

CSCI 5417
Information Retrieval Systems

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Lecture 23
11/15/2011

Today 11/15

- Sentiment analysis
- Quiz questions?
- Extra HW

Sentiment, Style, Identity, Opinion Classification

- Sentiment Analysis
 - Movie: is a review positive or negative
 - Products (new iPhone)
 - Sentiment over time (is voter anger increasing or decreasing?)
 - Politics (is this editorial left or right?)
 - Prediction (election outcomes, market trends). Will stock go up after this news report?
- Style/Emotion
 - Is this conversation (or blog) friendly, aggressive, polite, flirtatious, deceitful, threatening

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Why is it hard

The insurance folks were nice enough to set me up with a rental car until I get my settlement offer. Perfect, since I was planning to rent one to go to Vancouver this weekend anyway, and now its free. They paid for a "standard" size car, which means huge. I asked for something smaller with better fuel economy and ended up with a Kia Rondo in "velvet blue." It is indeed the color of Isabella Rossellini's bathrobe in Blue Velvet.

Every time I drive a rental car I'm a bit appalled. My antique vehicle not only got better gas mileage than most new cars, but it had leg room and head room and ample windows for seeing out. New cars have tiny, low windows with blind spots all over the place. This Kia is ridiculous. It seems to be made for very tall people with very short legs. High ceilings, but the back seat is practically up against the front seat, and the hauling capacity is not better than, say, a Prius.

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Example

So what exactly is the point of this compact, yet tall, mid-size SUV? Is it stylish? I can't see any practical reason it is designed this way. It is certainly not an off-road vehicle. I imagine it's front-wheel drive and a bitch to drive in snow. Does simply taking up a lot of space appeal to people? I'm sure it's a fine car, in a general sense, but whatever happened to "smart" design?

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Discussion

- What makes classification hard?
 - Sentiment can be subtle:
 - Perfume review in "Perfumes: the Guide":
 - "If you are reading this because it is your darling fragrance, please wear it at home exclusively, and tape the windows shut."
 - "She runs the gamut of emotions from A to B"
(Dorothy Parker on Katherine Hepburn)
 - Order effects
 - This film should be **brilliant**. It sounds like a **great** plot, the actors are **first grade**, and the supporting cast is **good** as well, and Stallone is attempting to deliver a good performance. However, it can't hold up.

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Classification

- Coarse-grained classification of sentiment
 - Document-level classification according to some simple (usually binary) scheme
 - Political bias
 - Likes/hates
- Fine-grained classification of sentiment-bearing mentions in a text
 - Positive/negative classification of opinions about entities mentioned in a text
 - Perhaps with intensity

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Movies

- A well-studied problem is the problem of classifying movie reviews
 - As either +/-
 - Or on a scale

MOVIES / IN THEATERS / FAST & FURIOUS



Fast & Furious (2009)

T-Meter Critics | Top Critics | RT Community | My Critics | My Friends

26% TOMATOMETER

How does the Tomatometer work?

Consensus: While *Fast and Furious* features the requisite action and stunts, the filmmakers have failed to provide a competent story or compelling characters.

Reviews Counted: 120
Fresh: 31 Rotten: 89
Average Rating: 4.4/10

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Political Sentiment

- Two examples of classifiers
 - Using words as features
 - With a Naïve Bayes or SVM classifier
 - To make a binary decision
 - About the political stance of a text

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Political Sentiment

Bitterlemon.com

- A website designed to “contribute to mutual understanding [between Palestinians and Israelis] through the open exchange of ideas”
- Can we label a Pro-Israeli or Pro-Palestinian perspective from editorial texts
 1. “*The inadvertent killing by Israeli forces of Palestinian civilians – usually in the course of shooting at Palestinian terrorists – is considered no different at the moral and ethical level than the deliberate targeting of Israeli civilians by Palestinian suicide bombers.*”
 2. “*In the first weeks of the Intifada, for example, Palestinian public protests and civilian demonstrations were answered brutally by Israel, which killed tens of unarmed protesters.*”

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Political Sentiment

- A naïve Bayes classifier applied to this domain achieved accuracy around 90%
- Recall with naïve Bayes we have
 - a table with priors on the class $P(C)$
 - and tables of conditionals of words given the class $P(\text{word}|C)$ for all the words in the vocabulary for the entire corpus

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Naïve Bayes: Top 20 words

- Palestinian
 - *palestinian, israel, state, politics, peace, international, people, settle, occupation, sharon, right, govern, two, secure, end, conflict, process, side, negotiate*
- Israeli
 - *israel, palestinian, state, settle, sharon, peace, arafat, arab, politics, two, process, secure, conflict, lead, america, agree, right, gaza, govern*

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Political Sentiment

- Goal: label a speech as a bill as for our against a bill in congress
- Data: transcripts of all debates in US House of Representatives in 2005
 - From GovTrack (<http://govtrack.us>) website
- Each speech segment (sequence of uninterrupted utterances by speaker)
 - Labeled by the vote ("yea" or "nay") cast
- Labeled by SVM classifier, using all word unigrams as features

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Results

- Majority baseline 58.37
- #("support") – #("oppos") 62.67
- SVM classifier 66.05

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Choosing a Vocabulary

- Key task: Vocabulary
 - Essentially feature selection
- The previous examples used all the words in the vocabulary
- Can we do better by focusing on subset of words?
 - How to find words, phrases, patterns that express sentiment or polarity?

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Words

- **Adjectives**
 - positive: **honest important mature large patient**
 - Ron Paul is the only **honest** man in Washington.
 - Kitchell's writing is unbelievably **mature** and is only likely to get better.
 - To humour me my **patient** father agrees yet again to my choice of film

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Words

- Adjectives

- negative: **harmful hypocritical inefficient insecure**
 - It was a macabre and **hypocritical** circus.
 - Why are they being so **inefficient** ?

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Other parts of speech

- Verbs

- positive: **praise, love**
- negative: **blame, criticize**

- Nouns

- positive: **pleasure, enjoyment**
- negative: **pain, criticism**

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Identifying Polarity Words

- Generating exhaustive lists is too hard
 - Hard to predict what words will be relevant and what their polarity will be in a given context
 - And hard to do the same thing in a new language
- We need a semi-automatic way to generate such lists
- Assume contexts are coherent with respect to polarity
 - Fair and legitimate vs. corrupt and brutal
 - But not: *fair and brutal, *corrupt and legitimate

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Finding Sentiment-bearing Adjectives

Hatzivassiloglou & McKeown 1997

Step 1

- From 21-million word WSJ corpus
- For every adjective with frequency > 20
 - Label for polarity
- Total of 1336 adjectives
 - 657 positive
 - 679 negative

Positive: adequate central clever famous
intelligent remarkable reputed
sensitive slender thriving
Negative: contagious drunken ignorant lanky
listless primitive strident troublesome
unresolved unsuspecting

WordNet has roughly
21k adjectives. The
2nd edition of the OED
has about 42k.

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Hatzivassiloglou & McKeown 1997

- Extract all **conjoined** adjectives

Web Results 1 - 10 of about 762,000 for "was **very nice and**".

[The Homestay Experience - Cultural Kaleidoscope 2006](#)
 My host's home was **very nice and comfortable**. I got to try all types of food; Malaysian, Chinese, Indonesian and I loved it all. My host's parents were very ...
www.gardenschool.edu.my/studentportal/aec/Kaleidoscope06/experience.asp - 10k -
 Cached - Similar pages - Note this

[PriceGrabber User Rating for Watch Your Budget - PriceGrabber.com](#)
 Reviews, Camera I purchased was **very nice and** a bargain. There was a problem with shipping, but was resolved quickly. Buy with confidence from this vendor. ...
www.pricegrabber.com/rating_getreview.php?retid=5821 - Similar pages - Note this

[Testimonials](#)
 "Everybody was **very nice and** service was as fast as they possibly could. ... "Staff member who helped me was **very nice and easy to talk to** ...
www.sa.psu.edu/uhs/news/testimonials.cfm - 22k - Cached - Similar pages - Note this

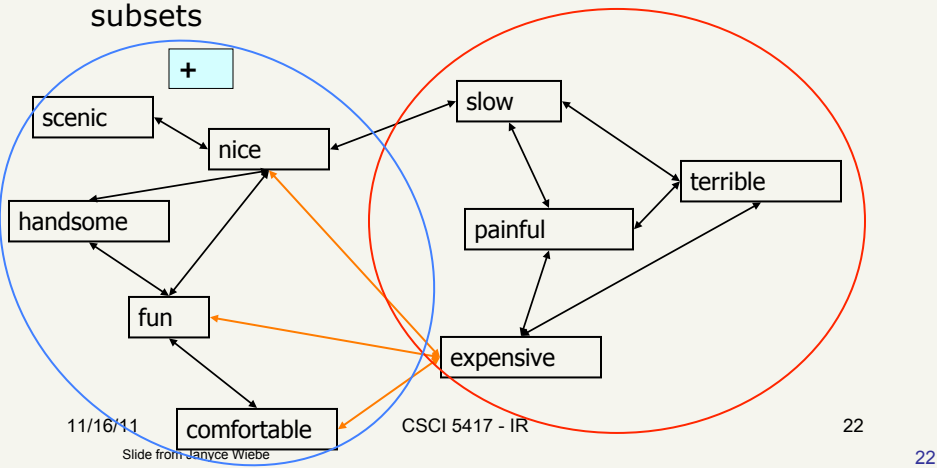
[Naxos Villages - Naxos Town or Chora Reviews: Very nice and very ...](#)
 -Did you enjoy the trip to Naxos Town: Yes it was **very nice and** very scenic. -In order to get to the village were there enough signs in order to find it: It ...
 ICWSM 2008

nice and comfortable
 nice and scenic

Slide adapted from Janyce Wiebe

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Form a graph based on co-occurrence in a conjunction. A **clustering algorithm** partitions the adjectives into two subsets



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Classified as positive:

bold decisive disturbing **generous good**
honest important large mature patient
peaceful positive proud sound
stimulating straightforward strange
talented vigorous witty

Classified as negative:

ambiguous cautious cynical evasive
harmful hypocritical inefficient insecure
irrational irresponsible minor outspoken
pleasant reckless risky selfish tedious
unsupported vulnerable wasteful

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Summary

- Cons
 - Not clear that the +/- scheme makes sense for all adjectives.
 - Treats adjectives as single entities... Doesn't deal with multiple meanings.
 - Doesn't deal with +/- flipping in different contexts
 - Tight seating vs. tight steering in a car

Fine-Grained/Structural Sentiment

- Discovery, classification, and aggregation of attributes/facets of objects of interest
 - For cameras...
 - Zoom, battery life, weight, usability, etc.
 - *Compact structure, beautiful appearance, convenient operation, good quality!*
- Requires the use of some form of syntactic analysis
 - To identify the attributes/entities of interest
 - Identify the modifiers of that that entity
- And the use ML-trained classifiers
 - To classify that modifier as +/-

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Challenges

- Mixed sentiment
 - *The steering is accurate but feels somewhat anesthetized*
- Sentiment inverters
 - *...never seen any RWD cars can handle well on snow even just few inches.*
- Anaphora and meronymy
 - *Its a great car for just about anything. The mkVI is pretty much a mkv but ironing out all the small problems*
 - *Hey is the back seat comfortable? In my MkV it feels like you're sitting on a vat of acid.*

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Quiz Questions?

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Quiz hints

- Make sure you can do a NB example

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Homework

- Extra HW
 - Classify sentences based on subjectivity
 - Sentences from movies
 - Objective/subjective
 - Johnny Depp plays Captain Jack Sparrow
 - The second Pirates of the Caribbean was too long.