions for the presentation?
"WINNING ARGUMENTS: INTERACTION DYNAMICS AND PERSUASION STRATEGIES IN GOOD-FAITH ONLINE DISCUSSIONS"
We are always trying to change someone else’s opinion!

Reviewer #2 must be stopped.
Original Opinion

- Certainty of the holder (Pomerantz et al. 1995)
- Importance of the belief (Petty et al. 1997)

Argument

- Properties such as intensity, valence, and framing (Althoff et al. 2014, Bailey et al. 2014, Bryan et al. 2013, etc)
- Social aspects such as social proof and authority (Chaiken 1987, Cialdini et al. 1999, etc)
CMV: the Tontine should be legalized and made a common retirement strategy. [Reference URL omitted] Basically, today we have a huge problem with retirement [...] words. A tontine for retirement looks like [...] words. The yearly sum is divided evenly for all the surviving participants [...] words. The key advantages as I see it are:
* We don’t need actuaries [...] words...
* Management fees can be quite low [...] words
  * [Another reason]
  * [Another reason]
But CMV. Are there major risks I am not foreseeing? [...] words

A tontine is a pretty crappy retirement vehicle for most people. It pays out the least when you need the most, and the most when you need the least. People’s income needs in retirement generally fall as they age. [...] words

Very interesting. I’ll give a Δ because I didn’t have any idea that was true and changes my idea of how the tontine should work. That said, I don’t think it’s unsolvable [...] words

[DeltaBot] Confirmed: 1 delta awarded to [red]
CMV: the Tontine should be legalized and made a common retirement strategy. [Reference URL omitted] Basically, today we have a huge problem with retirement [...+73 words]
A tontine for retirement looks like [...+56 words] The yearly sum is divided evenly for all the surviving participants [...+25 words]. The key advantages as I see it are:
* We don’t need actuaries [...+29 words...]
* Management fees can be quite low [...+22 words]
* [Another reason]
* [Another reason]
But CMV. Are there major risks I am not foreseeing? [+2 more questions]

A tontine is a pretty crappy retirement vehicle for most people. It pays out the least when you need the most, and the most when you need the least.
People’s income needs in retirement generally fall as they age. [...+35 words]
[URL]

Very interesting. I’ll give a Δ because I didn’t have any idea that was true and changes my idea of how the tontine should work. That said, I don’t think it’s unsolvable [...+44 words]

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The Social Security system is basically one giant Tontine [...+13 words] So it’s already legal.

There are some key differences though. First, Social Security is defined by the government [...+36 words]

And a tontine would be defined by your bank [...+79 words]

[...oh, ok[...]

Good points. I still am not sold [... > 100 words]

Then your back to needing actuaries, to predict [...+11 words]

Depends how exact you need to be [...+33 words]
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I'd imagine the tontine as a secondary system to social security though, one that is optional for people to do, not mandatory like social security. [...+11 words]

Good points. I still am not sold [...+100 words]

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Successful Argument

CMV: the Tontine should be legalized and made a common retirement strategy. [Reference URL omitted] Basically, today we have a huge problem with retirement [...+73 words]
A tontine for retirement looks like [...]+56 words] The yearly sum is divided evenly for all the surviving participants [...+25 words]. The key advantages as I see it are:
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  * [Another reason]
  * [Another reason]
But CMV. Are there major risks I am not foreseeing? [+2 more questions]

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• Interaction dynamics

• Stylistic choices (language indicators) in arguments

• Resistance to persuasion
Interaction Dynamics

- The entry time of the challenger
- The number of back-and-forth exchanges
- The number of challengers
- and possibly more ...

Challenger’s perspective
Original Post
Success of a comment vs. the challenger’s entry time

![Graph showing the success of a comment vs. the challenger's entry time. The graph plots delta percentage on the y-axis against challenger rank in time on the x-axis. The data shows a decreasing trend as the challenger rank increases.]
Success of a comment vs. the number of back-and-forth exchanges
Probability that opinion was changed vs. the number of challengers
Sheer number of challengers or diversity of counterarguments?
Stylistic choices (language indicators) in arguments

- Variations of setup
  - Root reply
  - Full path
  - Truncated
Original Opinion

- Interplay with original opinion:
  - similarity in different vocabulary sets

Argument

- Argument-only features:
  - Stylistic features
  - Bag-of-words
  - Part-of-speech tags
Performance Overview: Interplay with the OP plays an essential role.
Interplay with the original opinion

Metrics

- Number of common words
- Reply fraction
- OP fraction
- Jaccard

Types of words

- Stopwords
- Content
- All
Interplay with the original opinion

<table>
<thead>
<tr>
<th>Feature name</th>
<th>root reply</th>
<th>full path</th>
</tr>
</thead>
<tbody>
<tr>
<td>reply frac. in all</td>
<td>↓↓↓↓ ((T))</td>
<td>↓↓↓↓</td>
</tr>
<tr>
<td>reply frac. in content</td>
<td>↑↑↑↑ ((T^R))</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>OP frac. in stopwords</td>
<td>↑↑↑↑ ((T^R))</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>#common in stopwords</td>
<td>↑↑↑↑ ((T^R))</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>reply frac. in stopwords</td>
<td>↑↑↑↑</td>
<td></td>
</tr>
<tr>
<td>OP frac. in all</td>
<td>↑↑↑↑ ((T^R))</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>#common in all</td>
<td>↑↑↑↑ ((T^R))</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>Jaccard in content</td>
<td>↑↑↑↑ ((T^R))</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>Jaccard in stopwords</td>
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<tr>
<td>OP frac. in content</td>
<td>↑</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>Jaccard in all</td>
<td>↓</td>
<td>((T))</td>
</tr>
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</table>
Argument-only: stylistic features

- Number of words
- Word category-based features
- Word score-based features
- Characteristics of the entire argument
- Formatting
### Number of words

<table>
<thead>
<tr>
<th>Feature name</th>
<th>root reply</th>
<th>full path</th>
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<tbody>
<tr>
<td>#words</td>
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<td>↑↑↑↑</td>
</tr>
</tbody>
</table>
Word category-based features

- (In)definite articles:
  ○ General (a/an) vs specific (the)
- Positive and negative words:
  ○ Positive/negative from LIWC
- Arguer-relevant personal pronouns:
  ○ me, you, us
- Links:
  ○ Citing external evidence
- Hedging:
  ○ Hedges indicate uncertainty
  ○ ( “It could be the case” . )
- Examples:
  ○ “For example”, “for instance”, “e.g.”
- Question Marks
- Quotations
Word score-based features

- **Arousal:**
  - the intensity of an emotion
  - *Dull vs terrorism*

- **Concreteness:**
  - the degree to which a word denotes something perceptible
  - *Hamburger vs justice*

- **Dominance:**
  - the degree of control expressed by a word.
  - *Earthquake vs completion*

- **Valence:**
  - how pleasant the word’s denotation is.
  - *Murder vs sunshine*

<table>
<thead>
<tr>
<th>Feature name</th>
<th>root reply</th>
<th>full path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word score-based features</td>
<td>↓</td>
<td>(T) ↓↓</td>
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<tr>
<td>arousal</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>valence</td>
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## Formatting

<table>
<thead>
<tr>
<th>Feature name</th>
<th>root reply</th>
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<tbody>
<tr>
<td>Markdown formatting</td>
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<tr>
<td>#italics</td>
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<td>—</td>
</tr>
<tr>
<td>bullet list</td>
<td>↑↑↑↑</td>
<td>—</td>
</tr>
<tr>
<td>#bolds</td>
<td>↑↑</td>
<td>—</td>
</tr>
<tr>
<td>numbered words</td>
<td>↑</td>
<td>—</td>
</tr>
<tr>
<td>frac. italics</td>
<td>↑</td>
<td>—</td>
</tr>
</tbody>
</table>
Structure of an argument

(a) Arousal in root replies.
(b) Concreteness in root replies.
(c) Dominance in root replies.
(d) Valence in root replies.
Interplay with original posts

![Graph showing argument fraction over iterations for effective and not effective posts.](image)
Resistance to persuasion

Original opinion features:
- Stylistic features
- Bag-of-words
- Part-of-speech tags
Performance Overview: A much harder task

![Graph showing performance comparison]

- #words
- random
- BOW
- POS
- style
- all

AUC values: 0.48, 0.50, 0.52, 0.54, 0.56
## Malleability of the original opinion

<table>
<thead>
<tr>
<th>Feature name</th>
<th>More malleable?</th>
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</thead>
<tbody>
<tr>
<td>#1&lt;sup&gt;st&lt;/sup&gt; person pronouns</td>
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</tr>
<tr>
<td>frac. 1&lt;sup&gt;st&lt;/sup&gt; person pronoun</td>
<td>↑↑↑↑↑</td>
</tr>
<tr>
<td>dominance</td>
<td>↑↑↑↑↑</td>
</tr>
<tr>
<td>frac. 1&lt;sup&gt;st&lt;/sup&gt; person plural pronoun</td>
<td>↓↓↓↓</td>
</tr>
<tr>
<td>#paragraphs</td>
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<tr>
<td>#1&lt;sup&gt;st&lt;/sup&gt; person plural pronoun</td>
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<td>#bolds</td>
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<tr>
<td>arousal</td>
<td>↓</td>
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<tr>
<td>valence</td>
<td>↑</td>
</tr>
<tr>
<td>bullet list</td>
<td>↑</td>
</tr>
</tbody>
</table>
Discussions

- Experience level of challengers?
- Topics of original opinions and arguments?
  - topic: food, eat, eating, thing, meat
  - topic: government, state, world, country, countries
- Structure of arguments?
  - “First0–but1–because2”
  - “Now1–then2–instead3”
- Persuasion strategies?