Attitude Beyond the Word Level

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Preview
Why we might care about sentiment

- **private states**: judgment/emotion an evaluative source bears towards a target (entity, event, or proposition) (Weibe et al. 2003)
- sentiment analysis has been applied to a wide variety of “siding” problems in opinion analysis
  - election prediction
  - product review abstraction
  - political position profiling
Next generation opinion analysis

- **Clarity**: clear, grounded theories of what “sentiment” and “opinion” are
- **Coverage**: opinion extraction from more sophisticated, exotic (naturalistic?) texts
- **Context**: models of
  - genre
  - domain
  - pragmatic environment
  - semantic composition
Two approaches to sentiment
Two varieties of modeling sentiment

- **Lexical**: words are associated with constant values in relevant sentiment space

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```

Wilson et al. (2005)

- presence of word: presence of sentiment
- more carefully: sentiment triples of \langle source, target, sentiment \rangle
Two varieties of modeling sentiment

- **Compositional**: words are associated with \( n \)-ary functors into sentiment space
  - **flipper**: opposite polarity to its argument (fail)
  - **preserver**: same polarity to its argument (to)
  - **constant**: lexically determined determined polarity (praise)

Moilanen & Pulman (2007)
Two varieties of modeling sentiment

- **Lexical**: words are associated with constant values in relevant sentiment space
- **Compositional**: words are associated with $n$-ary functions over sentiment space

Choice point: determining **phrasal sentiment**

(1) a. John isn’t helpful.  
   b. John defeated Mary.
Event-level evaluativity

- Sentiments towards participants impacts sentiment of event

(2) a. The hero defeated the villain.  
   default positive
b. The villain defeated the hero.  
   default negative
Event-level evaluativity

- Sentiments towards participants impacts sentiment of event

(3)  a. The hero defeated the villain.  
     default positive

     b. The villain defeated the hero.  
     default negative

- Explicable in a compositional system
Event-level evaluativity

- Event sentiment determined by verb **outcome type** (Anand & Reschke 2010, Neviarouskaya et al. 2010)
  - verbs are **flippers** or **preservers**, given final state of event
    - injure/destroy affected object: **flippers**
    - create/benefit affected object: **preservers**
    - lack object: **flippers**
    - have object: **preservers**

- Outcome type estimated from proxies (Reschke & Anand 2011)
  - heuristic #1: MPQA (Wilson et al. 2005)
    - 380 + words $\mapsto$ **preservers** (abound, absolve, accomplish, ...)
    - 869 - words $\mapsto$ **flippers** (abandon, abase, abolish, ...)
  - heuristic #2: FrameNet (Ruppenhofer et al., 2006)
    - 124 frames manually extracted based on outcome type
    - 146 **preservers**: abet, begin, have, ...
    - 341 **flippers**: leave, lack, ...
Compositional Advantage: Top-Down Inference

In a compositional system, known event-level evaluativity can allow inference to entity sentiment (Reschke & Anand 2011)

(4) We liked_{elike} him because he so clearly disliked_{edislike} Margaret Thatcher.
LEXICAL EVALUATIVITY: ⟨we, him, +⟩; ⟨he, M.T., -⟩
PRAGMATIC INFERENCE: ⟨we, e_{dislike}, +⟩ (via because)
COMPOSITIONAL INFERENCE: ⟨we, M.T., -⟩
Comparing the strategies
Is this approach useful in practice?

- But perhaps people tend to choose verbs that lexically convey sentiment.

(5) The hero \{ \begin{align*} \text{killed} & \\ \text{eliminated} & \\ \text{took down} & \\ \text{took care of} & \end{align*} \} the monster.
Problem #1: Mixing of perspectives

- Neviarouskaya et al. (2010): distinguish between *internal* and *external* sources; distinct composition rules
- Moilanen & Pulman (2007) conflate Narrator source and Participant source, creating inconsistent lexicon
  - *defeat* marked as *flipper*
    - flips for Narrator
    - constant + for subject
  - *hate* marked as *constant +*
    - flips (?) for Narrator
    - constant + for subject
Problem #2: Lack of relevant evaluation data

- Moilanen & Pulman evaluate on the Headlines Corpus (Strapparava and Mihalcea 2007)
- annotators asked to provide polarity for whole headline
- problem: gestalt measures don’t necessarily target event-level evaluativity

(6) Outcry at N Korea ‘nuclear test’
(7) Minister slams airlines on carbon

- uncontrolled nuclear weapons and pollution are bad
- but are public outcry and calling out bad events bad?
Problem #2: Lack of relevant evaluation data

- Neviarouskaya et al. (2010) evaluate on 1000 sentences culled from online confessional site (Experience Project)
- but evaluation materials only annotated for internal (participant) perspective
Problem #2: Lack of relevant evaluation data

- MPQA corpus (Wiebe et al. 2005)
  - separates Narrator and participant sources
  - provides annotations for both NPs and VPs (among others)
  - but not all NPs are annotated

(8) He [Sharon] has destroyed the peace process and the Oslo agreements.
  a. destroyed: —
  b. he has destroyed...agreements: —
  c. no annotations for inanimates (peace process, Oslo agreements)
Political Ads (Reschke & Anand 2012)

- 161 TV political ads from 2008 Presidential campaign
  - short
  - designed to be engaging
  - high density of event-level evaluativity
  - important sentiment genre
  - text & video easily available
In tough times, who will help Michigan’s auto industry? Barack Obama favors loan guarantees to help Detroit retool and revitalize. But John McCain refused to support loan guarantees for the auto industry. Now he’s just paying lip service. Not talking straight. And McCain voted repeatedly for tax breaks for companies that ship jobs overseas, selling out American workers. We just can’t afford more of the same.
In [tough times], who will [help [[Michigan]’s auto industry]]? [Barack Obama] [favors [loan guarantees] to [help [Detroit] retool and revitalize]]. But [John McCain] [refused to [support [loan guarantees] for [the auto industry]]]. Now [he]’s just [paying [lip service]]. Not [talking straight]. And [McCain] [voted repeatedly for [tax breaks] for [[companies] that [ship [jobs] overseas]]], [selling out [American workers]]. [We] just can’t [afford [more of the same]].

- All NPs & VPs extracted via Stanford Parser
- VPs headed by auxiliaries and modals ignored
4 Perspectival Questions

1. **Narrator**: How does the narrator want you to feel about XP?
2. **You**: How do you feel about XP?
3. **Generic**: How do people in general feel about XP?
4. **Controversiality**: How controversial is XP?

- Included ‘Doesn’t Make Sense’ button for all response categories
When answering the questions, it is important to focus on the highlighted text. Here’s an example:

Obama doesn’t care about our troops.

Even though the whole sentence is a criticism of Obama, the highlighted portion is positive because “caring about our troops” is a good thing.

Consequently, the answer to question 1 (how the narrator feels) should be positive. You should answer questions 2-4 by asking what you and society in general thinks of “caring about our troops.”
Annotation Setup

Barack Obama: "I'm Barack Obama, and I approve this message." Announcer: In tough times, who will help Michigan's auto industry? Barack Obama favors **loan guarantees to help Detroit retool and revitalize**. But John McCain refused to support loan guarantees for the auto industry. Now he's just paying lip service. Not talking straight. And McCain voted repeatedly for tax breaks for companies that ship jobs overseas, selling out American workers. We just can't afford more of the same. PFB: **OBAMA FOR AMERICA**
Annotation Setup

- Mechanical Turk
  - $0.40 per HIT, 4-5 annotators per transcript
  - restricted to U.S.
  - no qualifications or training
- 206 workers annotated the 161 transcripts ($\mu = 4.8$/transcript)
  - 3945 NP tokens, 24892 total annotations
  - 1549 VP tokens, 9800 total annotations
- filtering
  - 74 low quality annotators (removed for analysis)
  - 132 high quality annotators ($\mu = 3.9$/transcript)
Experimental Setup

- 635 VPs with NP direct object selected as well as associated NPs
- 272 (44%) in our lexicons above
- lexical: 65.1% accuracy; compositional: 84.2%

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<th>LEXICAL</th>
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<td>INCORR.</td>
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More naturalistic data
Is this enough?

- Do the results of election ads carry over to the Big Data zoo?
Do the results of election ads carry over to the Big Data zoo?

Short answer: I don’t know

Long answer: I have doubts that the compositional model scales easily
Case Study: Informal online political discussion

- Online debate sites: portals for debate “poll” creation and participation (voting + commenting)
  - comments are pithy position statements
  - comments are automatically sided as pro or anti
- 1113 two-sided debates on 14 topics from Convinceme.net (Walker et al. 2012)
**Ninjas versus Pirates**

**History**

**+ Add Argument**

577 Ninjas historically have kicked Pirates' butts, and will continue to do so

- king
  Jan 03, 2007
  112 convinced
  Rebuttal

Ninjas have the advantage on land. I mean, you can't even see them until it's too late, and then you'll never see them because you have no head.

But on sea, pirates are dangerous. But a ninja could sneak on board. And pirates are too loud. Yell and say yar, and are usually drunk, so it is all ninja!

416 Pirates historically have kicked Ninjas' butts, and will continue to do so

- Wilbur
  Jan 03, 2007
  69 convinced
  Rebuttal

Ah, the anachronism that is the ninja! Are there even any ninjas left in the world, to fight the pirates? I am pretty sure that the true ninjas went the way of the samurai (speaking of which, in the movie THE LAST SAMURAI, ninjas and samurais duke it out, and I am pretty sure that was anachronistic too) I say NAY!


- mknorpp
  Jan 04, 2007
  53 convinced
  Rebuttal

Real pirates are and were historically horrible people killing and stealing from innocent people. Ninjas were people fighting for what was right - their freedoms and families. And they are way hotter. (Johnny Depp is the exception)

- king
  Jan 11, 2007
  31 convinced
  Rebuttal

Oh, come one people!! Obvious answer is the ninja. Not as "cool" as the pirate, but think about this way: When you were a kid what did you want to be? Everyone I know wanted to be a ninja. GI Joe? No pirates there. Lot's of ninjas though. Oh the countless number of Russians I killed in my backyard pretending I was a ninja.

How cool was it when your friend, or you yourself bought/made your first sharoken (spelling). And you threw it at some board until it had too many holes, or it accidentally hit your sister. Peter Pan fought pirates, but he wishes he was a ninja.

- Wilbur
  Jan 05, 2007
  33 convinced
  Rebuttal

That is just prejudice against Monocularism! One-eyed people are perfectly capable of seeing ninja stars.

- Wilbur
  Jan 04, 2007
  20 convinced
  Rebuttal

Two problems with the last pro-ninja argument... 1) it implies that ninjas are NOT horrible people historically... which is NOT TRUE!!
## Corpus details

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<tr>
<th>Topic</th>
<th>Posts</th>
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Siding results

- siding classifiers per topic using
  - unigrams
  - sentiment word classes
  - general word classes (LIWC)
  - part of speech
  - grammatical dependencies
- this is not easy (nowhere near human performance)
- domain effect: results vary by topic
- tough to beat unigrams, though POS dependencies do best
## Siding results

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Three reasons sentiment didn’t help

- **discourse context**: many texts are replies (esp. in contentious domains)
  - including previous post elevates results
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Three reasons sentiment didn’t help

- **discourse context**: many texts are replies (esp. in contentious domains)
  - including previous post elevates results
- **local pragmatic context**: people reference others’ positions
  - term usage isn’t enough
“Exactly, Evolution is no more science than Creation”
I honestly don’t know if this post is a troll.

1) “Creation” is faith-based. A religious book says it is so, and followers of that religion then take it on faith. Collecting evidence from the world is not required. This has 0 to do with science.

2) “Evolution”, agree with it or not, is our current best guess at how species came into being based on evidence that has been collected. This embodies the definition of science - it is creating explanations for natural phenomenon through observation and critical thought.

If you disagree, please explain by what method you believe the theory of evolution has come to exist.
Even if you want a baby, it’s unbelievably hard to go through and something your body never fully recovers from....You can’t force somebody to go through this life-threatening condition that is always physically harmful.

“Life threatening condition that is always physically harmful”? What a giant load of steamy BS. Rarely is pregnancy physically harmful and even rarer is it life threatening.

Pregnancy is ALWAYS physically harmful. You try carrying a load of extra weight about and see what that does to your heart.

So, tell me, if it is ALWAYS life-threatening, why are there so few life-threatening conditions mentioned above?
Three reasons sentiment didn’t help

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  - including previous post elevates results
- **local pragmatic context**: people reference others’ positions
  - term usage isn’t enough
  - attempts to model writer’s commitment to a text span environment (conditionals, questions, repetitions, strongly veridical contexts, doubt contexts) have little effect
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  ▶ attempts to model writer’s commitment to a text span environment (conditionals, questions, repetitions, strongly veridical contexts, doubt contexts) have little effect
▶ lack of term coverage: even in highly invested domains, people resort to side-indicating “emotional” language rarely
  ▶ unigrams beaten by POS-dependencies because have reasonable training data
  ▶ 40% of posts have no reliable sentiment term!
You don’t have to walk them or bathe them because they’re smart enough to figure out all that stuff on their own. Plus, they have the common courtesy to do their business in the litter box, instead of all over your house and yard. Just one of the many reasons cats rule and dogs, quite literally drool!

Say, you had a bad day at work, or a bad breakup, you just wanna go home and cry. A cat would just look at you like “oh ok, you’re home” and then walk away. A dog? Let’s see, the dog would most likely wiggle its tail, with tongue sticking out and head tilted - the “you’re home! i missed you so much, let’s go snuggle in front of the TV and eat ice-cream” look. What more do I need to say?
What we need, practically

- Reliable text span environment segmenter
- A good default procedure for guessing the sentiment type of neutral terms in context
- Training data
  - massive amounts of within-topic data
  - a better way to generalize words to relevant labels
What is needed, more generally

- **Clarity**: Is sentiment tendential or constant? Inferred or stated
- **Coverage**: How do we deal with the huge sentiment-less text subject to Clarity?
- **Context**: How do we incorporate
  - the type of conversation
  - the topic
  - the commitment environment
  - the local compositional system?