



Lecture 13:

Text Analysis: Sentiment Analysis

Jaeki Song, Ph.D.

Google Product Search



HP Officejet 6500A Plus e-All-in-One Color Ink-jet - Fax / copier / printer / scanner
\$89 online, \$100 nearby ★★★★★ 377 reviews
September 2010 - Printer - HP - Inkjet - Office - Copier - Color - Scanner - Fax - 250 shi

Reviews

Summary - Based on 377 reviews

1 star

2

3

4 stars

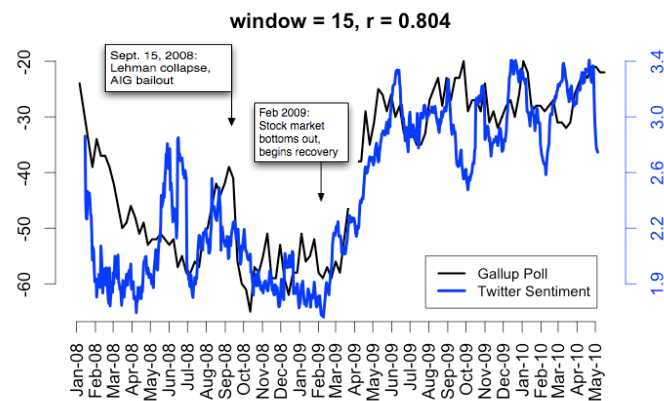
5 stars

What people are saying

ease of use	<div></div>	"This was very easy to setup to four computers."
value	<div></div>	"Appreciate good quality at a fair price."
setup	<div></div>	"Overall pretty easy setup."
customer service	<div></div>	"I DO like honest tech support people."
size	<div></div>	"Pretty Paper weight."
mode	<div></div>	"Photos were fair on the high quality mode."
colors	<div></div>	"Full color prints came out with great quality."



Twitter sentiment versus Gallup Poll of Consumer Confidence



Brendan O'Connor, Ramnath Balasubramanyam, Bryan R. Routledge, and Noah A. Smith. 2010. From Tweets to Polls: Linking Text Sentiment to Public Opinion Time Series. In ICWSM-2010

What is Sentiment?

- Sentiment = feelings
 - Attitudes
 - Emotions
 - Opinions
- Subjective impressions, not facts
- Generally, a binary opposition in opinions is assumed

Questions Related to Sentiment Analysis

- Is this product review positive or negative?
- Is this customer email satisfied or dissatisfied?
- Based on a sample of tweets, how are people responding to this ad campaign/product release/news item?
- How have bloggers' attitudes about the president changed since the election?



Sentiment Classification Levels

- Document Level Classification
 - Extracted from the entire review, and a whole opinion is classified based on the overall sentiment of the opinion holder
- Sentence Level Classification
 - subjectivity classification of a sentence into one of two classes: *objective* and *subjective*
 - Sentiment classification of subjective sentences into two classes: *positive* and *negative*
- Aspect/Feature Level Classification
 - To identify and extract object features that have been commented on by the opinion holder and determine whether the opinion is positive, negative, or neutral.



Sentiment Classification

- To perform sentiment analysis, it is important to understand the polarity of words and classify sentiments to categories, such as positive, negative, or neutral.
- Examples:
 - The General Inquirer
 - LIWC(Linguistic Inquiry and word count)
 - MPQA Subjective Cues Lexicon
 - Bing Liu's Opinion Lexicon
 - SentiWordNet



Challenges in Sentiment Analysis

- Human judgment is still far more accurate as a gauge in sentiment analysis.
- Mixed opinions such as “I like the printer quality, but the size is too big,” can be difficult to classify.
- It is also unlikely that an automated system could identify biased or fake reviews on a product or service.



Sentiment Analysis - Example

- Each word in the content is checked against the sentiment database and assigned a count value (2 or -2, 1 or -1)

Type	Word	Pos1	Polarity	Value
weaksubj	abandon	verb	negative	-1
weaksubj	abandoned	adj	negative	-1
strongsubj	anger	adj	negative	-2
strongsubj	happy	adj	positive	2
strongsubj	hardier	adj	positive	2
weaksubj	hardworking	adj	positive	1



Sentiment Analysis - Example

$$Senti_score_i = \frac{(str_pos_i * 2 + ord_pos_i * 1) - (str_neg_i * 2 + ord_neg_i * 1)}{(str_pos_i + str_neg_i) * 2 + (ord_pos_i + ord_neg_i) * 1}$$

- str_pos_i***: the number of strong positive terms in review *i*
- str_neg_i***: the number of strong negative terms in review *i*
- ord_pos_i***: the number of ordinary positive terms in review *i*
- ord_neg_i***: the number of ordinary negative terms in review *i*



Sentiment Analysis - Example

It **successfully** charged me \$14.99 for subscription. It doesn't let me watch anything by asking me to renew subscription. In billing, it says I am not subscribed. I try to play a video and when renew subscription dialog pops up, I pressed the Renew Button. It gets stuck at Validating Account. Their phone **support** is **unavailable** 24x7 and gives a **busy** signal instead of telling us about their work time or that it is closed currently. I used email and got someone to respond within a couple of hours. I sent the necessary information - an attachment of the subscription confirmation from play store. After that, no response at all. Today I called phone **support**. I have been on the wait queue for 20 minutes. I think I just **lost** my 15 bucks and **ruined** my Sunday night and **wasted** my time dealing with their **incompetence**. It would have been **nice** if they at **least** acknowledged the issue and sent out an email with an ETA of the fix to everyone (looking at reviews, I am not the only one facing this issue) affected by the issue and maybe a **free** month or 2 to **compensate** for the **loss** of time and **happiness**.



Sentiment Analysis - Example

It **successfully** charged me \$14.99 for subscription. It doesn't let me watch anything by asking me to renew subscription. In billing, it says I am not subscribed. I try to play a video and when renew subscription dialog pops up, I pressed the Renew Button. It gets stuck at Validating Account. Their phone support is **unavailable** 24x7 and gives a **busy** signal instead of telling us about their work time or that it is closed currently. I used email **support** and got someone to respond within a couple of hours. I sent the necessary information - an attachment of the subscription confirmation from play store. After that, no response at all. Today I called phone **support**. I have been on the wait queue for 20 minutes. I think I just **lost** my 15 bucks and **ruined** my Sunday night and **wasted** my time dealing with their **incompetence**. It would have been **nice** if they at **least** acknowledged the issue and sent out an email with an ETA of the fix to everyone (looking at reviews, I am not the only one facing this issue) affected by the issue and maybe a **free** month or 2 to **compensate** for the **loss** of time and **happiness**.



$$senti_score = \frac{(5*2+3*1)-(1*2+6*1)}{(5+1)*2+(3+6)*1} = ?$$