Detecting Opinionated Claims in Online Discussions

Sara Rosenthal
Kathleen McKeown

Definition

- Assertion by a speaker who is attempting to convince others that his opinion is true

- Claims that express an opinionated belief

This, as I said earlier, is a complex issue

Motivation

- Claims are common in social media

- Useful for identifying disputed claims
  - Claims that are not trustworthy

- Often a component of larger social acts
  - Argumentation: Claim followed by Justification
  - Agreement: Two claims agreeing on the same topic
  - Disagreement: Two claims disagreeing on the same topic

Belief vs Fact vs Request

- This, as I said earlier, is a complex issue .
- I have a job at Walmart.
- You say that " … for similar reasons I do not think the dead soldier is , either . "
- Lots of articles get a few instances of vandalism a day .
- Would be good if you could say what those reasons are .

Belief vs Fact vs Request

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- You say that " … for similar reasons I do not think the dead soldier is , either . "
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Outline

- Related Work
- Corpora
- Sentiment
- Committed Belief
- Other Features
- Experiments
- Conclusion

Related Work

- Bender et al (2011), Marin et al (2011)

> **Annotating social acts: Authority claims and alignment moves in wikipedia talk pages**, LSM 2011
> **Detecting forum authority claims in online discussions**, LSM 2011

  - Annotation and detection of authority claims on the sentence level
  - Authority claims can be credentials, experiential, institutional, forum, and external.

- Kwon et al (2007)

> **Identifying and classifying subjective claims**, Digital government research: bridging disciplines & domains

  - Identify and classify the main subjective claims in a document

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7

Outline

- Definition and Motivation
- Related Work
- **Corpora**
  - **Livejournal and Wikipedia Discussions**
  - **Annotation**
- Sentiment
- Committed Belief
- Other Features
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Corpora

- **LiveJournal** is a virtual community on the web where bloggers frequently post entries about their personal lives
- **Wikipedia Discussion Forums** are for discussing edits made to a particular Wikipedia page

Corpus	Documents	Claims	Not Claims	Subjective Phrases	Objective Phrases	Vocabulary Size
LiveJournal	285	1197 (60%)	791 (40%)	3035 (39%)	4709 (61%)	4747
Wikipedia	51	1282 (64%)	715 (36%)	1319 (37%)	4496 (63%)	4342

2,000 Sentences, between 30-120 characters

Annotation

- Instructions: A claim is a statement that is a belief that can be justified

- Two annotators, all disagreements were resolved

- IAA: 75.4% LiveJournal 79.2% Wikipedia

- Cohen's k: 50 LiveJournal 55.7 Wikipedia

Claim Examples

LiveJournal	oh yeah, you mentioned the race … that is so un-thanksgivingish !
	A good photographer can do awesome work with a polaroid or ' phonecam .
	hugs I feel like I have completely lost track of a lot of stuff lately .
Wikipedia	The goal is to make Wikipedia as good as possible and, more specifically , this article as good as possible .
	This was part of his childhood , and should be mentioned in the article .
	If the book is POV or the writer has only a slender grasp of relevant issues , material can be wrong .

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- Definition and Motivation
- Related Work
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- **Sentiment**
  - **System**
  - **Features**
- Committed Belief
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Sentiment

- Expand Previous Approach*
- Dictionaries
- Methods

*Apoorv Agarwal, Fadi Biadsy, and Kathleen R. McKeown. 2009. **Contextual phrase-level polarity analysis using lexical affect scoring and syntactic n-grams**. In Proceedings of EACL '09

Sentiment: Dictionaries

- Dictionary of Affect in Language (DAL) *
- Wordnet*
- Wiktionary
- Emoticons

*Apoorv Agarwal, Fadi Biadsy, and Kathleen R. McKeown. 2009. **Contextual phrase-level polarity analysis using lexical affect scoring and syntactic n-grams**. In Proceedings of EACL '09

Sentiment: DAL

- Dictionary of 8742 words built to measure the emotional meaning of texts
- Each word is given three scores (scale of 1 to 3)
  - pleasantness - also called evaluation (ee)
  - activeness (aa)
  - and imagery (ii)

$$\text{sub}(c) = \begin{cases} \text{objective} & \text{if } |\sqrt{ee^2 + aa^2}| < \alpha \\ & \text{and } ii > 0 \\ \text{subjective} & \text{otherwise} \end{cases}$$

C. M. Whissel. 1989. **The dictionary of affect in language**. In R. Plutchik and H. Kellerman, editors, Emotion: theory research and experience, volume 4, London. Acad. Press.

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Sentiment: Dictionaries

- Proper nouns (e.g. Britney Spears) are automatically marked as objective

- Wordnet*
  - Compute the average of the DAL scores of all the synonyms of the first sense
  - If there are no synonyms, look at the hypernym

- Wiktionary
  - Compute the average of the DAL scores for each word in the definition that has its own Wiktionary page

- Emoticons

emoticon	:)	:D	<3	:(	;)
definition	happy	laughter	love	sad	wink

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Sentiment: Methods

- Pre-processing steps
  - Emoticon keys and contraction expansion
  - Part-Of-Speech (POS) Chunker and tagger*
- Lexical Features*
  - Top 100 n-grams, POS tags
- Syntactic Features*
  - n-grams, POS, Position, Subjectivity
- Social Media Features

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Sentiment: Features

- Has Sentiment
- Subjective/Objective ratio
- Subjective/Objective Patterns (1-3 chunks)

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Sentiment: Features

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[Some posts]/o [seem to serve]/o **[no purpose]/s** [but]/o [to make]/o **[people pissed]/s**

Example

Has sentiment? Y

Sentiment: Features

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[Some posts]/o [seem to serve]/o [no purpose]/s [but]/o [to make]/o [people pissed]/s

Example

Subjective Ratio: 1/3

Sentiment: Features

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Example

Patterns: o o s

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Committed Belief

- Committed belief system detects speaker's expression about his own belief of statement truth

- Words in a sentence are tagged for belief
  - committed, e.g. I know
  - non-committed, e.g. I may
  - not applicable, e.g. I wish

- Lexical Features
  - POS, is-number, lemma

- Syntactic Features
  - is-predicate, root of parse

1. V. Prabhakaran, O. Rambow, and M. T. Diab, **Automatic committed belief tagging**, COLING, 2010
2. M. T. Diab, L. S. Levin, T. Mitamura, O. Rambow, V. Prabhakaran, and W. Guo, **Committed belief annotation and tagging**, in Linguistic Annotation Workshop, 2009

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Committed Belief: Features

Some posts seem/B-CB to serve/B-NA no purpose but to make/B-NA people pissed/B-NA

- Compute frequency of the tagged belief words
  - e.g. seem, serve, make, pissed
- Apply feature selection using the Chi Square test in Weka

LiveJournal	Wikipedia
good	added
hard	agree
love	disagree
call	needs
comment	think

Most Common Belief Words

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- **Other Features**
  - **Question**
  - **Lexical**
  - **Social Media**
- Experiments
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Questions and Lexical Features

- ## Question Feature
  - Questions are usually not claims

    e.g. *Can you help me fix it?*

- ## Lexical Features
  - POS tags
  - n-grams
    - 1-3 words
    - Top 250 n-grams
  - Feature selection is performed using Chi Square

Lexical Features

LiveJournal		Wikipedia		LiveJournal +Wikipedia	
POS	n-grams	POS	n-grams	POS	n-grams
VBZ	i do	VBZ	-	CD	added
VBP	is	RB	a	JJ	added by
RB	is not	JJ	agree	JJS	are you
PRP	it	CD	be	PRP	-
JJ	it is	VBD	facts	RB	bad
US	not	RBS	however	VBD	be
CD	pretty	WRB	i think	VBZ	but

Most common POS tags and n-grams

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Social Media Features

Feature	Example
Capital Words	WHAT
Out of Vocabulary	dunno
Emoticons	:)
Acronyms	LOL
Punctuation	.
Repeated Punctuation	#$@.
Punctuation Count	5
Exclamation Points	!
Repeated Exclamations	!!!!
Question Marks	?
Repeated Questions	???
Ellipses	…

Social Media Features
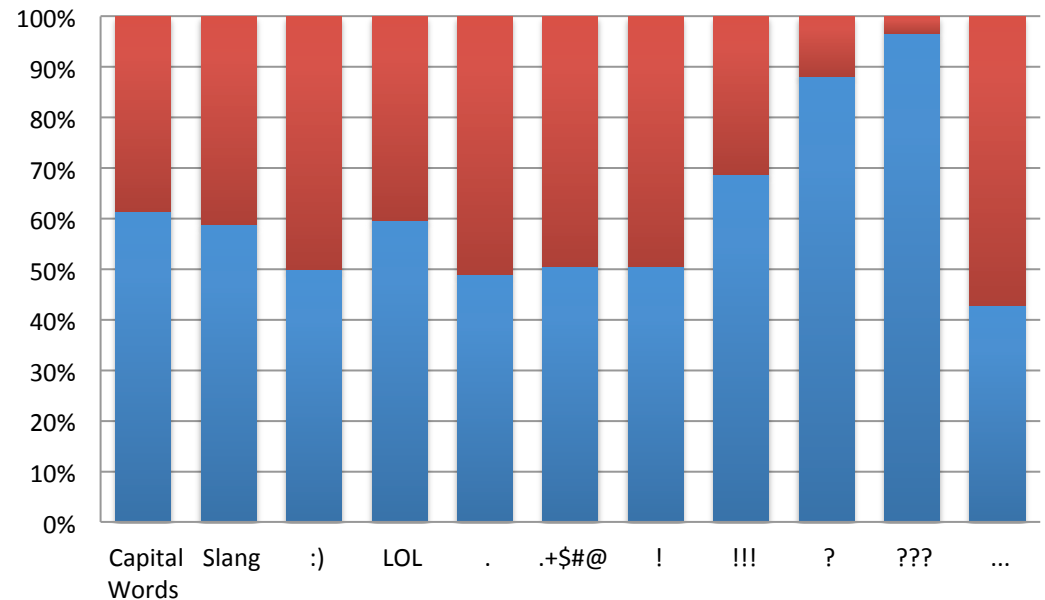
Wikipedia

Legend: claim, not claim

X-axis categories: Capital Words, Slang, :), LOL, ., .+$#@, !, !!!, ?, ???, ...

Livejournal

X-axis categories: Capital Words, Slang, :), LOL, ., .+$#@, !, !!!, ?, ???, ...

Social Media Features

Wikipedia

Livejournal

claim
not claim

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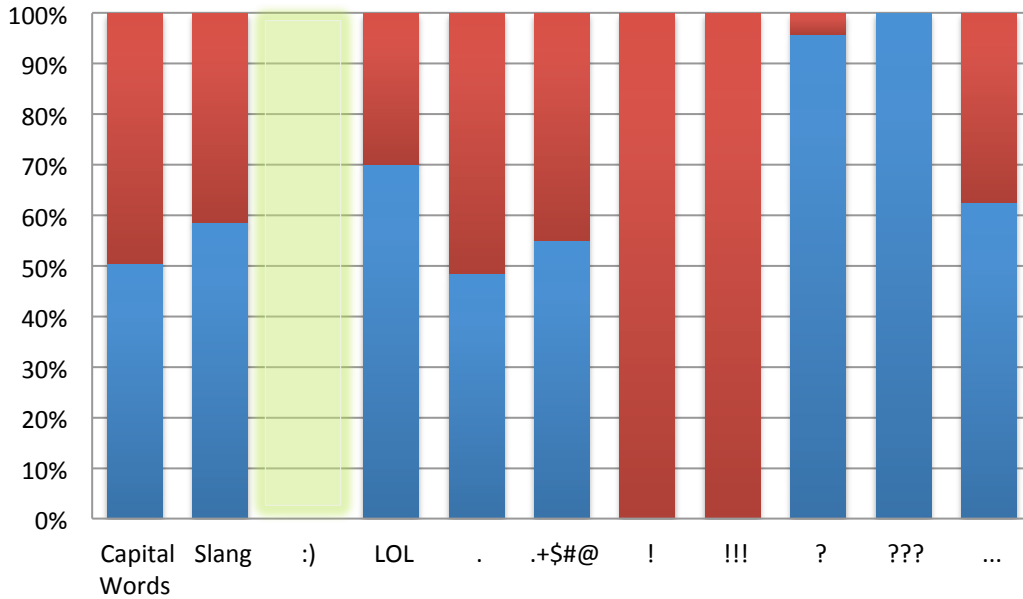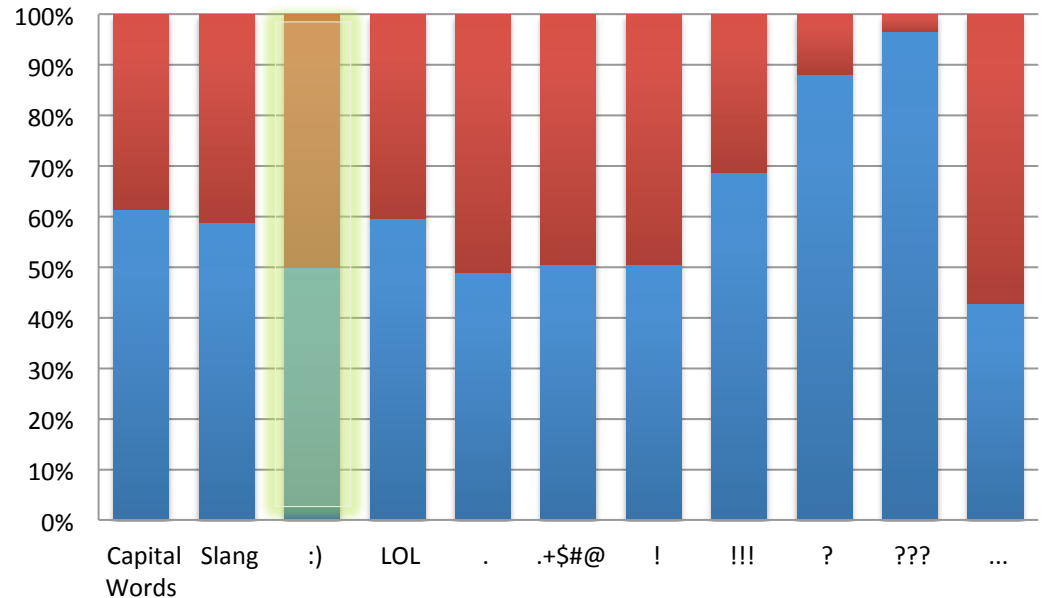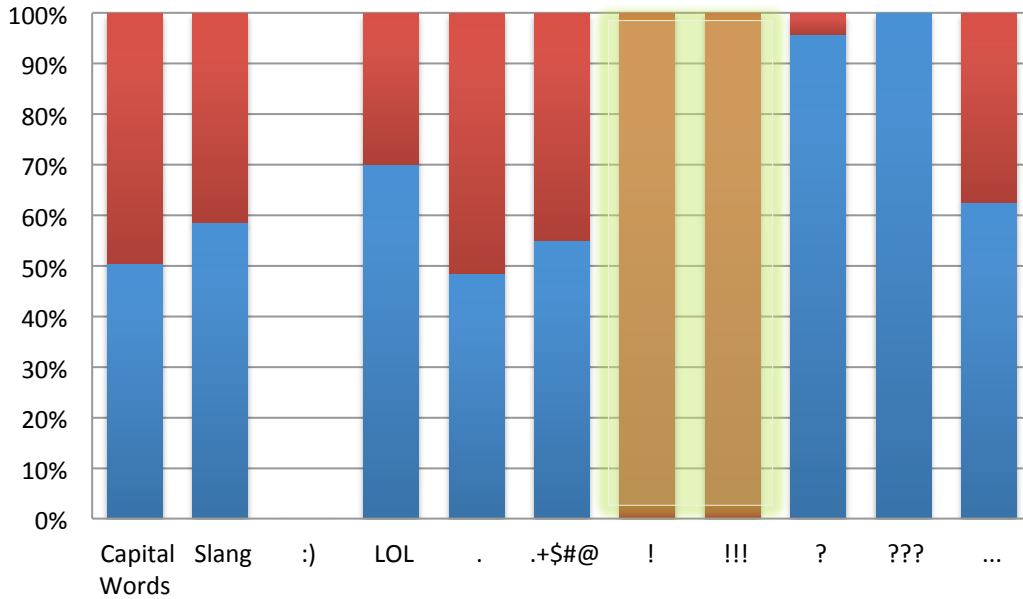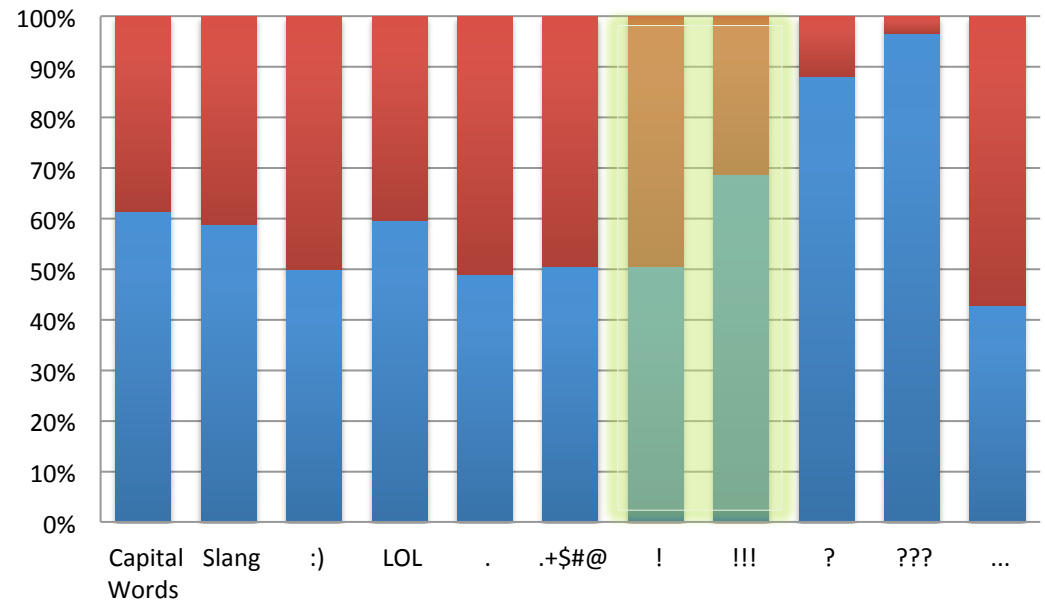
Social Media Features

Wikipedia
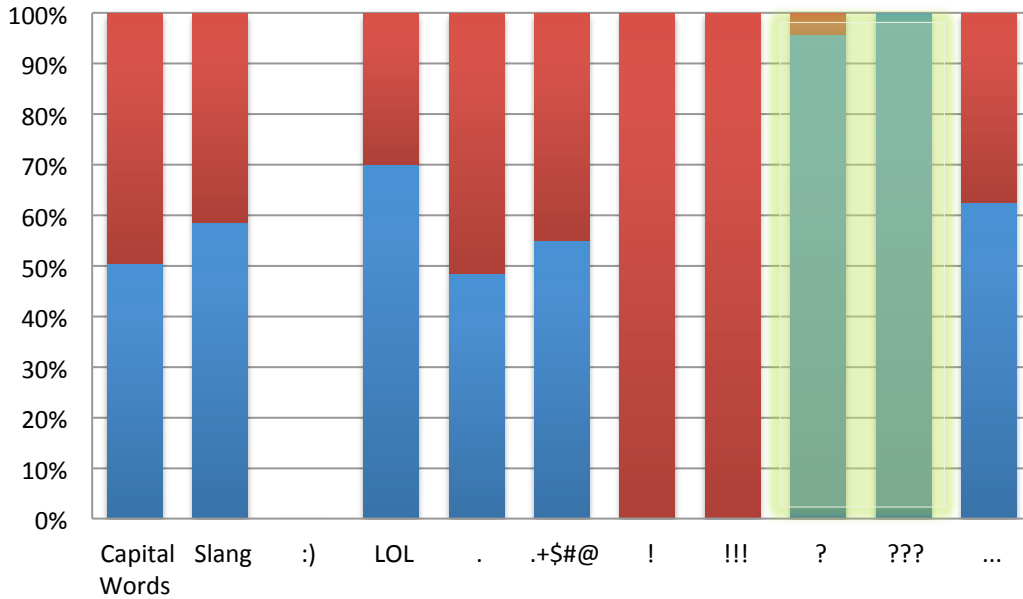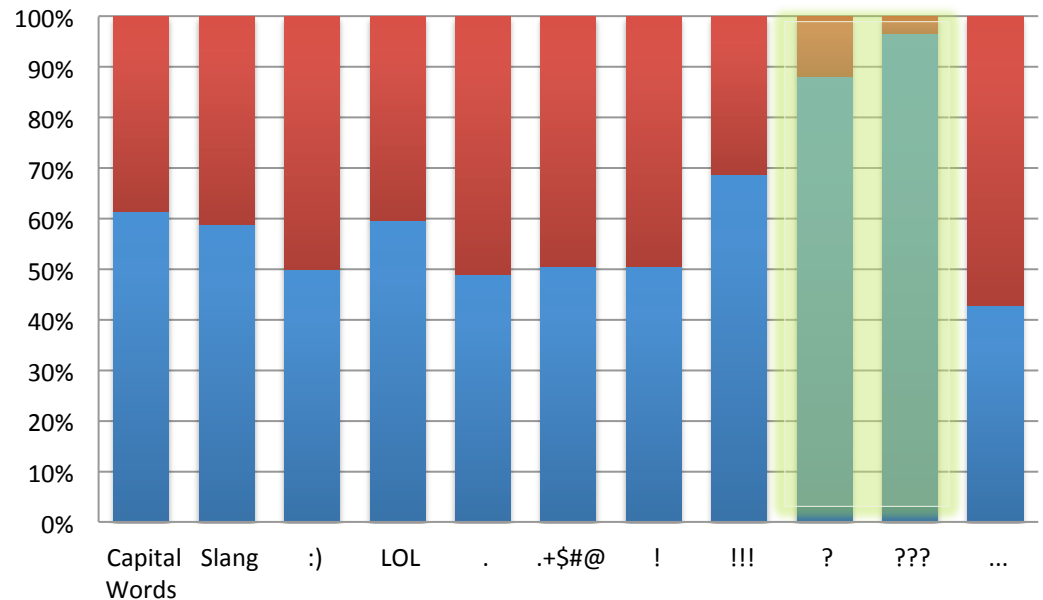
Livejournal

claim
not claim

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- **Experiments**
  - **Single Genre**
  - **Multiple Genre**
  - **Cross Genre**
- Conclusion

Experiments

- Classification in Weka using Logistic Regression
- Single Genre
  - 10 runs 10 fold cross-validation
- Multiple Genre
  - 10 runs 10 fold cross-validation
- Test Set
  - 200 claims
- Cross-Genre

Single Genre Cross-validation

Experiment	LJ	Wiki
Majority	50	50
?	55.5	57.3
?+sm	58.1	59.4
?+sentiment	63	57.6
?+belief	59	63
?+n-grams	63	68.1
?+pos	65.7	66.2
?+n-grams+pos	65.4	**71.1**
?+sentiment + belief	63	59.2
?+belief+pos	65.4	68
?+sm+pos+n-grams	65	**71.1**
?+sentiment+n-grams+pos	**66.4**	67.4
?+sentiment+belief+n-grams+pos	**66.2**	66.3
?+ belief+sm+pos+n-grams	65	**71.4**
All	65.6	66.1

Balanced

Committed Belief and n-grams are more important in Wikipedia

Sentiment and POS are more important in LiveJournal

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35

Single Genres Test Set

Experiment	LJ	Wiki
Majority	N/A	N/A
?	51.5	60
?+sm	51.5	68.5
?+sentiment	53	60.5
?+belief	55.9	65
?+n-grams	53.5	72
?+pos	57.9	75
?+n-grams+pos	57.9	76
?+sentiment + belief	54.5	62
?+belief+pos	**62.4**	**77.5**
?+sm+pos+n-grams	55	75.5
?+sentiment+n-grams+pos	56.4	69
?+sentiment+belief+n-grams+pos	56.9	65
?+ belief+sm+pos+n-grams	58.4	74
All	57.4	68

Balanced

n-grams are not as powerful

Belief makes a difference in both genres

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36

Cross-Genre

Experiment	Balanced		Unbalanced	
	L-W	W-L	L-W	W-L
majority	50	50	64.2	60.2
?	64.1	69.3	64.1	69.3
?+sm	62.3	67.2	64.7	69.9
?+sentiment	66.7	69.9	65.5	69.3
?+belief	65.6	71.6	66.1	73.7
?+n-grams	66.2	71.0	70.5	77.4
?+pos	66.9	67.9	70.4	72.4
?+sentiment+belief	69.1	72.4	69.0	73.5
?+belief+pos	68.9	71.5	72.4	77.4
?+sm+pos+n-grams	69.9	73.6	73.7	79.4
?+sentiment+n-grams+pos	72.2	75.0	70.7	77.6
?+sentiment+belief + n-grams+pos	**74.3**	**76.0**	72.1	80.0
?+belief+sm+pos + n-grams	71.6	**76.0**	**75.6**	**82.2**
All	74.0	**76.1**	72.8	80.8

Results are encouraging for Domain Adaptation

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Conclusion

- Sentiment and Committed Belief are important for detecting claims
- POS and n-grams have a strong impact
- Sentiment and POS are more important in LiveJournal
- Committed Belief and n-grams are more important in Wikipedia