Do we really know what people mean when they tweet?

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We are all connected to each other...

- Information, thoughts and opinions are shared prolifically on the social web these days
- 72% of online adults use social networking sites
Your grandmother is three times as likely to use a social networking site now as in 2009.
In Britain and the US, approx 1 hour a day on social media.

30% of Americans get all their news from Facebook.

Facebook has more users than the whole of the Internet in 2005.

40% of Twitter users don't actually tweet anything.
What are people reading about?

- Of the top 10 Twitter accounts with the highest number of followers:
  - 7 pop stars
  - 2 social media sites
  - and Barack Obama
- As you can imagine, there's a lot of mindless drivel on social media sites
There can be surprising value in mindless drivel
Opinion mining is about finding out what people think...
Voice of the Customer

- Someone who wants to buy a camera
  - Looks for comments and reviews
- Someone who just bought a camera
  - Comments on it
  - Writes about their experience
- Camera Manufacturer
  - Gets feedback from customer
  - Improves their products
  - Adjusts marketing strategies
More than just analysing product reviews

• Understanding customer reviews and so on is a huge business
• But also:
  • Tracking political opinions: what events make people change their minds?
  • How does public mood influence the stock market, consumer choices etc?
  • How are opinions distributed in relation to demographics?
• NLP tools are crucial in order to make sense of all the information
“Climate change? Oh great!” says Justin Bieber
What else do we want to investigate?

- Decarbonet project: investigating public perception of climate change
- How do opinions change over time and what causes these changes?
- How can we influence opinion?
- Sarcasm detection
- What social media content should be preserved/forgotten? Interestingness of opinions (ARCOMEM and ForgetIt projects)
But there are lots of tools that “analyse” social media already....

- Streamcrab http://www.streamcrab.com/
- Semantria http://semantria.com
- Social Mention http://socialmention.com/
- Sentiment140: http://www.sentiment140.com/
- TipTop: http://feeltiptop.com/
Why are these sites unsuccessful?

- They don't work well at more than a very basic level
- They mainly use dictionary lookup for positive and negative words
- Or they use ML, which only works for text that's similar in style to the training data
- They classify the tweets as positive or negative, but not with respect to the keyword you're searching for
  - keyword search just retrieves any tweet mentioning it, but not necessarily about it as a topic
  - no correlation between the keyword and the sentiment
“Positive” tweets about fracking

• *Help me stop fracking. Sign the petition to David Cameron for a #frack-free UK now!*  
• *I'll take it as a sign that the gods applaud my new anti-fracking country love song.*  
• *#Cameron wants to change the law to allow #fracking under homes without permission. Tell him NO!!!!!*
It's not just about looking at sentiment words.

“It's a great movie if you have the taste and sensibilities of a 5-year-old boy.”
“I'm not happy that John did so well in the debate last night.”
“I'd have liked the film if it had been shorter.”
“You're an idiot.”

• Conditional statements, content clauses, situational context can all play a role.
Whitney Houston wasn't very popular...
Death confuses opinion mining tools

Opinion mining tools are good for a general overview, but not for some situations.
Opinion spamming

Suppose we run a contest where people retweet our ad repeatedly, and the winner’s whoever loses the most followers.
Spam opinion detection (fake reviews)

- Sometimes people get paid to post “spam” opinions supporting a product, organisation or even government
- An article in the New York Times discussed one such company who gave big discounts to post a 5-star review about the product on Amazon
- Could be either positive or negative opinions
- Generally, negative opinions are more damaging than positive ones
How to detect fake opinions?

- Review content: lexical features, content and style inconsistencies from the same user, or similarities between different users
- Complex relationships between reviews, reviewers and products
- Publicly available information about posters (time posted, posting frequency etc)
I had never seen snow in Holland before but thanks to twitter and facebook I now know what it looks like. Thanks guys, awesome!

Life's too short, so be sure to read as many articles about celebrity breakups as possible.

I feel like there aren't enough singing competitions on TV. #sarcasmexplosion

I wish I was cool enough to stalk my ex-boyfriend! #sarcasm #bitchtweet

On a bright note if downing gets injured we have Henderson to come in
How do you know when someone is being sarcastic?

- Use of hashtags in tweets such as #sarcasm, emoticons etc.
- Large collections of tweets based on hashtags can be used to make a training set for machine learning
- But you still have to know which bit of the tweet is the sarcastic bit

*Man, I hate when I get those chain letters & I don't resend them, then I die the next day .. #Sarcasm*

*I am not happy that I woke up at 5:15 this morning. #greatstart #sarcasm*

*You are really mature. #lying #sarcasm*
Case study:
Rule-based Opinion Mining on Tweets
Why Rule-based?

- Although ML applications are typically used for Opinion Mining, there are advantages to using a rule-based approach when training data isn't easily available.
- For example, working with multiple languages and/or domains.
- Rule-based system is more easily adaptable.
- Novel use of language and grammar makes ML hard.
GATE Components

- TwitIE
  - structural and linguistic pre-processing, specific to Twitter
  - includes language detection, hashtag retokenisation, POS tagging, NER
- (Optional) term recognition using TermRaider
- Sentiment gazetteer lookup
- JAPE opinion detection grammars
- (Optional) aggregation of opinions
  - includes opinion interestingness component
Basic approach for opinion finding

- Find sentiment-containing words in a linguistic relation with terms/entities (opinion-target matching)
- Dictionaries give a starting score for sentiment words
- Use a number of linguistic sub-components to deal with issues such as negatives, adverbial modification, swear words, conditionals, sarcasm etc.
- Starting from basic sentiment lookup, we then adjust the scores and polarity of the opinions via these components
A positive sentiment list

- awesome  category=adjective  score=0.5
- beaming category=adjective  score=0.5
- becharm category=verb  score=0.5
- belonging  category=noun  score=0.5
- benefic  category=adjective  score=0.5
- benevolently category=adverb  score=0.5
- caring  category=noun  score=0.5
- charitable  category=adjective  score=0.5
- charm  category=verb  score=0.5
A negative sentiment list

Examples of phrases following the word “go”:

- down the pan
- down the drain
- to the dogs
- downhill
- pear-shaped
Opinion scoring

- Sentiment gazetteers (developed from sentiment words in WordNet) have a starting “strength” score
- These get modified by context words, e.g. adverbs, swear words, negatives and so on

  *The film was awesome* --> *The film was really amazing.*
  *The film was awful* --> *The film was absolutely awful.*
  *The film was good* --> *The film was not so good.*

- Swear words modifying adjectives count as intensifiers

  *The film was good* --> *The film was damned good.*

- Swear words on their own are classified as negative

  *Damned politicians.*
Example: Opinions on Greek Crisis
Using Machine Learning for the task

- If we can collect enough manually annotated training data, we can also use an ML approach for this task
- Product reviews: use star-based rating (but these have flaws)
- Other domains, e.g. politics: classify sentences or tweets (the ML instances), many of which do not contain opinions.
- So the ML classes will be positive, neutral and negative
- (Some people classify neutral and no opinion as distinct classes, but we find the distinction too difficult to make reliably)
Training on tweets

- You can use hashtags as a source of classes
  - Example: collect a set of tweets with the #angry tag, and a set without it, and delete from the second set any tweets that look angry
  - Remove the #angry tag from the text in the first set (so you're not just training the ML to spot the tag)
  - You now have a corpus of manually annotated angry/non-angry data
- This approach can work well, but if you have huge datasets, you may not be able to do the manual deletions
- You can also train on things like #sarcasm and #irony
Summary

- Opinion mining is **hard** and therefore **error-prone** (despite what vendors will tell you about how great their product is)
- There are many types of sentiment analysis, and many different uses, each requiring a different solution
- It's very unlikely that an off-the-shelf tool will do exactly what you want, and even if it does, performance may be low
- Opinion mining tools need to be **customised** to the task and domain
- Anything that involves processing **social media** (especially messy stuff like Facebook posts and Twitter) is even harder, and likely to have lower performance
- For tasks that mainly look at aggregated data, this isn't such an issue, but for getting specific sentiment on individual posts/reviews etc, this is more problematic
So where does this leave us?

- Opinion mining is ubiquitous, but it's still far from perfect, especially on social media.
- There are lots of linguistic and social quirks that fool sentiment analysis tools.
- The good news is that this means there are lots of interesting problems for us to research.
- And it doesn’t mean we shouldn’t use existing opinion mining tools.
- The benefits of a modular approach mean that we can pick the bits that are most useful.
- Take-away message: use the right tool for the right job.
More information

• GATE http://gate.ac.uk (general info, download, tutorials, demos, references etc)

• The EU-funded Decarbonet and TrendMiner projects are dealing with lots of issues about opinion and trend mining from social media
  • http://www.decarbonet.eu
  • http://www.trendminer-project.eu/

• Tutorials
  • Module 12 of the annual GATE training course: “Opinion Mining” (2013 version)
    http://gate.ac.uk/wiki/TrainingCourseJune2013/
  • Module 14 of the annual GATE training course: “GATE for social media mining”
Some GATE-related opinion mining papers
(available from http://gate.ac.uk/gate/doc/papers.html)


- Diana Maynard, David Dupplaw, Jonathon Hare. Multimodal Sentiment Analysis of Social Media. Proc. of BCS SGAI Workshop on Social Media Analysis, Dec 2013


Some demos to try

- http://sentiment.christopherpotts.net/lexicon/
  Get sentiment scores for single words from a variety of sentiment lexicons
- http://sentiment.christopherpotts.net/textscores/
  Show how a variety of lexicons score novel texts
- http://sentiment.christopherpotts.net/classify/
  Classify tweets according to various probabilistic classifier models
- http://demos.gate.ac.uk/arcomem/opinions/
  Find and classify opinionated text, using GATE-based ARCOMEM system
Questions?