

# Retrieval of the Best Counterargument without Prior Topic Knowledge

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# Countering an argument

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## ▪ **Argument**

The Feminist Cause No Longer Appeals to Women. (conclusion)

Many women no longer identify themselves as feminists, associating feminism with man-hating, sex-hating humourlessness, and seeing it as a relic of the 1970s. Modern women are perfectly capable of competing with men on equal terms [...] (premise)

<https://idebate.org/debatabase/society-gender/house-believes-feminism-still-needed>

## ▪ **Counterargument**

Opponents of the feminist movement have always sought to stereotype feminists in order to reduce their support. That this enterprise is often successful is not an argument against feminism [...]

<https://idebate.org/debatabase/society-gender/house-believes-feminism-still-needed>

## ▪ **Disclaimer**

- Even the best counterargument will not convince everyone

# Countering an argument — with no/less prior knowledge

## ▪ Argument

Neo-functionalism proposes a purpose to EU integration. (conclusion)

Neo-functionalism proposed building a community Europe, through the concept of spillover the theory proposes economic determinism. Spill-over will eventually lead to a completely integrated Europe with a strong central government [...] (premise)

<https://idebate.org/debatabase/economy-economic-policy-economy-general-international-europe-philosophy-political>

## ▪ Counterargument

Neo-functionalism believes in building a community Europe, but then the question is raised, what is the purpose of this new entity? There is no common outlook and getting the major powers of Europe to agree what this should be will be near impossible [...]

<https://idebate.org/debatabase/economy-economic-policy-economy-general-international-europe-philosophy-political>

## ▪ Observation

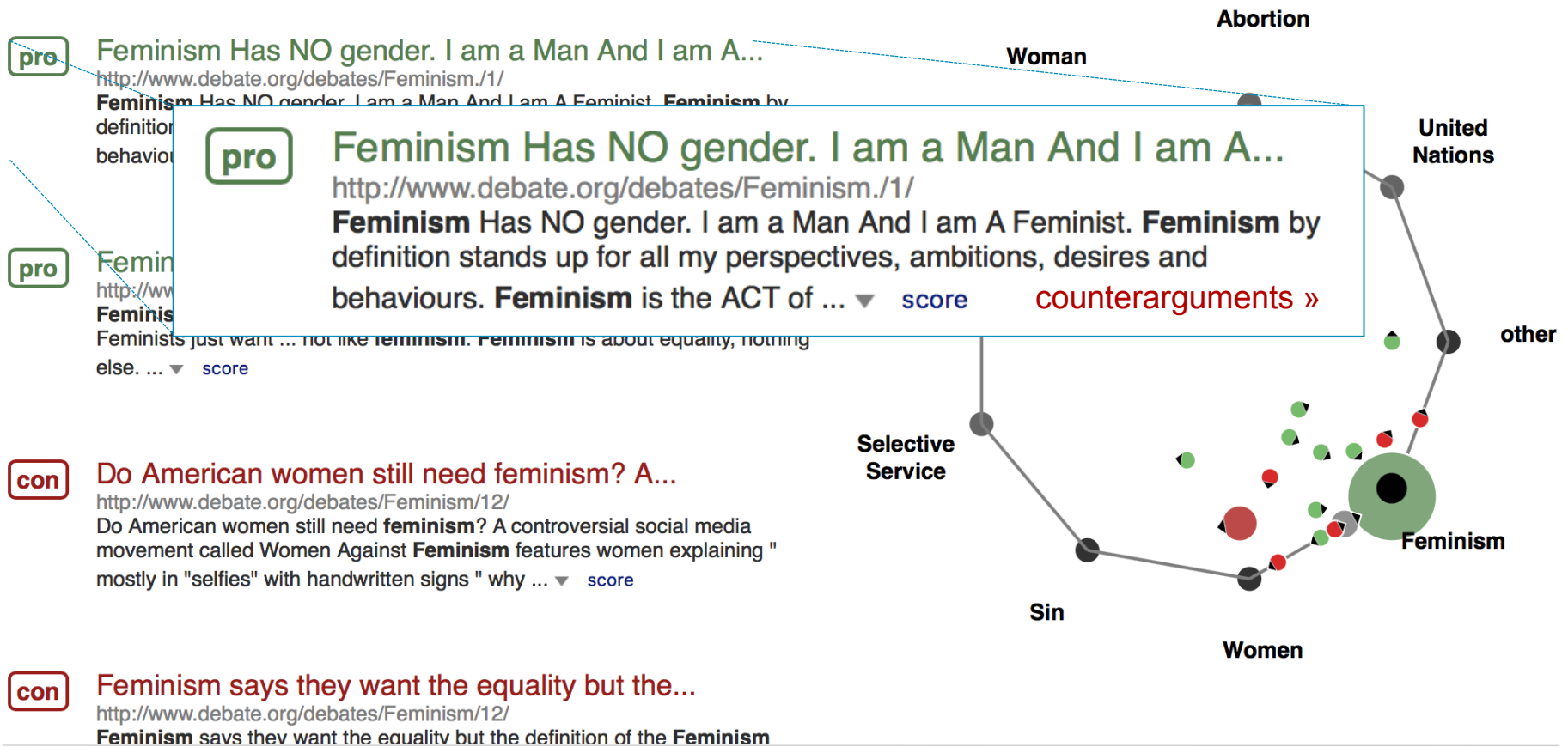
- Similar aspects but opposite stance

# Motivation: Counterarguments on <https://args.me>



Q feminism →

Page 1 of 659 arguments (retrieved in 320.7ms) Pro vs. Con View | Topic Space View



# This paper

## ▪ Research question

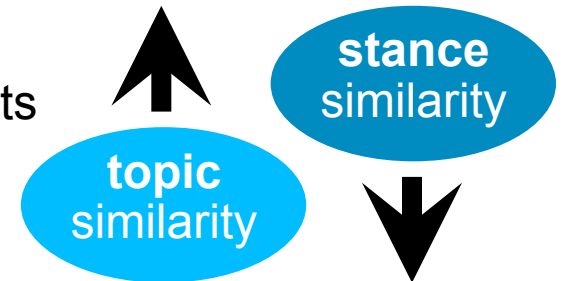
- Given any argument on any controversial topic, how to best counter it?

argument conclusion  
argument premise(s)

counterargument

## ▪ Simplifying hypothesis

- The best counterargument invokes the same aspects while having opposite stance

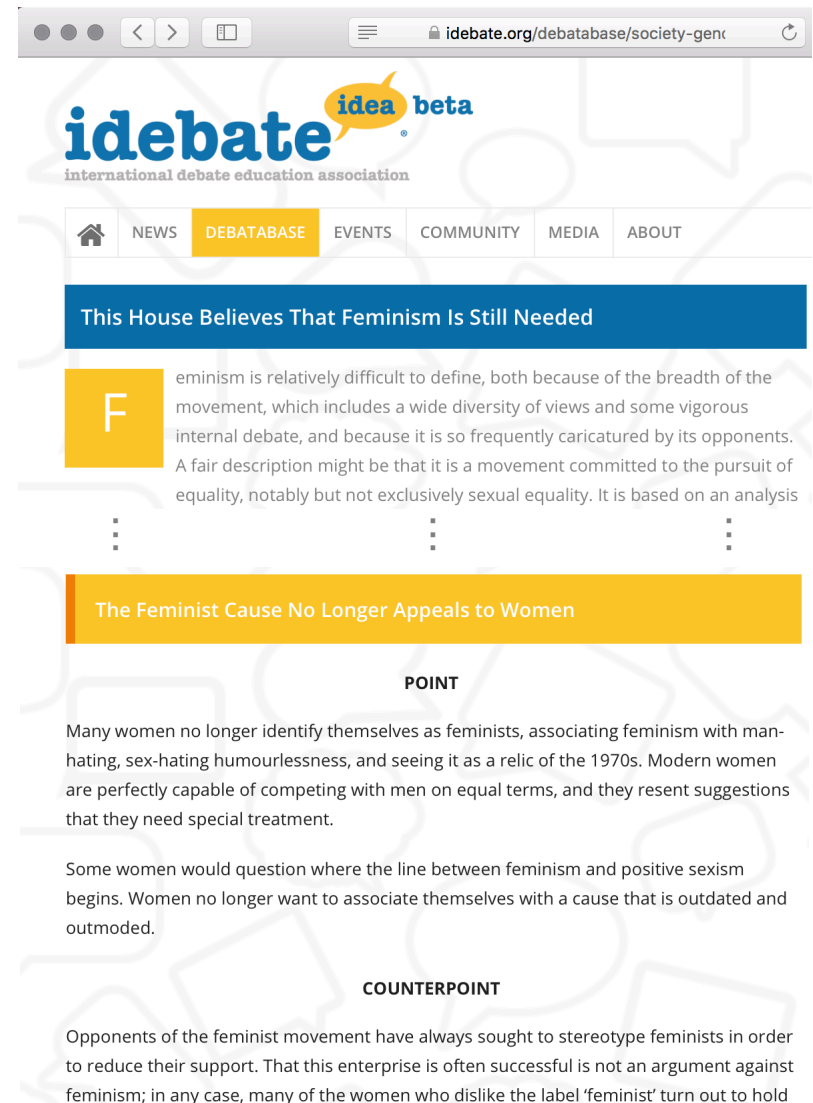


## ▪ Contributions

- **Corpus.** 6753 argument-counterargument pairs
- **Approach.** Topic-independent counterargument retrieval
- **Insights.** Evidence for partial truth of hypothesis

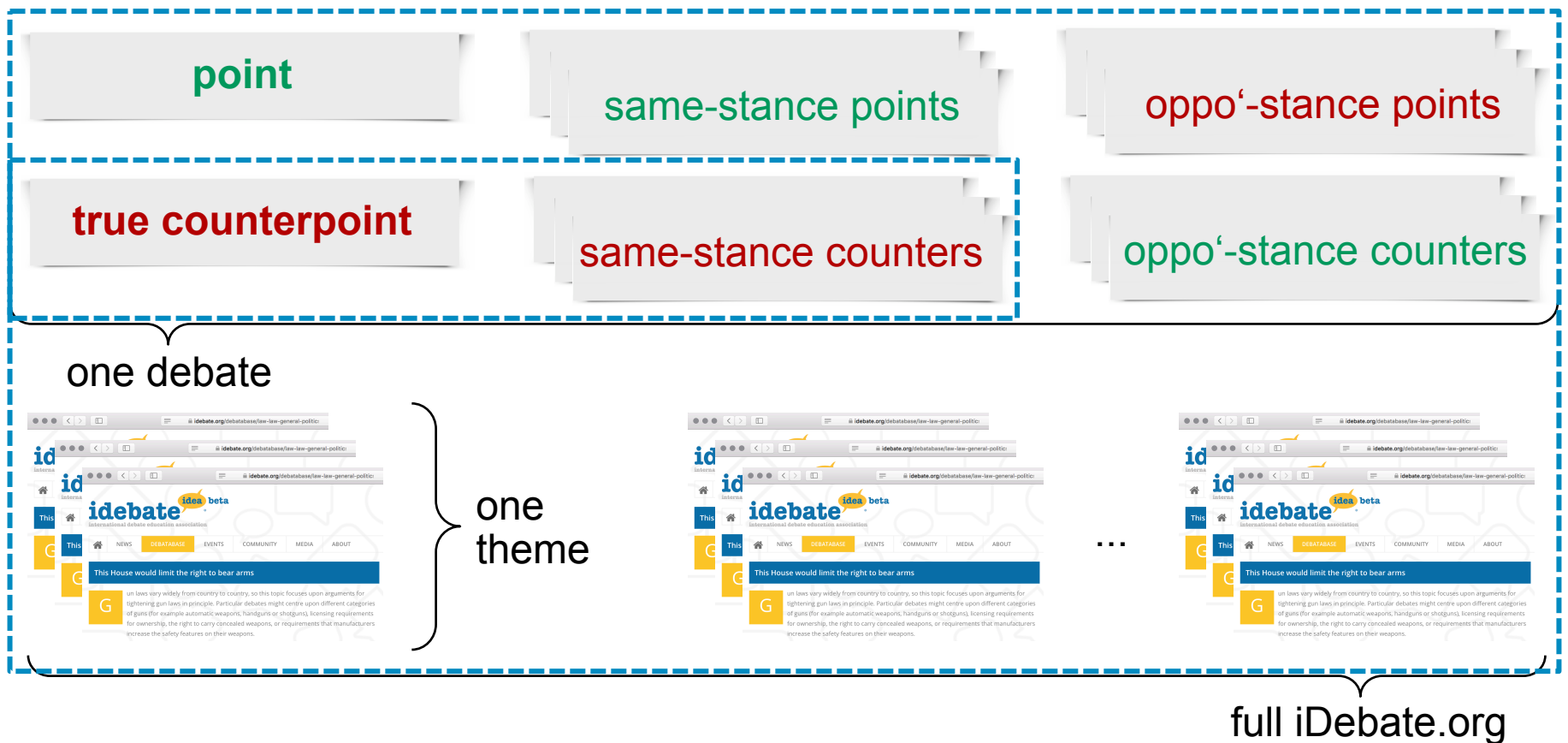
# A counterargument corpus (available at <http://www.arguana.com>)

- **Web portal iDebate.org**
  - Debates on controversial topics  
e.g., feminism is still needed
  - Categorized into 15 themes  
economy, religion, society, ...
- **Arguments on the portal**
  - Pro and con points on each topic  
each with conclusion and premise
  - **Counterpoint to every point**
- **Corpus construction**
  - 1069 debates crawled
  - 6753 true point-counterpoint pairs  
only counterpoint seen as correct counterargument
- **Datasets**
  - 60% train, 20% validation, 20% test  
no debate in two datasets



The screenshot shows a web browser window with the URL [idebate.org/debatatabase/society-gen](http://idebate.org/debatatabase/society-gen). The page features the iDebate logo and navigation tabs for NEWS, DEBATABASE, EVENTS, COMMUNITY, MEDIA, and ABOUT. A blue banner at the top reads "This House Believes That Feminism Is Still Needed". Below this, a yellow box with a large letter 'F' contains the text: "eminism is relatively difficult to define, both because of the breadth of the movement, which includes a wide diversity of views and some vigorous internal debate, and because it is so frequently caricatured by its opponents. A fair description might be that it is a movement committed to the pursuit of equality, notably but not exclusively sexual equality. It is based on an analysis". Below this text are three vertical ellipsis icons. A yellow banner below the ellipsis reads "The Feminist Cause No Longer Appeals to Women". Underneath this banner, the word "POINT" is centered. The text of the point reads: "Many women no longer identify themselves as feminists, associating feminism with man-hating, sex-hating humourlessness, and seeing it as a relic of the 1970s. Modern women are perfectly capable of competing with men on equal terms, and they resent suggestions that they need special treatment. Some women would question where the line between feminism and positive sexism begins. Women no longer want to associate themselves with a cause that is outdated and outmoded." Below this text, the word "COUNTERPOINT" is centered. The text of the counterpoint reads: "Opponents of the feminist movement have always sought to stereotype feminists in order to reduce their support. That this enterprise is often successful is not an argument against feminism; in any case, many of the women who dislike the label 'feminist' turn out to hold".

# Counterargument retrieval tasks



- **Eight tasks in paper, two in this talk**

1. Candidates are all counters with opposite stance → true-to-false ratio **1:3**
8. Candidates are all arguments → true-to-false ratio **1:2800**

# Retrieval approach: Concept

- **Approach**

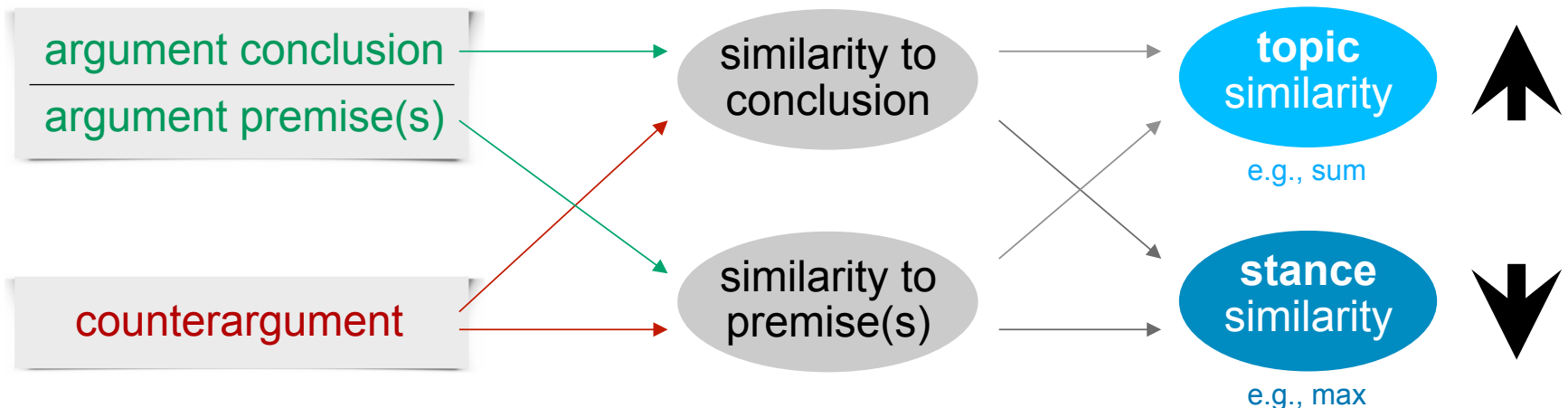
- Capture simultaneous topic similarity and stance *dissimilarity*

- **Background from theory** (Walton, 2009)

- A counterargument attacks an argument's conclusion
- ... or the argument's premise(s)
- ... or the inference from premise(s) to conclusion



- **Infer both similarities from premise(s) and conclusion ... in different ways**





# Retrieval approach: Realization

## Ranking by simultaneous (dis)similarity

$$\alpha \cdot \text{topic similarity} - (1-\alpha) \cdot \text{stance similarity}$$
$$\left\{ \begin{array}{l} 1.0 \\ 0.9 \\ 0.8 \\ \dots \end{array} \right\} \cdot \left\{ \begin{array}{l} \text{min} \\ \text{max} \\ \text{prod} \\ \text{sum} \end{array} \right\} \left( \begin{array}{l} \text{similarity to} \\ \text{conclusion} \\ \text{similarity to} \\ \text{premise(s)} \end{array} \right) - \left\{ \begin{array}{l} 0.0 \\ 0.1 \\ 0.2 \\ \dots \end{array} \right\} \cdot \left\{ \begin{array}{l} \text{min} \\ \text{max} \\ \text{prod} \\ \text{sum} \end{array} \right\} \left( \begin{array}{l} \text{similarity to} \\ \text{conclusion} \\ \text{similarity to} \\ \text{premise(s)} \end{array} \right)$$

- Learn best  $\alpha$  and best **topic-stance** similarity pair on validation set
- Apply best combinations on test set

## Embedding + word similarity

- **Embeddings.** Word mover's distance on ConceptNet Numberbatch  
outperformed average word embeddings and GoogleNews-vectors, wiki-news-300d-1M, and crawl-300d-2M
- **Words.** Manhattan distance on stem 1-grams  
outperformed Jaccard, Euclidean, and Cosine distance on word, stem, and lemma 1-, 2-, and 3-grams

# Accuracy of ranking the best counterarguments highest

- Selected baselines and approaches

Argument-level similarities

embedding  
similarity

word  
similarity

Best conc'/prem' similarities

embedding  
product

word  
sum

Best approaches

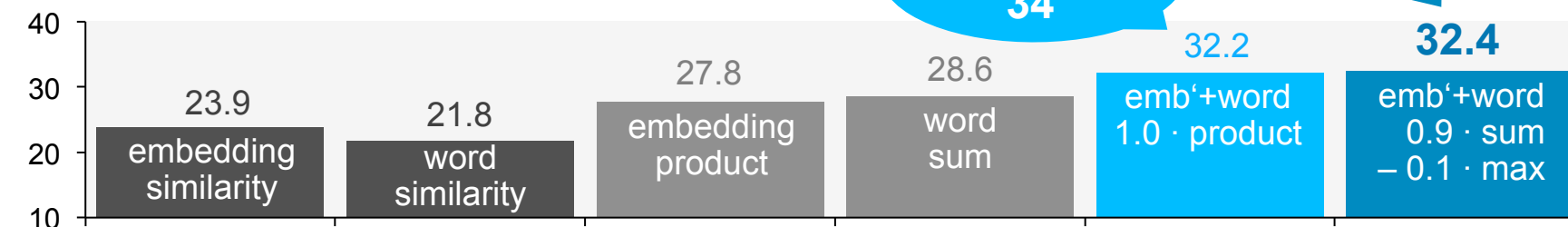
emb'+word  
 $1.0 \cdot \text{product}$

emb'+word  
 $0.9 \cdot \text{sum}$   
 $- 0.1 \cdot \text{max}$

## 1. Candidates: All counters with opposite stance (true-to-false ratio 1:3)

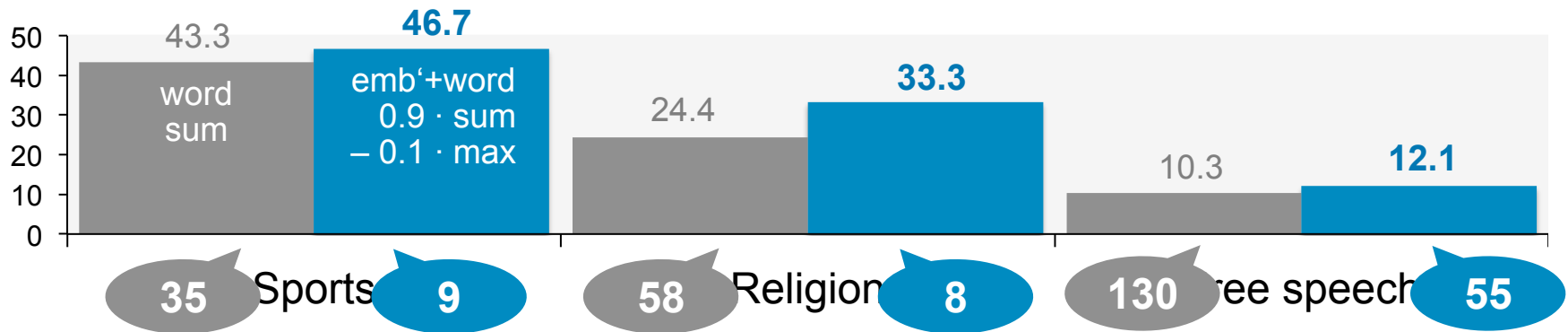


## 8. Candidates: All arguments (true-to-false ratio 1:2800)



# Selected insights from the experiments

## Results on different themes (true-to-false ratio 1:2800)



## Results on different tasks

- Baselines outperformed with  $p < 0.01$  on all tasks
- $\alpha = 0.9$  best on six tasks,  $\alpha = 1.0$  on two
- **sum-max** best on seven tasks, **prod'-min** on one

## Results on side hypotheses

- **Rejected.** Counterarguments have high embedding but low word similarity
- **Rejected.** Counterarguments have opposite sentiment
- **Confirmed.** Counterargument similarity varies across topics

# Take aways

## ▪ Counterarguments

- Attack an argument's conclusion, premises, or both
- Critical to know for both arguers and opponents
- Hard to find, especially without prior topic knowledge



## ▪ This paper

- **Question.** Given *any* argument, how to best counter it?
- **Hypothesis.** Similar aspects but opposite stance
- **Approach.** Simultaneous similarity and dissimilarity

argument conclusion  
argument premise(s)

counterargument

## ▪ Results and implications

- Best counter among 2801 candidates found in 32.4%
- Approach robust across iDebate topics
- **But there's more to do on counterarguments...**

corpus at  
[arguana.com](http://arguana.com)

arguments at  
[args.me](http://args.me)