



Tamkang
University

商業智慧實務

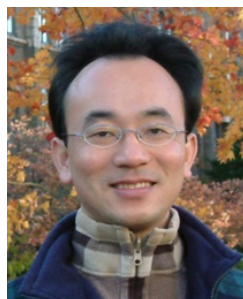
Practices of Business Intelligence

意見探勘與情感分析 (Opinion Mining and Sentiment Analysis)

1022BI08

MI4

Wed, 9,10 (16:10-18:00) (B113)



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2014-05-07



課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	103/02/19	商業智慧導論 (Introduction to Business Intelligence)
2	103/02/26	管理決策支援系統與商業智慧 (Management Decision Support System and Business Intelligence)
3	103/03/05	企業績效管理 (Business Performance Management)
4	103/03/12	資料倉儲 (Data Warehousing)
5	103/03/19	商業智慧的資料探勘 (Data Mining for Business Intelligence)
6	103/03/26	商業智慧的資料探勘 (Data Mining for Business Intelligence)
7	103/04/02	教學行政觀摩日 (Off-campus study)
8	103/04/09	資料科學與巨量資料分析 (Data Science and Big Data Analytics)

課程大綱 (Syllabus)

週次	日期	內容 (Subject/Topics)
9	103/04/16	期中報告 (Midterm Project Presentation)
10	103/04/23	期中考試週 (Midterm Exam)
11	103/04/30	文字探勘與網路探勘 (Text and Web Mining)
12	103/05/07	意見探勘與情感分析 (Opinion Mining and Sentiment Analysis)
13	103/05/14	社會網路分析 (Social Network Analysis)
14	103/05/21	期末報告 (Final Project Presentation)
15	103/05/28	畢業考試週 (Final Exam)

Outline

- Social Word-of-Mouth
- Opinion Mining and Sentiment Analysis
- Social Media Monitoring/Analysis
- Resources of Opinion Mining
- Opinion Spam Detection

Word-of-mouth on the Social media

- Personal experiences and opinions about anything in reviews, forums, blogs, micro-blog, **Twitter**.
- Posting at social networking sites, e.g., **Facebook**
- Comments about articles, issues, topics, reviews.

Social media + beyond

- Global scale
 - No longer – one's circle of friends.
- Organization internal data
 - Customer feedback from emails, call center
- News and reports
 - Opinions in news articles and commentaries

Social Media and the Voice of the Customer

- Listen to the **Voice of the Customer (VoC)**
 - Social media can give companies a torrent of highly valuable customer feedback.
 - Such input is largely free
 - Customer feedback issued through social media is qualitative data, just like the data that market researchers derive from focus group and in-depth interviews
 - Such qualitative data is in digital form – in text or digital video on a web site.

Listen and Learn

Text Mining for VoC

- Categorization
 - Understanding what topics people are talking or writing about in the unstructured portion of their feedback.
- Sentiment Analysis
 - Determining whether people have **positive**, **negative**, or **neutral** views on those topics.

Opinion Mining and Sentiment Analysis

- Mining opinions which indicate **positive** or **negative** sentiments
- Analyzes people's opinions, appraisals, attitudes, and emotions toward entities, individuals, issues, events, topics, and their attributes.

Opinion Mining and Sentiment Analysis

- Computational study of opinions, sentiments, subjectivity, evaluations, attitudes, appraisal, affects, views, emotions, etc., expressed in text.
 - Reviews, blogs, discussions, news, comments, feedback, or any other documents

Terminology

- Sentiment Analysis
is more widely used in industry
- Opinion mining / Sentiment Analysis
are widely used in academia
- Opinion mining / Sentiment Analysis
can be used interchangeably

Example of Opinion: review segment on iPhone

“I bought an iPhone a few days ago.

It was such a nice phone.

The touch screen was really cool.

The voice quality was clear too.

However, my mother was mad with me as I did not tell her before I bought it.

She also thought the phone was too expensive, and wanted me to return it to the shop. ... ”

Example of Opinion: review segment on iPhone

“(1) I bought an iPhone a few days ago.

(2) It was such a **nice** phone.

(3) The touch screen was really **cool**.

**+Positive
Opinion**

(4) The voice quality was **clear** too.

(5) However, my mother was mad with me as I did not tell her before I bought it.

(6) She also thought the phone was too expensive, and wanted me to return it to the shop. ...”

**-Negative
Opinion**

Why are opinions important?

- “Opinions” are key influencers of our behaviors.
- Our beliefs and perceptions of reality are conditioned on how others see the world.
- Whenever we need to make a decision, we often seek out the opinion of others.

In the past,

– Individuals

- Seek opinions from friends and family

– Organizations

- Use surveys, focus groups, opinion pools, consultants

Applications of Opinion Mining

- **Businesses and organizations**
 - Benchmark products and services
 - Market intelligence
 - Business spend a huge amount of money to find consumer opinions using consultants, surveys, and focus groups, etc.
- **Individual**
 - Make decision to buy products or to use services
 - Find public opinions about political candidates and issues
- **Ads placements**: Place ads in the social media content
 - Place an ad if one praises a product
 - Place an ad from a competitor if one criticizes a product
- **Opinion retrieval**: provide general search for opinions.

Research Area of Opinion Mining

- Many names and tasks with difference objective and models
 - Sentiment analysis
 - Opinion mining
 - Sentiment mining
 - Subjectivity analysis
 - Affect analysis
 - Emotion detection
 - Opinion spam detection

Existing Tools

(“Social Media Monitoring/Analysis”)

- Radian 6
- Social Mention
- Overtone OpenMic
- Microsoft Dynamics Social Networking Accelerator
- SAS Social Media Analytics
- Lithium Social Media Monitoring
- RightNow Cloud Monitor

Existing Tools

("Social Media Monitoring/Analysis")

- Radian 6
- Social Mention
- Overtone OpenMic
- Microsoft Dynamics Social Networking Accelerator
- SAS Social Media Analytics
- Lithium Social Media Monitoring
- RightNow Cloud Monitor

Word-of-mouth

Voice of the Customer

- 1. Attensity
 - Track social sentiment across brands and competitors
 - <http://www.attensity.com/home/>
- 2. Clarabridge
 - Sentiment and Text Analytics Software
 - <http://www.clarabridge.com/>

Attensity: Track social sentiment across brands and competitors

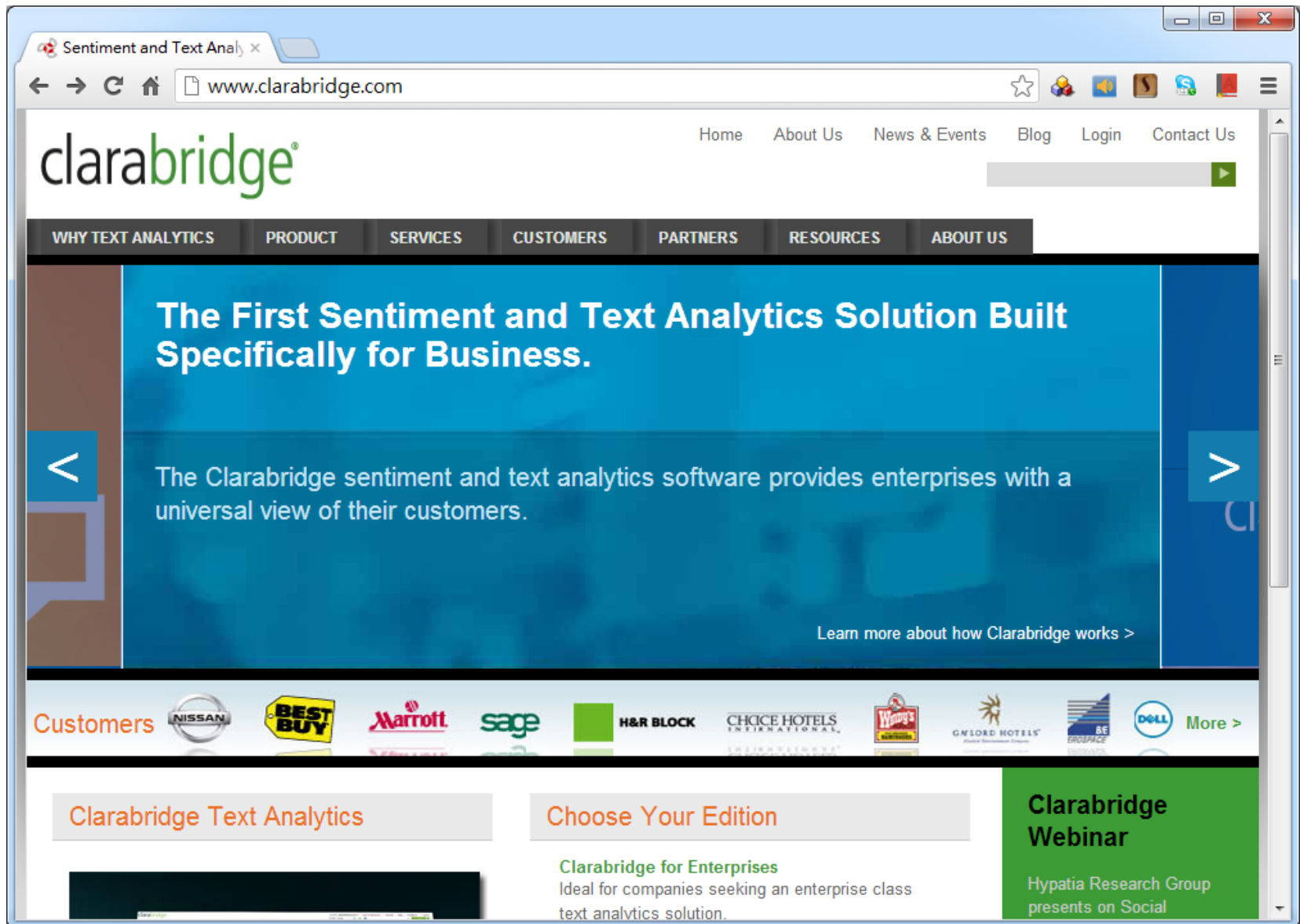
<http://www.attensity.com/>

The screenshot displays the Attensity website homepage. At the top, there's a navigation bar with the Attensity logo, a language selector set to 'English', and links for 'Contact', 'Resources', 'Support', 'Blog', and a search bar. Below this is a secondary navigation bar with 'Products', 'Solutions', 'Services', 'Customers', and 'Partners'. The main content area features a large central banner with the headline 'Your real-time window into the social web.' and a quote from Yahoo! stating, 'Teaming with a leading analytics provider like Attensity offers Yahoo! a great opportunity to deliver the key news and analysis that matter.' To the left of the banner is a sidebar with links to 'Social Analytics', 'Social Response', 'Customer Analytics', 'Industry Solutions', and 'Why Attensity'. To the right of the banner are several dashboard previews showing 'Comparison of Feedback Over Different Time Periods' with bar charts, 'NPS Index' gauges, and a 'Twitter Accounts' feed. Below the main banner, there are sections for 'Attensity for Marketing', 'Attensity for Customer Service', 'Attensity for IT', 'Effectiveness of your social marketing strategies:', 'Success Story' featuring JetBlue Airways, 'About Attensity' (describing it as the leading provider of social analytics and engagement solutions), and 'Watch Video' (Command Center Video). The footer contains the URL 'www.attensity.com/home/#fragment-1' and a 'DOWNLOAD NOW' button.

<http://www.youtube.com/watch?v=4goxmBEg2lw#/>

Clarabridge: Sentiment and Text Analytics Software

<http://www.clarabridge.com/>



<http://www.youtube.com/watch?v=IDHudt8M9P0>

<http://www.radian6.com/>

Social Media Monitoring x

www.radian6.com

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salesforce **radian6**

How We Help What We Sell See Demo Free Resources Training & Support

The Social Enterprise.
Get closer to your customer.
Learn how >

Have Us Contact You

Live Demo

Free Trial

Chat & find out more.

Offline. Leave us a message

Sales The social web is a goldmine of untapped sales opportunities. Let us help you realize your potential. [Learn more >](#)

Marketing Brands are now the sum of the conversations about them. We can help you hear what's being said. [Learn more >](#)

Customer Service Take your customer service where your consumers are gathering. Respond to issues voiced on the social web. [Learn more >](#)

Newsletter Sign up and get the regular Radian6 goods. Enter email address [GO](#)

Mashable named Radian6's Co-founder Chris Ramsey one of five masterminds redefining social media

JUST Get the Skinny

WEBINAR / June 7th at 2pm est


CASE STUDY

radian6 Community

http://www.youtube.com/watch?feature=player_embedded&v=8i6Exg3Urg0

Social Media Monitoring x

← → ↻ ⬆ ⬇ ⌚ www.sas.com/software/customer-intelligence/social-media-analytics/ ☆ 📱 📧 📄 📅 🔍

 **THE POWER TO KNOW.**
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PRODUCTS & SOLUTIONS / SOCIAL MEDIA ANALYTICS

Products and Solutions

- Industries
- Small and Midsize Business
- Nonprofit Organizations
- Analytics
 - Business Analytics
 - Business Intelligence
 - Customer Intelligence
 - Strategy & Planning
 - Information & Analytics
 - Orchestration & Interaction
 - Customer Experience
 - Customer Experience Analytics
 - Social Media Analytics
 - Web Analytics
- Financial Intelligence
- Foundation Tools
- Fraud & Financial Crimes
- Governance, Risk & Compliance
- High-Performance Analytics
- Human Capital Intelligence
- Information Management
- IT & CIO Enablement

SAS® Social Media Analytics

Integrate, archive, analyze and act on online conversations

Overview Benefits Features Demos & Screenshots System Requirements

SAS Social Media Analytics is an enterprise-hosted, on-demand solution that integrates, archives, analyzes and enables organizations to act on intelligence gleaned from online conversations on professional and consumer-generated media sites. It enables you to attribute online conversations to specific parts of your business, allowing accelerated responses to marketplace shifts.

Based on your unique business challenges and enterprise goals, SAS can provide a tailored implementation that's hosted and managed by [SAS Solutions OnDemand](#).


Benefits


- Analyze conversation data.
- Identify advocates of, and threats to, corporate reputation and brand.
- Quantify interaction among traditional media/campaigns and social media activity.
- Establish a platform for social CRM strategy.

“The great thing about SAS is that it's so powerful and has such a broad offering.”


—Jonathan Prantner
Manager of Statistics
Organic

▶ Read full story



Questions?

- Phone
- Contact Form

White Paper

Text Analytics for Social Media: Evolving Tools for an Evolving Environment

Download Now

SAS® Social Media Analytics

- Overview

RESOURCES

- Fact Sheet (PDF)
- Solution Brief (PDF)
- White Papers

23

What do tweeples think ab x

www.tweetfeel.com/index.php#iPhone4s

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tweetfeel

|| iPhone4s Search

Try some Twitter trends: [Tomorrow is June](#) [H&M](#) [Defense of Marriage Act](#) [Diddy's](#) [Bloomberg](#) [UCLA](#) [ESPN](#)

 40  41 = 51%

Those are all the results available right now. Try again or try another term to see how people feel towards it.
Got questions? [Read our FAQ.](#)

 RT @jigglinjello: This 12 year old has an iPhone4s wtf

 So my 9 year old little sister has a iPhone4s . Wtf bruh?!

 This 12 year old has an iPhone4s wtf

 So my sister has a android and i dont even have a phone and she gets a brand new iPhone4s - ___ - #Wtf

 iPhone4s is funny ass a bitch

 -Ohwell .. a new iPhone4s won't hurt , aha.

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Browser window: Tweet Sentiments - Know ' x

Address bar: tweetsentiments.com/analyze?utf8=✓&q=iphone4s&topic=true&commi ☆

Lang: Eng

tweet v0.8.6

Dashboard Analyze Recent Top 1000 Users Maps Charts About Login

Tweet Sentiment Analysis


iphone4s

User ☐ Topic ☒

Analyze Tweets

Feedback

50.00



Sentiments

Index[0-100]: 50.00

Positive: 8

Negative: 1

Neutral: 13

Total Analyzed: 0

Profile


Education:

Flamboyance:

Slang:


Gender:

Age:




Niggie, if i dont jailbreak my Iphone4s, u mean i cant play Street fighter4? wtf @louistekneeq

1 minute ago by Flow_Show




リフォロー100%です！ #Arashi #韓fan #wstcg #板野友美 #followme #アメブロ #kimiboku #ntb #autofollow #apple #mt2 #相互フォローの輪 #iphone4s #Arashi #twitter #前田敦子

1 minute ago by designer_sayaka




Rumor has it that #Apple #iPhone5 will have a 4" screen (compared 2 3.5" in #iPhone4S), gving direct competition 2... <http://t.co/zsIGPxbX>

1 minute ago by abhay01007



RT @BallMe_Dollar: The iPhone4S look better then the iPhone5.

1 minute ago by SuckMy_TwitNuts



#iphoneography #iphonography #bahrain #iphone4s #photography #sunrise #scenery #beautiful #sun <http://t.co/Ee4VNmsL>

2 minutes ago by thementaldawg

i-Buzz網路口碑研究中心.網 x

www.i-buzz.com.tw/index.asp

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永慶房屋得據房仲龍頭 資訊

f 臉書粉絲團排行榜

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政治人物

名人

演藝人員

馬英九總統

蔡英文 Tsai

蘇貞昌

粉絲數 1419591

粉絲數 669928

粉絲數 317035

排行榜

Traffic 交通

 第1名
FORD (FIESTA)

第2名 PORSCHE (911)

第3名 SUBARU (legacy)

更多

Traffic 交通

 第1名

進口車

- 吵了這麼久，就是不要「超速」超車，還不懂 (224)
- 讓一下，很難嗎。。。 (184)
- 請問大家認為這樣要賠多少?? (148)
- 當Audi 一直被鍵盤魔人攻擊時，表示已經威 (134)
- ELANTRA系列 vs ALTIS 系列之比較 (109)

更多

高級進口車

- 吵了這麼久，就是不要「超速」超車，還不懂 (224)

研究專題

便利商店衝人氣 臉書加持少不得

研究專題

LUMIX與Samsung相機
口碑比拼 粉絲只顧「按讚」不「留言」



社交媒介監看

了解社群監測

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OpView 服務總覽

搜尋

OpView 服務總覽

什麼是OpView服務？

OpView是協助您蒐集、處理、分析網路資訊的雲端服務。

OpView服務，猶如提供您無盡網路情報能量的發電廠。以雲端架構為基礎，OpView服務蒐集、處理、分析各類型網路資訊與情報，並以雲端服務平台供客戶使用。OpView服務的資料涵蓋範圍包括台灣最具代表性的新聞網站、

相關文件下載

- OpView Insight DM
- OpView品牌口碑雷達 DM
- OpView品牌口碑雷達訂購單

更多

Sentiment Analysis

- Sentiment
 - A thought, view, or attitude, especially one based mainly on emotion instead of reason
- Sentiment Analysis
 - opinion mining
 - use of natural language processing (NLP) and computational techniques to automate the extraction or classification of sentiment from typically unstructured text

Applications of Sentiment Analysis

- Consumer information
 - Product reviews
- Marketing
 - Consumer attitudes
 - Trends
- Politics
 - Politicians want to know voters' views
 - Voters want to know politicians' stances and who else supports them
- Social
 - Find like-minded individuals or communities

Sentiment detection

- How to interpret features for sentiment detection?
 - Bag of words (IR)
 - Annotated lexicons (WordNet, SentiWordNet)
 - Syntactic patterns
- Which features to use?
 - Words (unigrams)
 - Phrases/n-grams
 - Sentences

Problem statement of Opinion Mining

- Two aspects of abstraction
 - Opinion definition
 - What is an opinion?
 - What is the structured definition of opinion?
 - Opinion summarization
 - Opinion are subjective
 - An opinion from a single person (unless a VIP) is often not sufficient for action
 - We need opinions from many people, and thus opinion summarization.

Abstraction (1) :

what is an opinion?

- Id: **Abc123** on **5-1-2008** “*I bought an iPhone a few days ago. It is such a nice phone. The touch screen is really cool. The voice quality is clear too. It is much better than my old Blackberry, which was a terrible phone and so difficult to type with its tiny keys. However, my mother was mad with me as I did not tell her before I bought the phone. She also thought the phone was too expensive, ...*”
- One can look at this review/blog at the
 - Document level
 - Is this review + or -?
 - Sentence level
 - Is each sentence + or -?
 - Entity and feature/aspect level

Entity and aspect/feature level

- Id: **Abc123** on **5-1-2008** “*I bought an iPhone a few days ago. It is such a nice phone. The touch screen is really cool. The voice quality is clear too. It is much better than my old Blackberry, which was a terrible phone and so difficult to type with its tiny keys. However, my mother was mad with me as I did not tell her before I bought the phone. She also thought the phone was too expensive, ...*”
- **What do we see?**
 - **Opinion targets**: entities and their features/aspects
 - **Sentiments**: positive and negative
 - **Opinion holders**: persons who hold the opinions
 - **Time**: when opinion are expressed

Two main types of opinions

- **Regular opinions**: Sentiment/Opinion expressions on some target entities
 - **Direct opinions**: sentiment expressions on one object:
 - “The touch screen is really cool.”
 - “The picture quality of this camera is great”
 - **Indirect opinions**: comparisons, relations expressing similarities or differences (objective or subjective) of more than one object
 - “phone X is cheaper than phone Y.” (objective)
 - “phone X is better than phone Y.” (subjective)
- **Comparative opinions**: comparisons of more than one entity.
 - “iPhone is better than Blackberry.”

Subjective and Objective

- Objective

- An objective sentence expresses some **factual information** about the world.
- “I **returned** the phone yesterday.”
- Objective sentences can implicitly indicate opinions
 - “The **earphone** **broke** in two days.”

- Subjective

- A subjective sentence expresses some **personal feelings** or **beliefs**.
- “The voice on my phone was **not** so **clear**”
- Not every subjective sentence contains an opinion
 - “I wanted a phone with **good** **voice** **quality**”

- ➔ Subjective analysis

Sentiment Analysis vs. Subjectivity Analysis

Sentiment Analysis	Subjectivity Analysis
Positive	Subjective
Negative	
Neutral	Objective

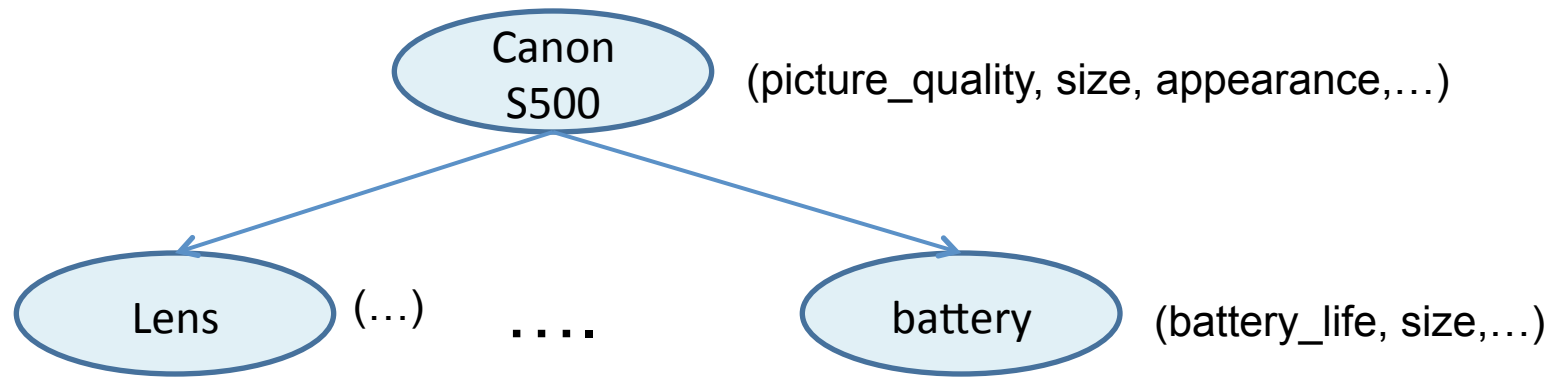
A (regular) opinion

- **Opinion** (a restricted definition)
 - An opinion (regular opinion) is simply a **positive or negative** sentiment, view, attitude, emotion, or appraisal about **an entity** or **an aspect of the entity** from an **opinion holder**.
- **Sentiment orientation of an opinion**
 - **Positive, negative, or neutral** (no opinion)
 - Also called:
 - **Opinion orientation**
 - **Semantic orientation**
 - **Sentiment polarity**

Entity and aspect

- Definition of **Entity**:
 - An *entity* e is a product, person, event, organization, or topic.
 - e is represented as
 - A hierarchy of components, sub-components.
 - Each node represents a components and is associated with a set of attributes of the components
- An opinion can be expressed on any node or attribute of the node
- **Aspects(features)**
 - represent both components and attribute

Entity and aspect



Opinion definition

- An opinion is a quintuple

$(e_j, a_{jk}, so_{ijkl}, h_i, t_l)$

where

- e_j is a target entity.
- a_{jk} is an aspect/feature of the entity e_j .
- so_{ijkl} is the sentiment value of the opinion from the opinion holder on feature of entity at time.
 so_{ijkl} is +ve, -ve, or neu, or more granular ratings
- h_i is an opinion holder.
- t_l is the time when the opinion is expressed.

Opinion definition

- An opinion is a quintuple

$(e_j, a_{jk}, so_{ijkl}, h_i, t_l)$

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 so_{ijkl} is +ve, -ve, or neu, or more granular ratings
 - h_i is an opinion holder.
 - t_l is the time when the opinion is expressed.
- (e_j, a_{jk}) is also called opinion target

Terminologies

- **Entity**: object
- **Aspect**: feature, attribute, facet
- **Opinion holder**: opinion source
- **Topic**: entity, aspect
- Product features, political issues

Subjectivity and Emotion

- **Sentence subjectivity**
 - An objective sentence presents some factual information, while a subjective sentence expresses some personal feelings, views, emotions, or beliefs.
- **Emotion**
 - Emotions are people's subjective feelings and thoughts.

Emotion

- Six main emotions
 - Love
 - Joy
 - Surprise
 - Anger
 - Sadness
 - Fear

Abstraction (2): opinion summary

- With a lot of opinions, a summary is necessary.
 - A multi-document summarization task
- For factual texts, summarization is to select the most important facts and present them in a sensible order while avoiding repetition
 - 1 fact = any number of the same fact
- But for opinion documents, it is different because opinions have a quantitative side & have targets
 - 1 opinion \leftrightarrow a number of opinions
 - Aspect-based summary is more suitable
 - Quintuples form the basis for opinion summarization

An aspect-based opinion summary

Cellular phone 1:

Aspect: **GENERAL**

Positive: 125 <individual review sentences>

Negative: 7 <individual review sentences>

Aspect: **Voice quality**

Positive: 120 <individual review sentences>

Negative: 8 <individual review sentences>

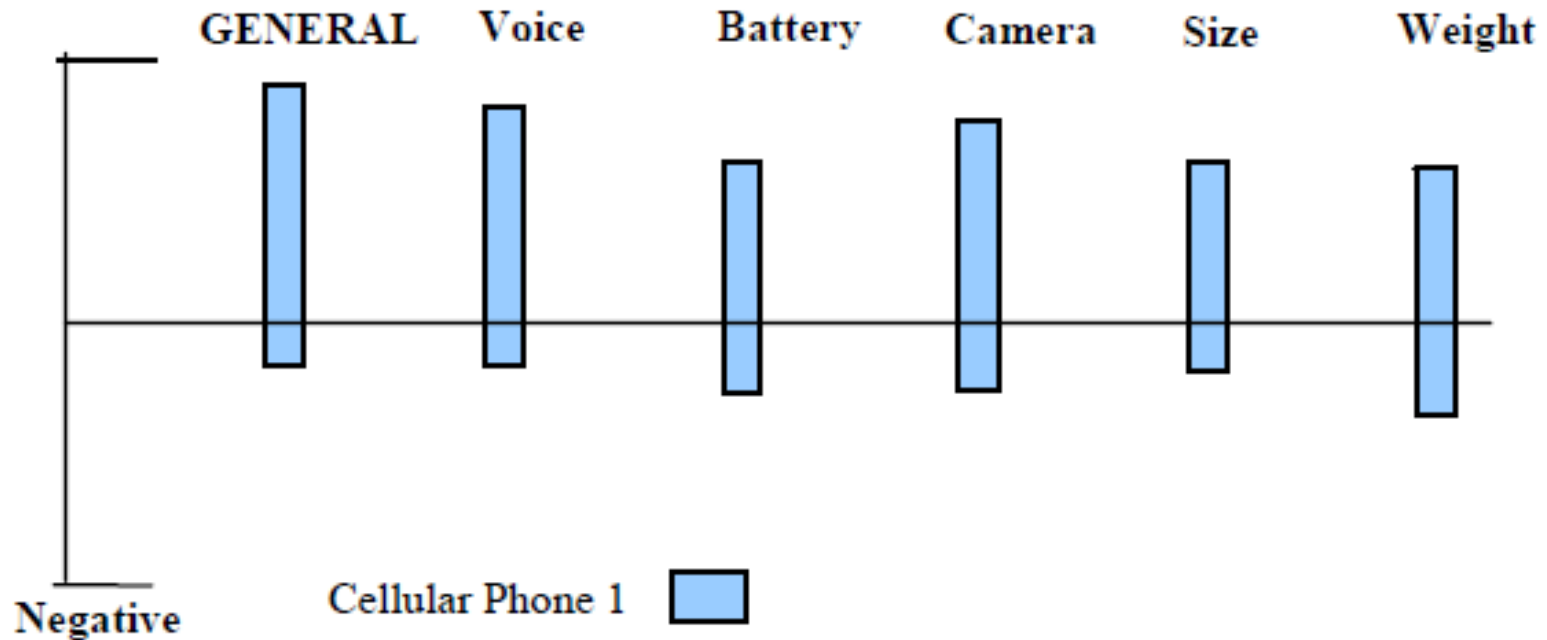
Aspect: **Battery**

Positive: 80 <individual review sentences>

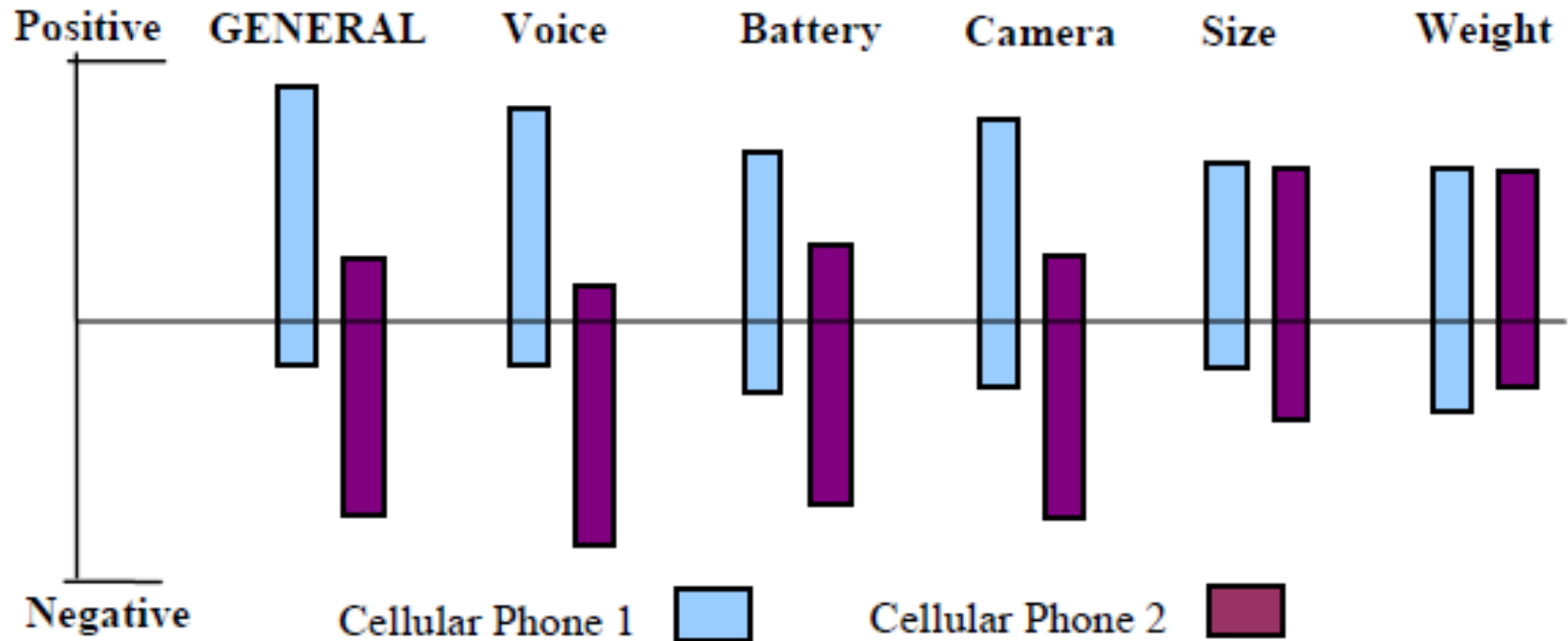
Negative: 12 <individual review sentences>

...

Visualization of aspect-based summaries of opinions



Visualization of aspect-based summaries of opinions



Classification Based on Supervised Learning

- Sentiment classification
 - Supervised learning Problem
 - Three classes
 - *Positive*
 - *Negative*
 - *Neutral*

Opinion words in Sentiment classification

- topic-based classification
 - topic-related words are important
 - e.g., *politics, sciences, sports*
- Sentiment classification
 - topic-related words are unimportant
 - **opinion words** (also called **sentiment words**)
 - that indicate **positive** or **negative** opinions are important,
e.g., *great, excellent, amazing, horrible, bad, worst*

Features in Opinion Mining

- *Terms and their frequency*
 - TF-IDF
- *Part of speech (POS)*
 - Adjectives
- *Opinion words and phrases*
 - beautiful, wonderful, good, and amazing are *positive opinion words*
 - bad, poor, and terrible are *negative opinion words*.
 - opinion phrases and idioms,
e.g., *cost someone an arm and a leg*
- *Rules of opinions*
- *Negations*
- *Syntactic dependency*

Rules of opinions

Syntactic template

<subj> passive-verb

<subj> active-verb

active-verb <dobj>

noun aux <dobj>

passive-verb prep <np>

Example pattern

<subj> was satisfied

<subj> complained

endorsed <dobj>

fact is <dobj>

was worried about <np>

A Brief Summary of **Sentiment Analysis** Methods

Study	Analysis Task	Sentiment Identification		Sentiment Aggregation		Nature of Measure
		Method	Level	Method	Level	
Hu and Li, 2011	Polarity	ML (Probabilistic model)	Snippet			Valence
Li and Wu, 2010	Polarity	Lexicon/Rule	Phrase	Sum	Snippet	Valence
Thelwall et al., 2010	Polarity	Lexicon/Rule	Sentence	Max & Min	Snippet	Range
Boiy and Moens, 2009	Both	ML (Cascade ensemble)	Sentence			Valence
Chung 2009	Polarity	Lexicon	Phrase	Average	Sentence	Valence
Wilson, Wiebe, and Hoffmann, 2009	Both	ML (SVM, AdaBoost, Rule, etc.)	Phrase			Valence
Zhang et al., 2009	Polarity	Lexicon/Rule	Sentence	Weighted average	Snippet	Valence
Abbasi, Chen, and Salem, 2008	Polarity	ML (GA + feature selection)	Snippet			Valence
Subrahmanian and Reforgiato, 2008	Polarity	Lexicon/Rule	Phrase	Rule	Snippet	Valence
Tan and Zhang 2008	Polarity	ML (SVM, Winnow, NB, etc.)	Snippet			Valence
Airolidi, Bai, and Padman, 2007	Polarity	ML (Markov Blanket)	Snippet			Valence
Das and Chen, 2007	Polarity	ML (Bayesian, Discriminate, etc.)	Snippet	Average	Daily	Valence
Liu et al., 2007	Polarity	ML (PLSA)	Snippet			Valence
Kennedy and Inkpen, 2006	Polarity	Lexicon/Rule, ML (SVM)	Phrase	Count	Snippet	Valence
Mishne 2006	Polarity	Lexicon	Phrase	Average	Snippet	Valence
Liu et al., 2005	Polarity	Lexicon/Rule	Phrase	Distribution	Object	Range
Mishne 2005	Polarity	ML (SVM)	Snippet			Valence
Popescu and Etzioni 2005	Polarity	Lexicon/Rule	Phrase			Valence
Efron 2004	Polarity	ML (SVN, NB)	Snippet			Valence
Wilson, Wiebe, and Hwa, 2004	Both	ML (SVM, AdaBoost, Rule, etc.)	Sentence			Valence
Nigam and Hurst 2004	Polarity	Lexicon/Rule	Chunk	Rule	Sentence	Valence
Dave, Lawrence, and Pennock, 2003	Polarity	ML (SVM, Rainbow, etc.)	Snippet			Valence
Nasukawa and Yi 2003	Polarity	Lexicon/Rule	Phrase	Rule	Sentence	Valence
Yi et al., 2003	Polarity	Lexicon/Rule	Phrase	Rule	Sentence	Valence
Yu and Hatzivassiloglou 2003	Both	ML (NB) + Lexicon/Rule	Phrase	Average	Sentence	Valence
Pang, Lee, and Vaithyanathan 2002	Polarity	ML (SVM, MaxEnt, NB)	Snippet			Valence
Subasic and Huettner 2001	Polarity	Lexicon/Fuzzy logic	Phrase	Average	Snippet	Valence
Turney 2001	Polarity	Lexicon/Rule	Phrase	Average	Snippet	Valence

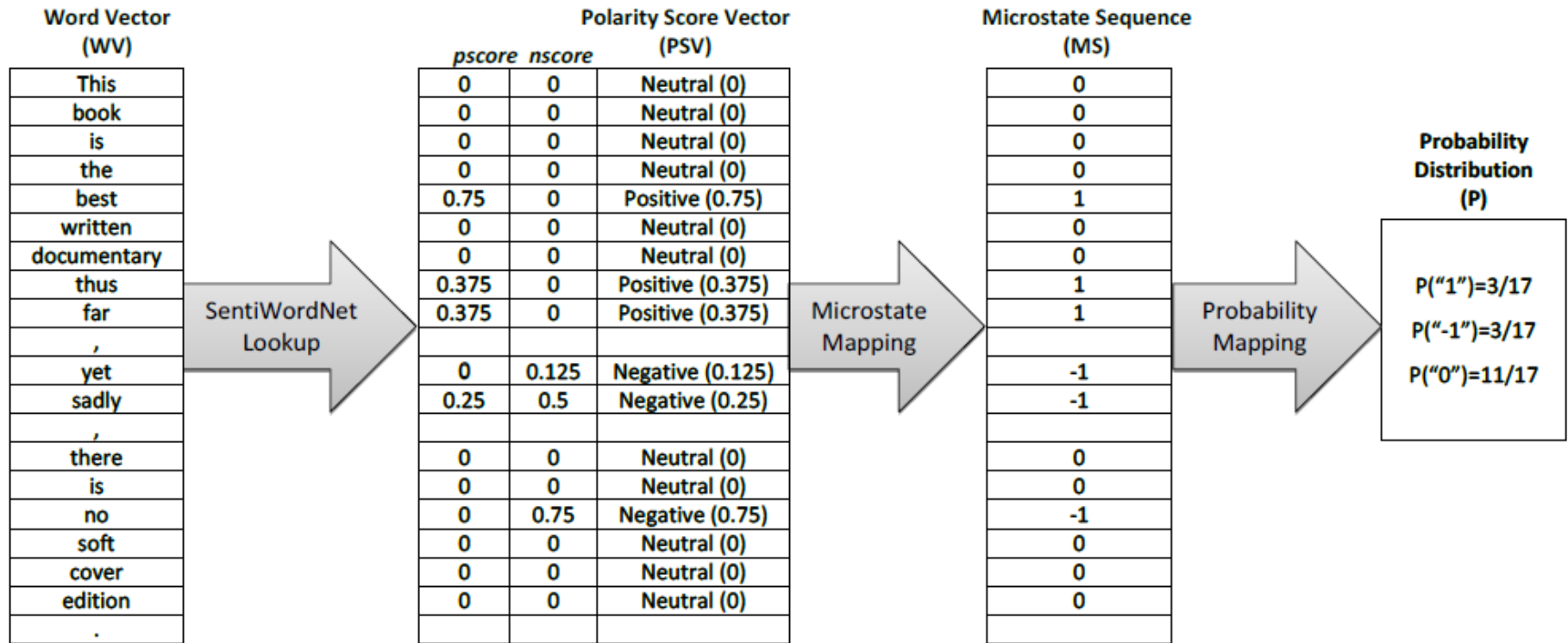
(Both = Subjectivity and Polarity; ML= Machine Learning; Lexicon/Rule= Lexicon enhanced by linguistic rules)

Word-of-Mouth (WOM)

- “This book is the best written documentary thus far, yet sadly, there is no soft cover edition.”
- “This book is the **best** written documentary **thus far**, **yet** **sadly**, there is **no** soft cover edition.”

	Word	POS
This	This	DT
book	book	NN
is	is	VBZ
the	the	DT
best	best	JJS
written	written	VBN
documentary	documentary	NN
thus	thus	RB
far	far	RB
,	,	,
yet	yet	RB
sadly	sadly	RB
,	,	,
there	there	EX
is	is	VBZ
no	no	DT
soft	soft	JJ
cover	cover	NN
edition	edition	NN
.	.	.

Conversion of text representation



Datasets of Opinion Mining

- Blog06
 - 25GB TREC test collection
 - [http://ir.dcs.gla.ac.uk/test collections/access to data.html](http://ir.dcs.gla.ac.uk/test%20collections/access%20to%20data.html)
- Cornell movie-review datasets
 - <http://www.cs.cornell.edu/people/pabo/movie-review-data/>
- Customer review datasets
 - <http://www.cs.uic.edu/~liub/FBS/CustomerReviewData.zip>
- Multiple-aspect restaurant reviews
 - <http://people.csail.mit.edu/bsnyder/naacl07>
- NTCIR multilingual corpus
 - NTCIR Multilingual Opinion-Analysis Task (MOAT)

Lexical Resources of Opinion Mining

- SentiWordnet
 - <http://sentiwordnet.isti.cnr.it/>
- General Inquirer
 - <http://www.wjh.harvard.edu/~inquirer/>
- OpinionFinder's Subjectivity Lexicon
 - <http://www.cs.pitt.edu/mpqa/>
- NTU Sentiment Dictionary (NTUSD)
 - <http://nlg18.csie.ntu.edu.tw:8080/opinion/>
- Hownet Sentiment
 - http://www.keenage.com/html/c_bulletin_2007.htm

Example of SentiWordNet

POS	ID	PosScore		NegScore		SynsetTerms	Gloss
a	00217728	0.75	0		beautiful#1	delighting the senses or exciting intellectual or emotional admiration; "a beautiful child"; "beautiful country"; "a beautiful painting"; "a beautiful theory"; "a beautiful party"	
a	00227507	0.75	0		best#1	(superlative of `good') having the most positive qualities; "the best film of the year"; "the best solution"; "the best time for planting"; "wore his best suit"	
r	00042614	0	0.625	unhappily#2	sadly#1	in an unfortunate way; "sadly he died before he could see his grandchild"	
r	00093270	0	0.875	woefully#1	sadly#3	lamentably#1 deplorably#1	in an unfortunate or deplorable manner; "he was sadly neglected"; "it was woefully inadequate"
r	00404501	0	0.25	sadly#2		with sadness; in a sad manner; "She died last night,' he said sadly"	

《知網》情感分析用詞語集 (beta版)

- “中英文情感分析用詞語集”
 - 包含詞語約 17887
- “中文情感分析用詞語集”
 - 包含詞語約 9193
- “英文情感分析用詞語集”
 - 包含詞語 8945

中文情感分析用詞語集

中文正面情感詞語	836
中文負面情感詞語	1254
中文正面評價詞語	3730
中文負面評價詞語	3116
中文程度級別詞語	219
中文主張詞語	38
Total	9193

中文情感分析用詞語集

- “正面情感” 詞語

- 如：

- 愛，讚賞，快樂，感同身受，好奇，
喝彩，魂牽夢縈，嘉許 ...

- “負面情感” 詞語

- 如：

- 哀傷，半信半疑，鄙視，不滿意，不是滋味兒，後悔，大失所望 ...

中文情感分析用詞語集

- “正面評價” 詞語

- 如：

- 不可或缺，部優，才高八斗，沉魚落雁，
催人奮進，動聽，對勁兒 ...

- “負面評價” 詞語

- 如：

- 醜，苦，超標，華而不實，荒涼，混濁，
畸輕畸重，價高，空洞無物 ...

中文情感分析用詞語集

- “程度級別” 詞語
 - 1. “極其|extreme / 最|most”
 - 非常，極，極度，無以倫比，最為
 - 2. “很|very”
 - 多麼，分外，格外，著實
 - ...
- “主張” 詞語
 - 1. {perception|感知}
 - 感覺，覺得，預感
 - 2. {regard|認為}
 - 認為，以為，主張

Opinion Spam Detection

- Opinion Spam Detection: Detecting Fake Reviews and Reviewers
 - Spam Review
 - Fake Review
 - Bogus Review
 - Deceptive review
 - Opinion Spammer
 - Review Spammer
 - Fake Reviewer
 - Shill (Stooge or Plant)

Opinion Spamming

- Opinion Spamming
 - "illegal" activities
 - e.g., writing fake reviews, also called shilling
 - try to mislead readers or automated opinion mining and sentiment analysis systems by giving undeserving positive opinions to some target entities in order to promote the entities and/or by giving false negative opinions to some other entities in order to damage their reputations.

Forms of Opinion spam

- fake reviews (also called bogus reviews)
- fake comments
- fake blogs
- fake social network postings
- deceptions
- deceptive messages

Fake Review Detection

- Methods
 - supervised learning
 - pattern discovery
 - graph-based methods
 - relational modeling
- Signals
 - Review content
 - Reviewer abnormal behaviors
 - Product related features
 - Relationships

Professional Fake Review Writing Services (some Reputation Management companies)

- Post positive reviews
- Sponsored reviews
- Pay per post
- Need someone to write positive reviews about our company (budget: \$250-\$750 USD)
- Fake review writer
- Product review writer for hire
- Hire a content writer
- Fake Amazon book reviews (hiring book reviewers)
- People are just having fun (not serious)

SponsoredReviews.com

[www.sponsoredreviews.com](#)


SponsoredReviews.com
 Bloggers Earn Cash, Advertisers Build Buzz!

[Members Login](#)
Sales Toll-Free (877) 360-3683

[Home](#)
[Sign-Up](#)
[FAQs](#)
[Our Blog](#)
[Contact Us](#)

SponsoredReviews connects bloggers with SEO's, Marketers, and Advertisers looking to build Links, Traffic and Buzz.

Direct Traffic.

Millions of people read blogs every day. Paying for posts puts the spotlight on your company and will generate tons of targeted traffic.

Buzz & Branding.

The more bloggers talk about your site the better. Many blogs syndicate stories they see on other sites. A couple well timed sponsored posts has the potential to generate a flurry of other post being written.

Search Engine Rankings.


Every post has links back to your site. Getting links from quality blogs will increase your link popularity and will help your site rank better in the search engines.

Valuable Feedback.

Getting Reviewed by bloggers will provide you with valuable feedback that you can use to better understand your audience and customers.

Advertisers

Start Here.



- Announce your products, services, websites, and ideas to the world!
- Tap into the power of the blogosphere to build traffic, links and valuable feedback.

[Free Sign Up](#)
[Read More](#)

Bloggers

Earn Cash.



- Earn cash by writing honest posts about our advertiser's products and services.
- Write posts in your own tone and style, and gear them to your audience's interest.

[Free Sign Up](#)
[Read More](#)

How it works:

 Advertiser
  Blogger





Post Project

Find Freelancers

Browse Projects

Post Contest

Search for Freelancers, Projects...



Need someone to write and post positive reviews

[f Like](#) 0 [f Send](#) [t Tweet](#) 0 [g +1](#) 0 [+ Share](#)

Bids

10

Avg Bid (USD)

N/A

Project Budget (USD)

\$250 - \$750

Featured
Sealed

CLOSED

Project Description:

We need someone to write and post positive reviews about our company on websites. Please send an example of a review you would post for any company. We can also send examples of comments our customers have sent us to use and refer too as well

This is a long term project, so if it works out there will be a healthy amount of work. Please reply back with all your experience and how much you would charge per post.

thank you.

Skills required:

Publicación en foros, Opiniones



Follow

Project posted by:

dvel

★★★★★ 5.0 (1 Review)

✓ VERIFIED

Your ad could

From \$100/week

Papers on Opinion Spam Detection

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2. Guan Wang, Sihong Xie, Bing Liu, Philip S. Yu. Identify Online Store Review Spammers via Social Review Graph. ACM Transactions on Intelligent Systems and Technology, accepted for publication, 2011.
3. Guan Wang, Sihong Xie, Bing Liu, Philip S. Yu. Review Graph based Online Store Review Spammer Detection. ICDM-2011, 2011.
4. Arjun Mukherjee, Bing Liu, Junhui Wang, Natalie Glance, Nitin Jindal. Detecting Group Review Spam. WWW-2011 poster paper, 2011.
5. Nitin Jindal, Bing Liu and Ee-Peng Lim. "Finding Unusual Review Patterns Using Unexpected Rules" Proceedings of the 19th ACM International Conference on Information and Knowledge Management (CIKM-2010, short paper), Toronto, Canada, Oct 26 - 30, 2010.
6. Ee-Peng Lim, Viet-An Nguyen, Nitin Jindal, Bing Liu and Hady Lauw. "Detecting Product Review Spammers using Rating Behaviors." Proceedings of the 19th ACM International Conference on Information and Knowledge Management (CIKM-2010, full paper), Toronto, Canada, Oct 26 - 30, 2010.
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Source: <http://www.cs.uic.edu/~liub/FBS/fake-reviews.html>

Summary

- Social Word-of-Mouth
- Opinion Mining and Sentiment Analysis
- Social Media Monitoring/Analysis
- Resources of Opinion Mining
- Opinion Spam Detection

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