Improving Automated Controversy Detection on the Web

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Motivation

In the age of “Filter Bubble”, readers who have not heard of the controversy is likely to be misled or uninformed.

Webpage

1. Query Generation: TF10
   abortion pregnancy risk procedure woman breast study doctor cancer birth medical

Voting Scheme

2. Find K-NN Wikipages

Wikipedia

3. Extract Wikipedia Controversy Scores
   And turn them into controversy labels

4. Classify by Voting

Solution 1: Finding KNN Pages with TileQuery

1. Document Segmentation
   Split a document into multiple blocks of sentences (tiles) using TextTiling.

   Webpage

2. Query Generation
   Generate a query of a mixture of $g$ (global) and $l$ (local) most frequent terms from the tile.

   Webpage

3. Aggregating the Ranked Lists
   Compute the relevance of each retrieved Wikipedia page $w$ by aggregating its rank scores as follows:

   \[
   \text{Relevance}(w) = \sum_{i \in T} (K - \text{rank}_i(w))
   \]

   Ranked list

Solution 2: Smoothing Wikipedia Controversy Scores

1. Construct Wikipedia Topic Hierarchy using their Titles’ prefix-relation

   Abortion

2. Network-based Smoothing

   Abortion

Experiments

Dataset

- 303 Web documents
- Collected from topics with varying controversy level
- 42%: controversial

Extensive Parameter Explorations:

- Query Methods = {AllQuery, TF10, TileQuery}
- # of Wikipedia Neighbors, $K = \{1, \ldots, 20\}$
- Use of score smoothing
- Thresholds for C and M Scores
- Wikipedia neighbors selection = {Pair, Clique}
- Voting Method = (M, C, D, Majority, Or/AND)

Solution 2. Smoothing Wikipedia controversy scores using neighbors

Conclusion and Future Work

- Our modifications of TileQuery and Wikipedia controversy score smoothing improved the state-of-the-art controversy detection by 5% in Acc and 14% in F1.
- Title prefix-relation only covered 5–10% of the Wikipedia titles. More sophisticated methods to find Wikipedia neighbors for smoothing can be studied.
- We plan to further investigate different scenarios where TF10 and TileQuery works well.

Limitations

1. Ambiguous Query Generation
   The generated query ends up containing an unknown mixture of different sub-topics of a document.

   Solution 1: Generating multiple queries from smaller but more coherent blocks (or tiles) of the document

2. Underrated Wikipedia Controversy Scores
   The controversy level is underestimated on specific and sub-topical Wikipages whose topical disputes have often been delegated by other Wikipages on the broader topic.

   Solution 2. Smoothing Wikipedia controversy scores using neighbors

State-of-the-art Approach


Solution 3: Improving Automated Controversy Detection

- Improving Automated Controversy Detection is underexplored.
- TiltQuery and Wikipedia controversy scores are used.

- We experimentally compare the accuracies of the different methods and found that the proposed method improves the state-of-the-art controversy detection by 5% in Acc and 14% in F1.

- We also found that the proposed method can be used to automatically warn users when a Web-page discusses controversial topics.

- We plan to further investigate different scenarios where TF10 and TileQuery works well.