



Statistical Natural Language Processing

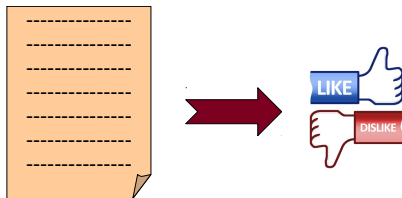
Lecture 13: Sentiment Analysis

Dr. Momtazi

Amirkabir University of Technology

Sentiment Analysis

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Outline

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- ➊ Applications
- ➋ Task
- ➌ Machine Learning Approach
- ➍ Rule-based Approach

Outline

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① Applications

② Task

③ Machine Learning Approach

④ Rule-based Approach

Hotel Reviews



Sign in with Facebook | Sign in | Register Now! | FREE Mobile App | [PRG Mobile App](#) | [City, hotel name, etc.](#) [SEARCH](#)

Home Berlin Hotels Flights Vacation Rentals Restaurants Things to Do Best of 2012 More Write a Review

Home > Europe > Germany > Berlin > Berlin Hotels > The Ritz-Carlton, Berlin

The Ritz-Carlton, Berlin

Postdam Platz 3, 10785 Berlin, Germany [Map](#) [Hotel amenities](#)



Ranked #7 of 952 hotels in Berlin
 647 Reviews
 Travelers' Choice 2012 Winner
 Luxury Top 25 Best Hotel

Show the lowest price for this hotel*

Check In: 4/9/2012 Check Out: 4/10/2012 Adults: 2 ▼

Show Prices

Professional photos
 251 traveler photos

Booking.com
 Expedia.de
 Lastminute.com
 Hotels.com
 Lastminute.de
 Lastminute.it

647 reviews from our community

What travelers say about this hotel

- "Clean hotel" (1)
- "Wonderful place" (1)
- "Excellent hotel" (1)
- "Very good" (1)
- "Excellent service" (1)

See which rooms travelers prefer - 22 traveler tips

Only show reviews for: Family (0) Couples (0) Business (0)

647 reviews sorted by Date Rating [English first](#)



Guest photo

17 reviews

17 traveler photos

"A really great place to stay in Berlin"

Reviewed March 21, 2012 new

The price for the Ritz in Berlin was quite reasonable considering I was in a major European capital. That takes a lot of getting used to. It is like the prices you get staying in Chicago versus New York or San Francisco. The hotel itself is very new and nice. The service is quite excellent. They have a family...

Was this review helpful?

Travelers with this interest?

"Great location and very comfortable hotel"



Guest photo

Reviewed March 14, 2012

I person found this review helpful

My family of 5 stayed for 9 nights in mid-December/January. We had 2...

Travelers also viewed...

- [Steinbock Berlin](#) [More Photos](#)
- [Radisson Blu Hotel, Berlin](#) [More Photos](#)
- [Pullman Berlin Schweizerhof](#) [More Photos](#)

Browse nearby

Hotels (10) Restaurants (10) Things to Do (10)



Interactive map

Travelers say this accommodation offers a good night's sleep.

See more

Sleep Rating

Based on the results of 1,000+ reviews

See more

See more

See more

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Reviewed February 22, 2012

I person found this review helpful

I originally selected this hotel over others in Berlin - including Hotel Adlon - due to its top 3 TripAdvisor ranking at the time. I stayed with family that ever since then its position had been continuously slipping ever downwards! I really had hoped that the recent surge of new, good reviews would be due to fairly particular aspects of the occasional bad experience, which can happen even at the best properties. As I'd booked it through a third party agent I would advise using a price comparison web site as I got to be better than I'd booked directly with the hotel; and paid in advance there was no better deal.

Berlin I launch into the full review. I will note that the best thing about this hotel is the breakfast. It is superb, and any criticism would only really come down to very personal taste and would be not picking. Everything is catered for - a wonderful selection of bread, including brioche, and cereals. Lots of different breads, rolls, and even bagels, and a basket to see one based selection something one wishes, there is also an equally large array of pastries to enjoy with the bread. There is a good selection of cold cuts, from high-quality cheeses, as well as the usual American style hot buffet complete with omelettes, made to order. As if this isn't enough, vegans, American pancakes, French toast, and waffles can all be made to order (at no extra charge). In short, this is an exemplary hotel breakfast in both terms of quality and variety. The service was usually attentive with glasses regularly topped up, but once it seemed to get busy (around 9.30 onwards, especially at the weekend) one did notice a drop in attention to detail, as well as a queue forming to get to the bar. If you are going to stay here, make sure you have breakfast included as it is the major redeeming factor of this property!

Upon arrival, a car-paged doorman opened my taxi door, and swiftly removed the luggage and welcomed me to the hotel. If only things had continued like this... The girl at the front desk was polite, but far from welcoming as the doorman had been. Things went wrong when she asked for my voucher. I explained that whilst I had booked through a third party I had e-mailed the hotel directly to confirm everything was as it should be and they had never mentioned the need for any voucher. She was very pleasant and went away to ask someone else, and still returned on the voucher. I advised that I could probably dig out an email once I had access to a computer and get it off to them. She still wasn't really satisfied, and a little huffy said that they would contact the travel agent for another copy. I told her this, I had been travelling since 4am that morning. Whilst I did not expect the hotel to specifically know that, the front desk should always be very, that most travelers will always be somewhat weary from their journey! I had expected that they should check into me and then contact me if I had indeed needed to provide the voucher (which as it turned out I didn't).

A bell boy showed me up to my room and was extremely friendly and professional and showed me the various features of the room, how to operate touch-plate light switches etc. This was a thoughtful touch, and much appreciated. The room itself was an huge lobby (I will discuss the rooms in more detail a little later) and the double glazing was far from top quality, and a hissing noise could be heard where the window did not seal fully on the right side. I complained about this, and they advised someone would look at the window whilst I was out. I was indeed and the problem was as before and there was no noise explaining what had happened. I went to shower and get ready to go out, the box containing the vanity kit was empty which I was not best pleased with. I spoke to the duty manager in my way out and he assured me he would resolve the issue with the window. I returned from shower, still no noise and the hissing sound never more appeared. I called the guest service department yet again (I am sure they were bored of my call) and they advised that maintenance considered the noise to be normal. I am not someone who requires complete silence, but it was a very particular noise and the room otherwise was pretty quiet so it would've been rather noticeable.

The next day I returned and was offered a change of room, and a complimentary breakfast (which was not included in my booking) and a complimentary taxi to the airport.



Reviewed February 22, 2012

I person found this review helpful

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Value
 Location
 Sleep Quality

Rooms
 Cleanliness
 Service

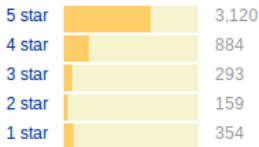
Product Reviews

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★★★★★ (4,810)

4.3 out of 5 stars



Picture Quality



Ease of Use



Size



Weight



Color



Zoom



Social Media

7




The screenshot shows the 'tweetfeel' website interface. At the top, the logo 'tweetfeel' is displayed in blue and yellow, followed by a blue bird icon. Below the logo is a search bar containing the text 'julia roberts' and a yellow 'Search' button. Under the search bar, a list of Twitter trends is shown: 'Rise & Grind', 'Happy Birthday Jeremy', 'Last Week Of School', 'Say It Back', 'MTV Movie Awards', 'Richard Dawson', and 'Tiger Woods'. Below the trends, a sentiment analysis graphic shows a green smiley face with '48' below it, a red frowny face with '21' below it, an equals sign, and '70%' in green. The main content area displays a list of tweets, each with a profile picture, a username, and the tweet text. The tweets mention 'julia roberts' and discuss her movies and public life.

tweetfeel


||


Try some Twitter trends: [Rise & Grind](#) [Happy Birthday Jeremy](#) [Last Week Of School](#) [Say It Back](#) [MTV Movie Awards](#) [Richard Dawson](#) [Tiger Woods](#)


48 21 = 70%

 #NottingHill's on yay! [julia roberts](#) get in me. I don't even know what Hugh Grant is.

 @Vanna2409 lol I loved [julia roberts](#) in this movie!


 RT @carnauval: Charlize Theron digs her Evil Queen persona way better than [julia roberts](#). Theron balances her OTT acts & fragility well. She saves #SWATH.


 @sydd_thekydd lol I know I saw this tweet and decided to steal it. The one with [julia roberts](#) sucked.

 Eat Pray Love with [julia roberts](#) is better than the book #mustsee

 [julia roberts](#) was great in Pretty Space Woman.

 @cheaty I've heard good things about it! The other Snow White movie w/ [julia roberts](#) was great as well.

 I want someone to love me like Hugh grant loves [julia roberts](#) in notting hill

 RT @saratopss: She loves [julia roberts](#)' movies <http://t.co/rrMaXsrT>

 RT @iHeartLABlush: I love pretty woman [julia roberts](#) is amazing!

Event Analysis and Prediction

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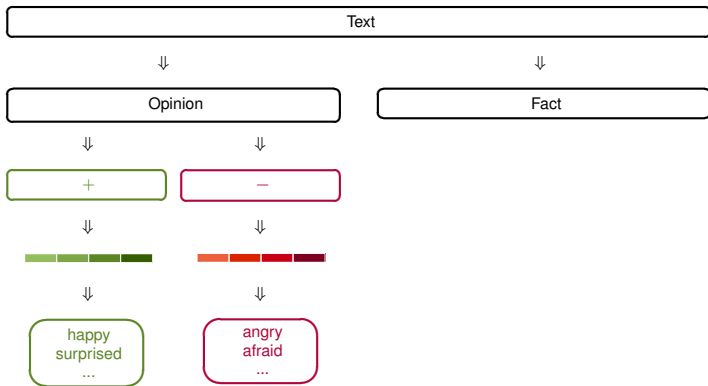
- Analyzing the side effects of events in different communities
- Predicting the election results
- Predicting the Stock exchange
- ...

Outline

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- ① Applications
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- ③ Machine Learning Approach
- ④ Rule-based Approach

Sentiment Analysis Levels



Sentiment Analysis Tasks

- Opinion holder detection
- Opinion target detection
- Aspect detection

Students like Wikipedia because it is easy to use and it sounds authoritative.
op holder *target*

I had a nice stay in this hotel and the rooms were very clean.
aspect

The restaurant has an amazing view but the staffs are unfriendly.
aspect *aspect*

Mixed opinions

Other Names

- Opinion mining
- Opinion extraction
- Sentiment mining
- Subjectivity detection
- Subjectivity analysis

Sentiment Analysis Approaches

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- Machine learning methods
⇒ classification
- Rule-based methods
⇒ dictionary oriented

Outline

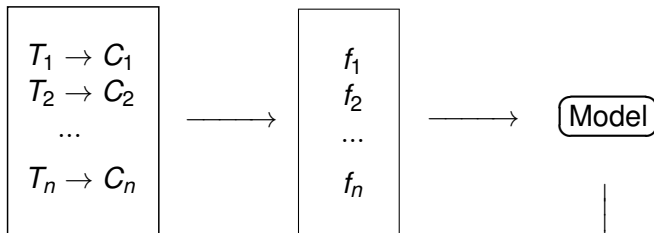
14

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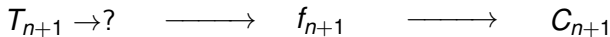
Machine Learning Approach

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Training



Testing



Sentiment Classification

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- Using any kinds of supervised classifiers
 - *K* Nearest Neighbor
 - Support Vector Machines
 - Naïve Bayes
 - Maximum Entropy
 - Logistic Regression
 - ...

Features

■ Word

- All words or adjectives?
All words works better than adjectives only
- Word occurrence or frequency?
Word occurrence is more useful than frequency
 - Using binary value for words
 - Replace all word counts higher than 0 in each text by 1

Features

■ Negation

- Negation words change the text polarity
 - Adding prefix *NOT_* to every word between negation and next punctuation

*“I did **not** like the restaurant location, but the food ...”*

I did not **NOT-like** **NOT-the** **NOT-restaurant** **NOT-location** but the food ...

Features

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- Other emotions
 - Considering emoticons as additional features
 - :)
 - :(

Fine-grained Analysis

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- Dealing with finer classes of sentiment
-3,-2,-1,+1,+2,+3

- Approaches
 - Using multiclass classifier (6 classes in this case)
 - Using two level classifier
 - First level: polarity classifier (positive or negative)
 - Second level: strength classifier (1 or 2 or 3)

Outline

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Rule-based Approach

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Training

~~$T_1 \rightarrow C_1$~~

~~$T_2 \rightarrow C_2$~~

~~...~~

~~$T_n \rightarrow C_n$~~



good
love
brave
intelligent
nice
...

bad
hate
lie
ugly
poor
...

Testing

$T_{n+1} \rightarrow ?$



C_{n+1}

Rule-based Approach

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- Looking for opinionated words in each text
- Classifying the text based on the number of positive and negative words
- Considering different rules for classification
 - Fine-grained dictionary
 - Negation words
 - Booster words
 - Idioms
 - Emoticons
 - Mixed opinions
 - Linguistic features of the language

Rule-based Approach

24

- Fine-grained Dictionary

*"It was a **good** song."*



*"The song was **excellent**."*



Rule-based Approach

25

■ Negation Words

"The song was good."



*"The song was **not** good."*



Rule-based Approach

26

■ Booster Words

"The song was interesting."



*"The song was **very** interesting."*



*"The song was **somewhat** interesting."*



Rule-based Approach

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- Idioms

“shock horror”



Rule-based Approach

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- Mixed Opinions

*"The song was **good**, but I think its title was **strange**."*



Rule-based Approach

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- Linguistic Features
 - The position of negation or boosting words differ from one language to another

*"I do **not** love the song."*

Opinion Dictionary

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■ English

- Subjectivity Clues (2005)
- SentiSpin (2005)
- SentiWordNet (2006)
- Polarity Enhancement (2009)
- SentiStrength (2010)

Machine Learning with Opinion Dictionary

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- Using opinion words as a feature in the algorithms
- Ignoring other words in the text

Adjectives alone do not work well,
but opinion words are the best features to be used

Further Reading

32

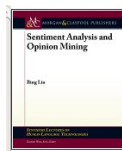
Opinion Mining and Sentiment Analysis



Bo Pang, Lillian Lee

Now Publishers Inc, 2008 - [Computers](#) - 137 pages

Sentiment Analysis and Opinion Mining



Bing Liu

Morgan & Claypool Publishers, Ordibehesht 12, 1391 AP - [Computers](#) - 167 pages