

社群網路行銷管理

Social Media Marketing Management



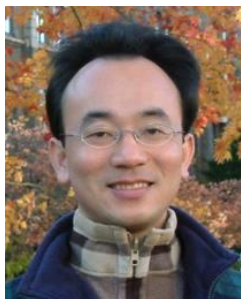
Tamkang
University
淡江大學

社群口碑與社群網路探勘 (Social Word-of-Mouth and Web Mining on Social Media)

1042SMMM09

MIS EMBA (M2200) (8615)

Thu, 12,13,14 (19:20-22:10) (D309)



Min-Yuh Day

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淡江大學 資訊管理學系

<http://mail.tku.edu.tw/myday/>

2016-05-05



課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2016/02/18	社群網路行銷管理課程介紹 (Course Orientation for Social Media Marketing Management)
2	2016/02/25	社群網路商業模式 (Business Models of Social Media)
3	2016/03/03	顧客價值與品牌 (Customer Value and Branding)
4	2016/03/10	社群網路消費者心理與行為 (Consumer Psychology and Behavior on Social Media)
5	2016/03/17	社群網路行銷蜻蜓效應 (The Dragonfly Effect of Social Media Marketing)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
6	2016/03/24	社群網路行銷管理個案研究 I (Case Study on Social Media Marketing Management I)
7	2016/03/31	行銷傳播研究 (Marketing Communications Research)
8	2016/04/07	教學行政觀摩日 (Off-campus study)
9	2016/04/14	社群網路行銷計劃 (Social Media Marketing Plan)
10	2016/04/21	期中報告 (Midterm Presentation)
11	2016/04/28	行動 APP 行銷 (Mobile Apps Marketing)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
12	2016/05/05	社群口碑與社群網路探勘 (Social Word-of-Mouth and Web Mining on Social Media)
13	2016/05/12	社群網路行銷管理個案研究 II (Case Study on Social Media Marketing Management II)
14	2016/05/19	深度學習社群網路情感分析 (Deep Learning for Sentiment Analysis on Social Media)
15	2016/05/26	Google TensorFlow 深度學習 (Deep Learning with Google TensorFlow)
16	2016/06/02	期末報告 I (Term Project Presentation I)
17	2016/06/09	端午節(放假一天)
18	2016/06/16	期末報告 II (Term Project Presentation II)

Data Scientist

資料科學家

What makes a data scientist?

The big data phenomenon trained a bright spotlight on those who perform deep information analysis and can combine quantitative and statistical modeling expertise with business acumen and a talent for finding hidden patterns. Here's a closer look.



Social Media



Social Media



Facebook



Twitter



Twitter



LinkedIn



Google+



My Space



Tumblr



Bebo



Foursquare



Delicious



Digg



Stumbleupon



Reddit



Technorati



Slashdot



Share this



YouTube



Flickr



Instagram



Pinterest



Deviant Art



Soundcloud



Vimeo



Twylah



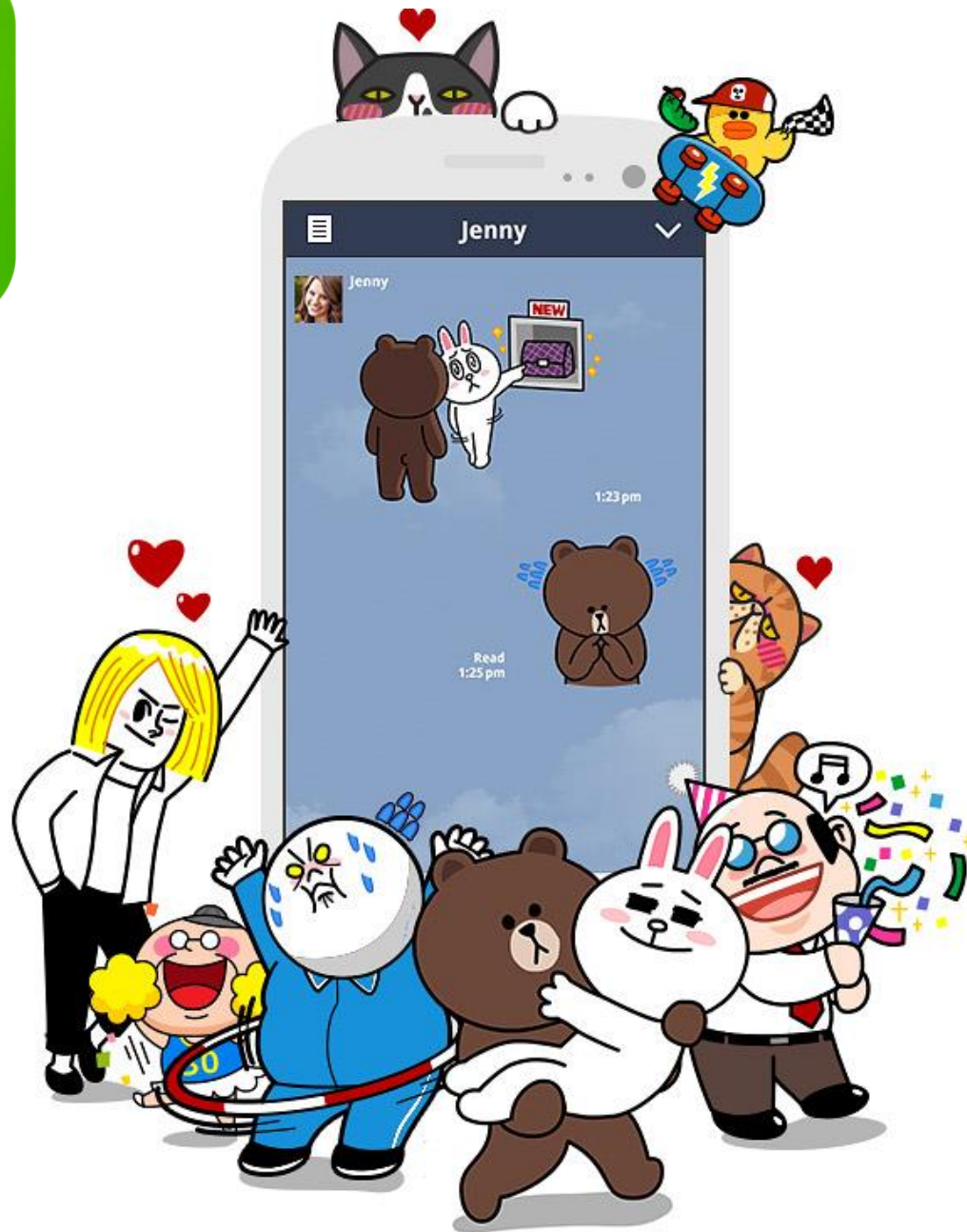
RSS



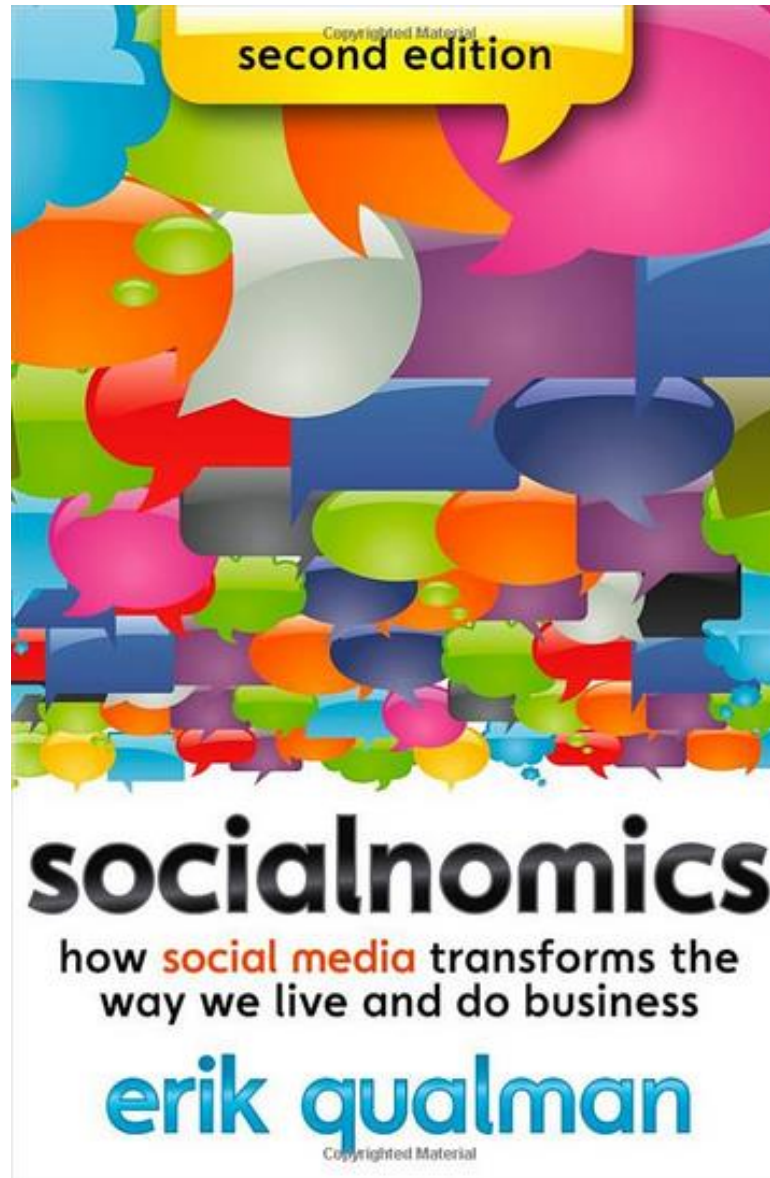
Skype



Line



Socialnomics



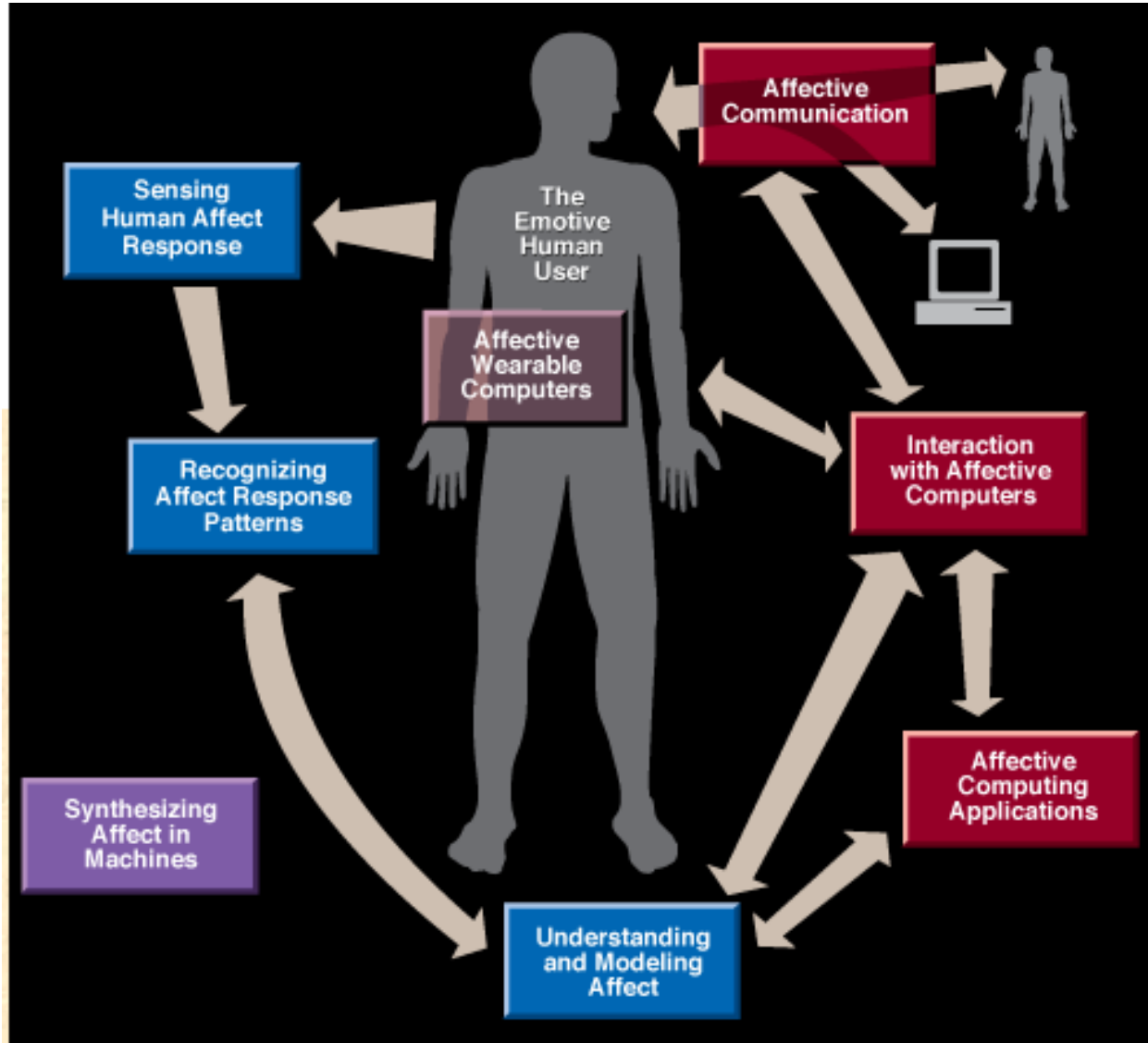
Affective Computing

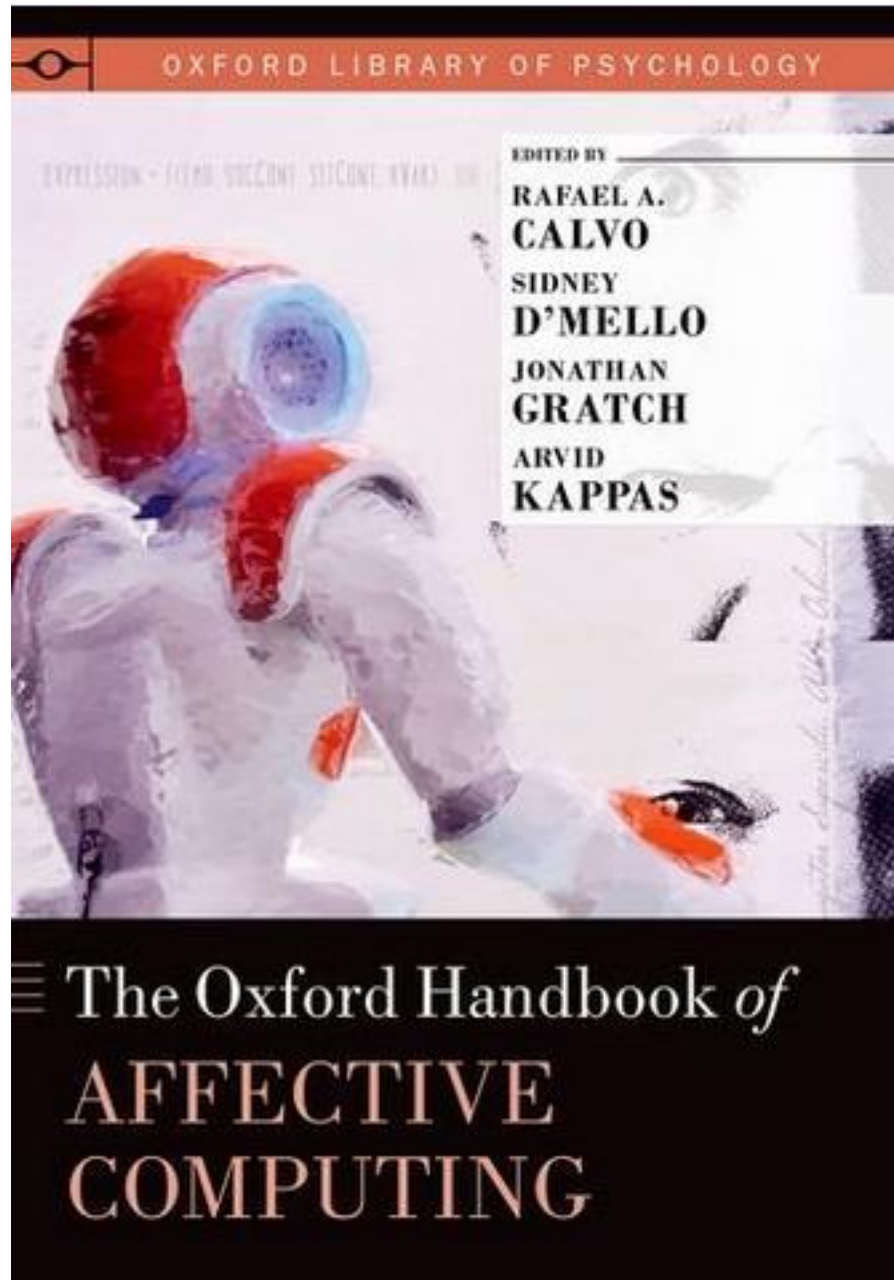
Rosalind W. Picard, **Affective Computing**, The MIT Press, 2000



Affective Computing

Research Areas





Affective computing

is the study and development of

systems and devices

that can

recognize, interpret,
process, and simulate

human affects.

Affective Computing

Affective Computing research

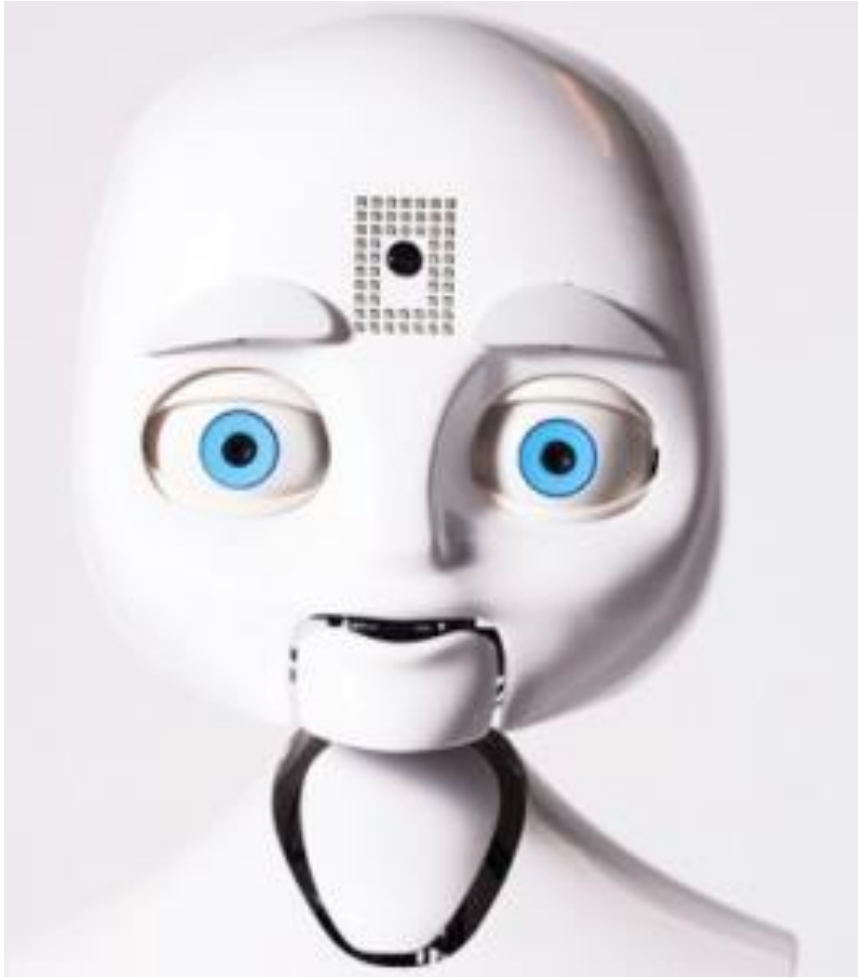
combines

engineering and computer science

with

psychology, cognitive science,
neuroscience, sociology, education,
psychophysiology, value-centered
design, ethics, and more.

Affective Computing





Advancing Human Mobility

ASIMO drives more than just robotics research. Leading edge technologies developed for ASIMO provide a springboard for other Honda product development projects such as the ones shown below.



[Click to learn more](#)

STRIDE MANAGEMENT ASSIST



Honda's Stride Management Assist device is designed to help those with weakened leg muscles but who are still able to walk. A motor helps lift each leg at the thigh as it moves forward and backward. This lengthens the user's stride, making it easier to cover longer distances at a greater speed.

Emotions



Love

Anger

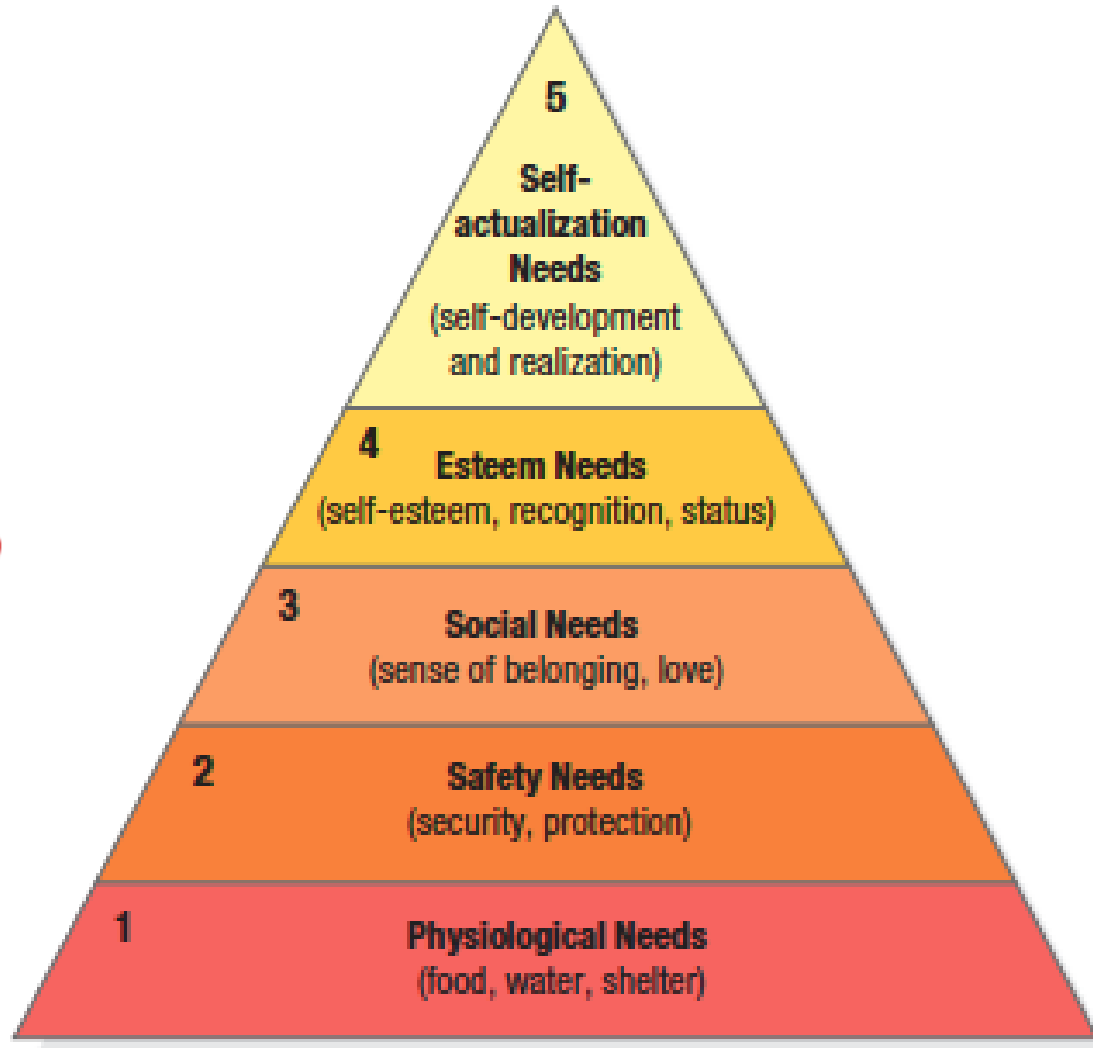
Joy

Sadness

Surprise

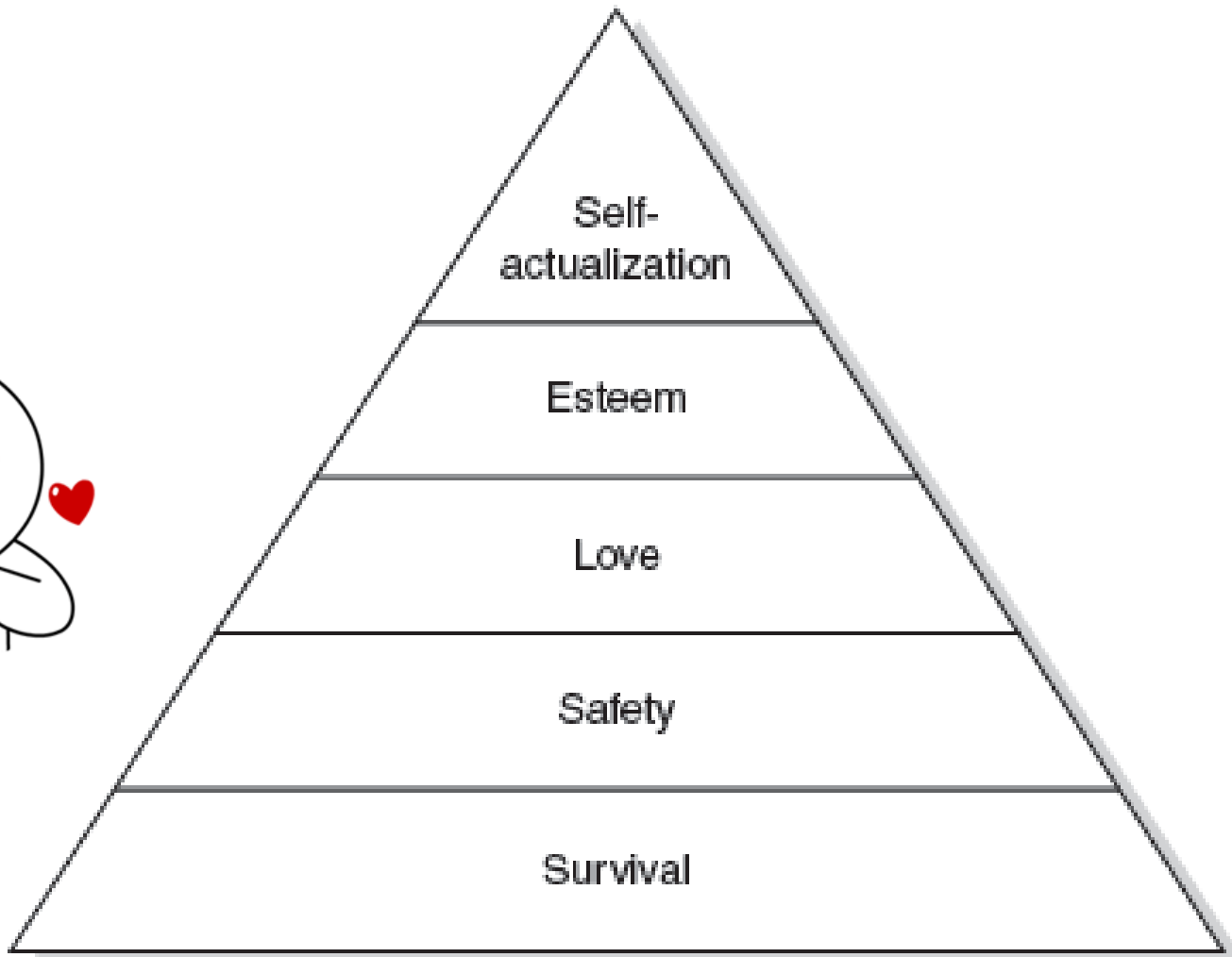
Fear

Maslow's Hierarchy of Needs

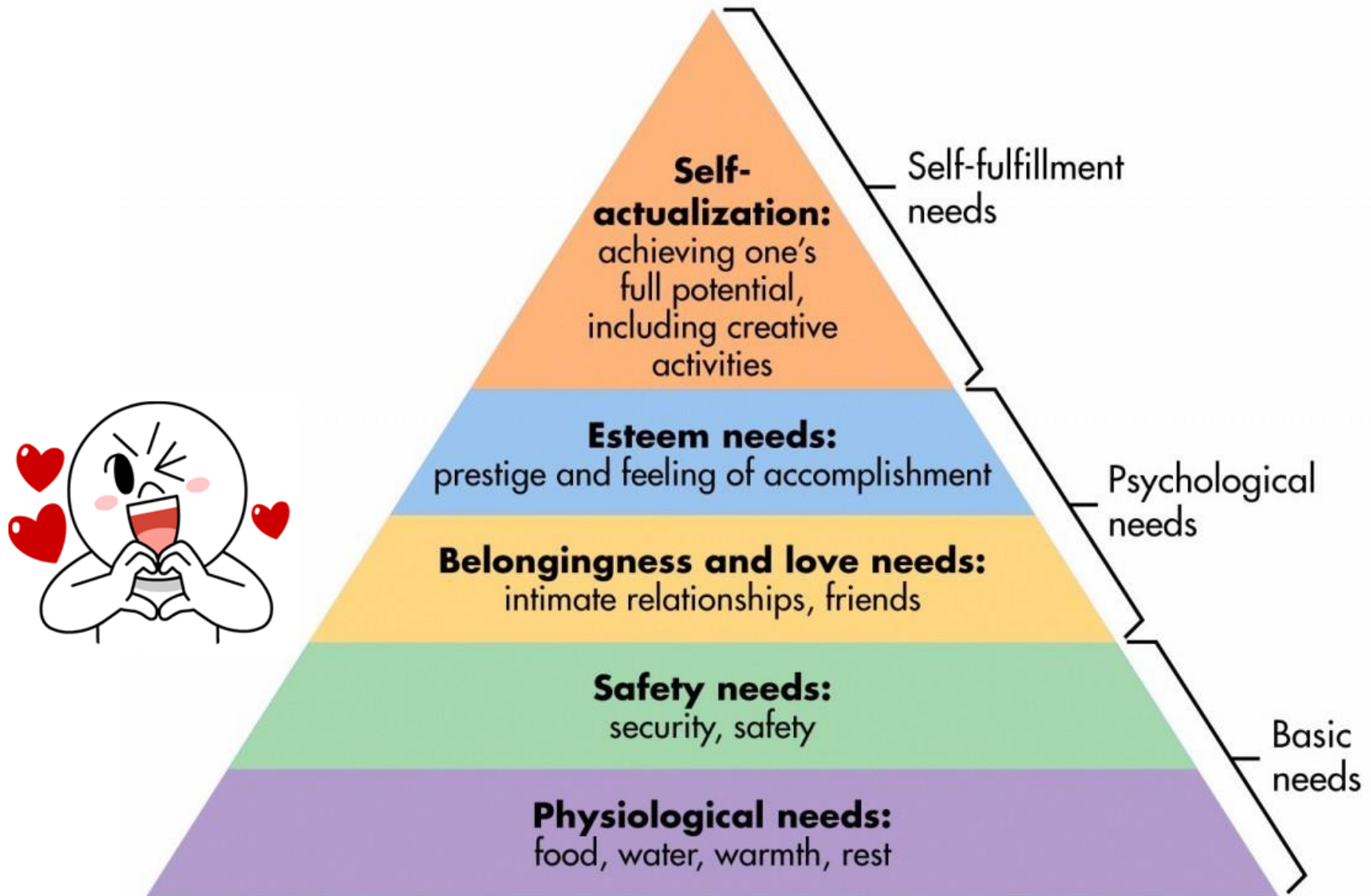


Maslow's hierarchy of human needs

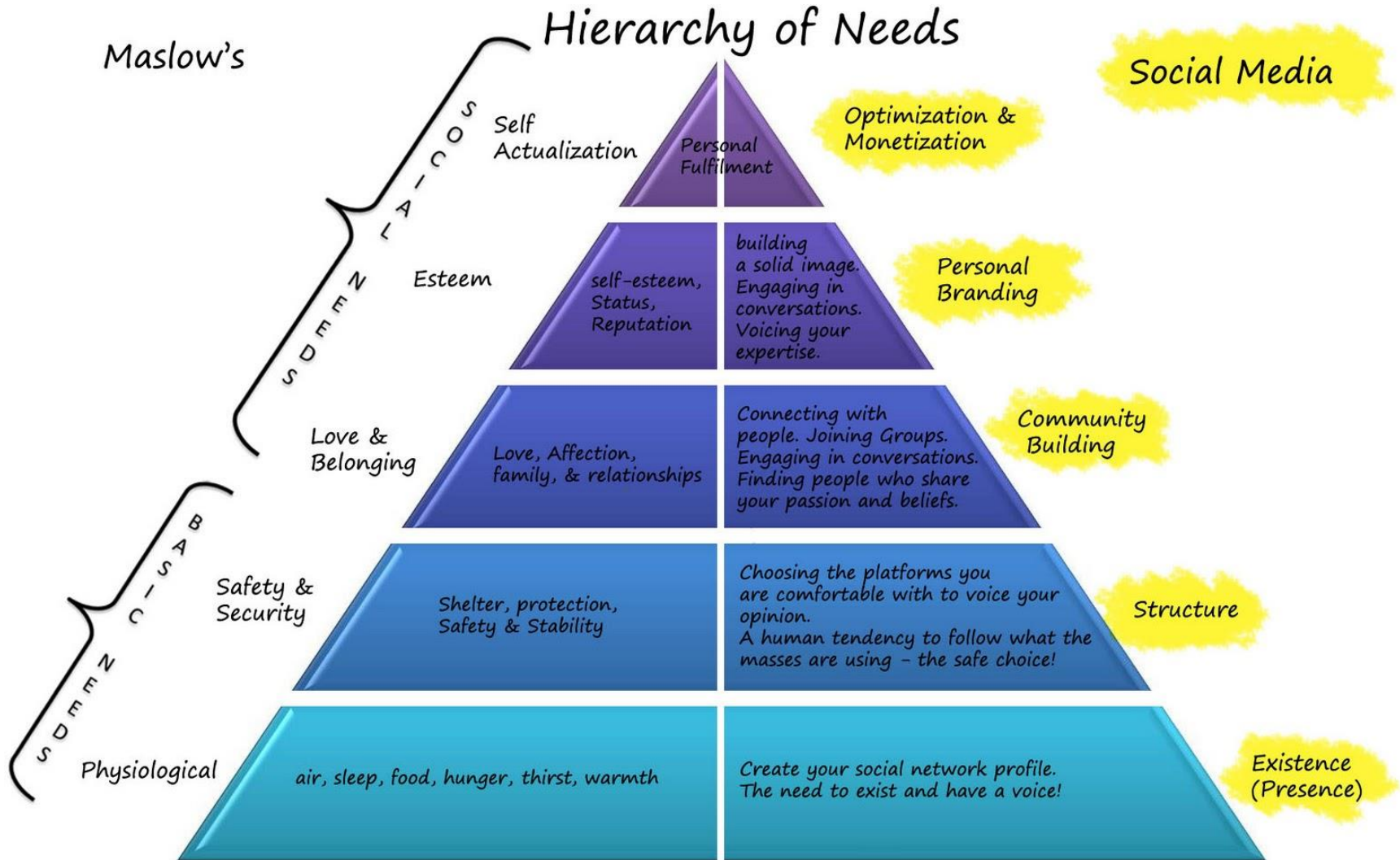
(Maslow, 1943)



Maslow's Hierarchy of Needs

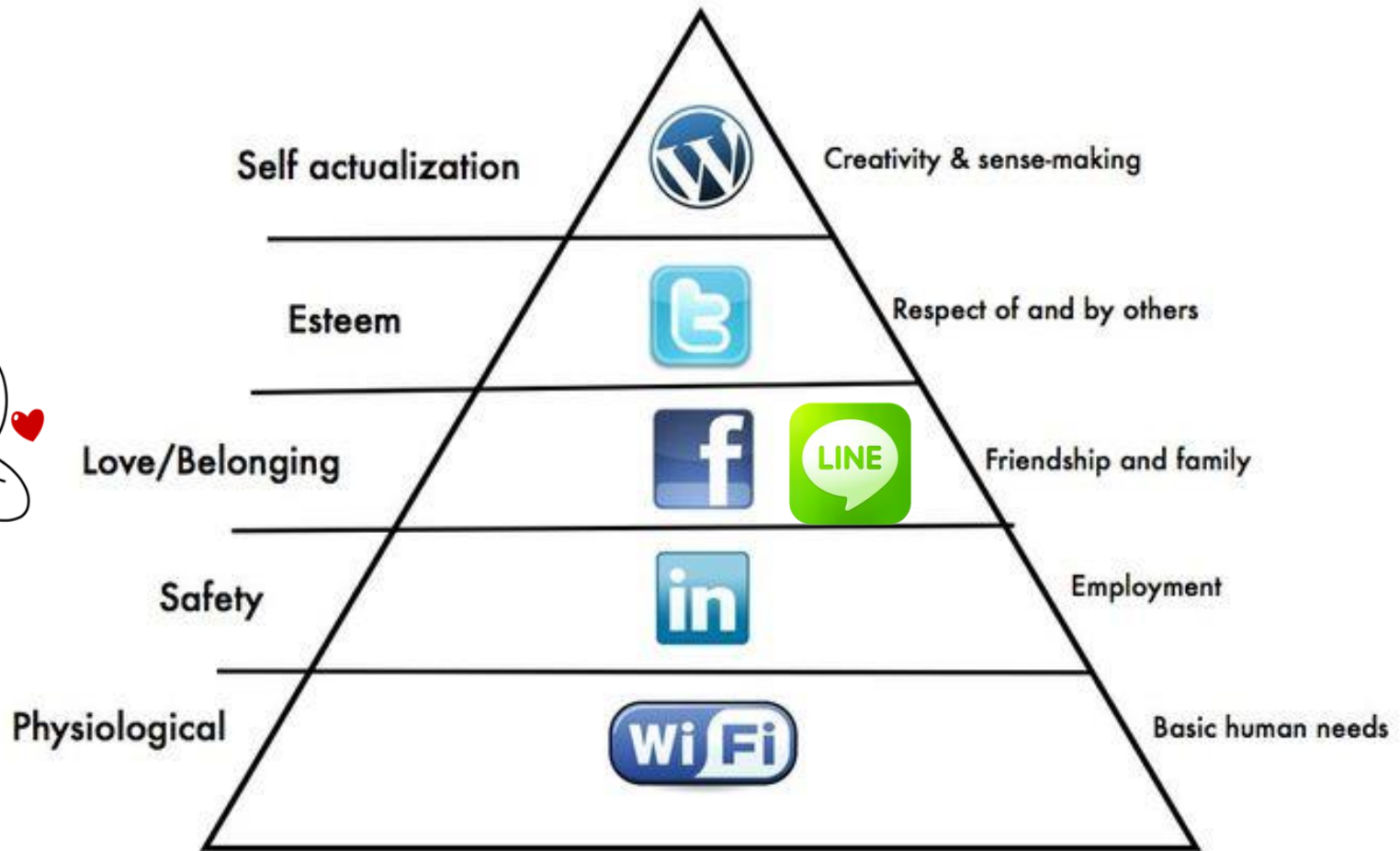


Social Media Hierarchy of Needs



Social Media Hierarchy of Needs - by John Antonios

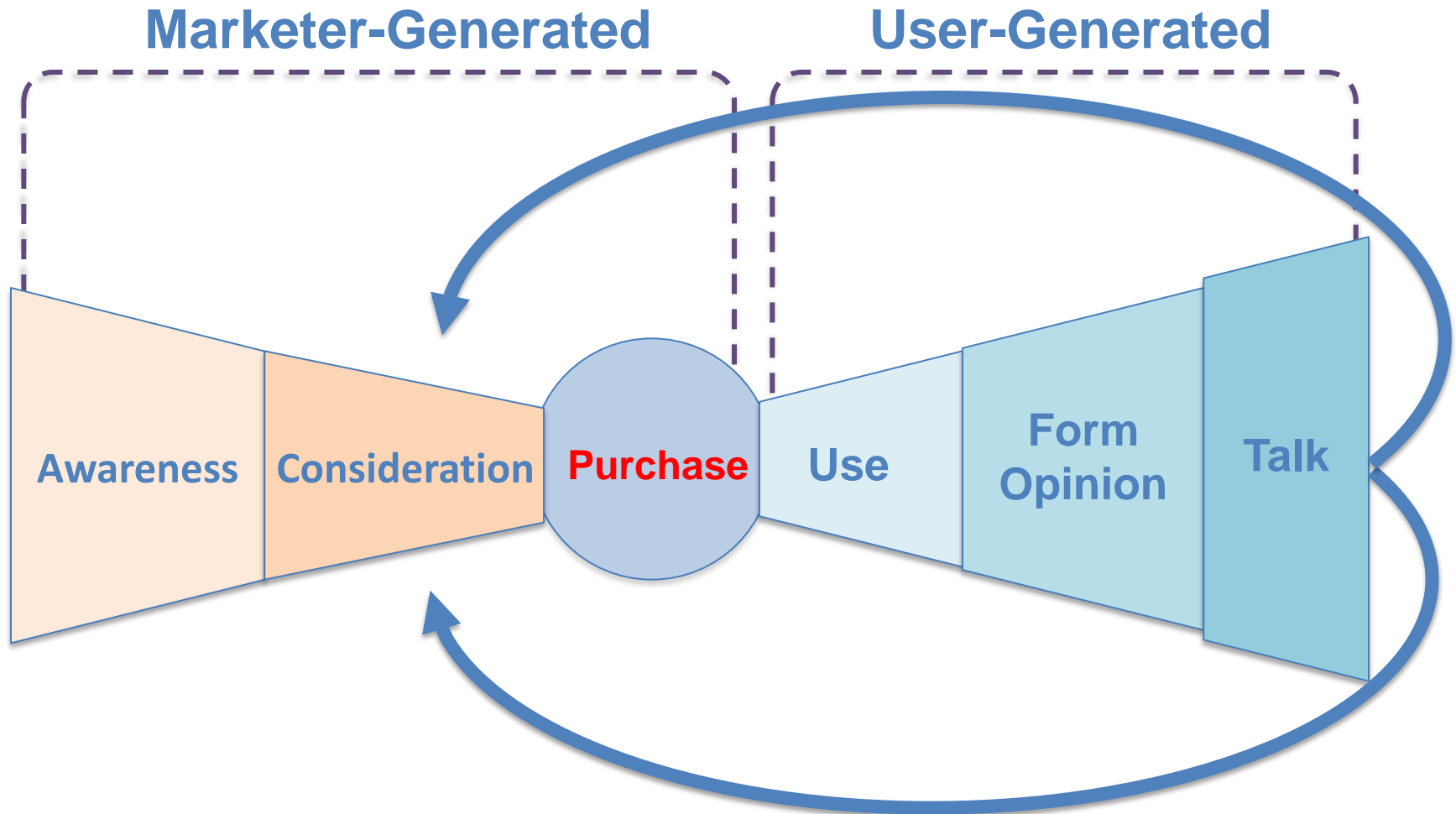
Social Media Hierarchy of Needs



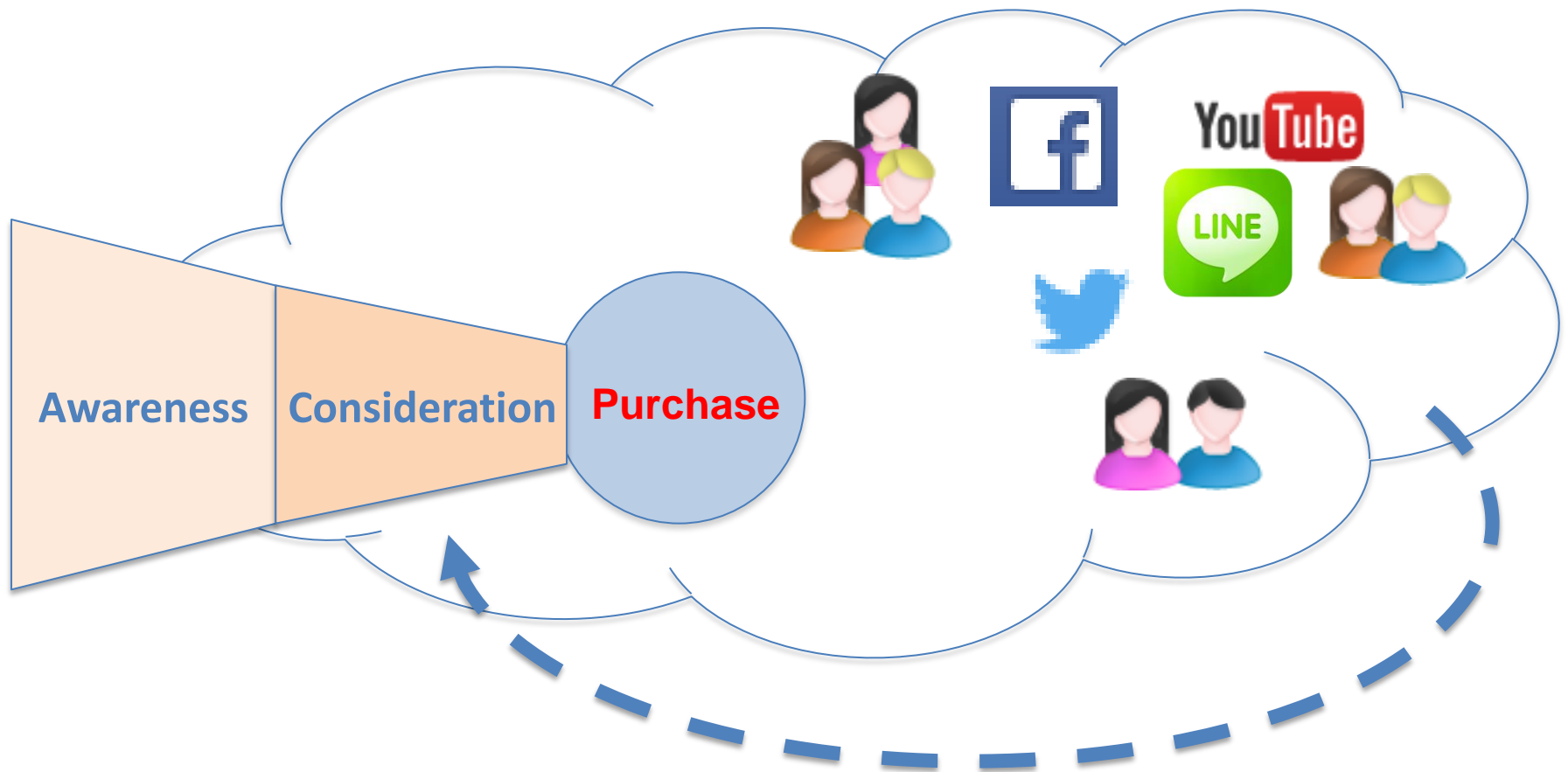
@daveduarte

The Social Feedback Cycle

Consumer Behavior on Social Media



The New Customer Influence Path





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**.

(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. ...”



+Positive
Opinion



-Negative
Opinion

Attensity: Track social sentiment across brands and competitors

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

The screenshot shows the Attensity website homepage. At the top, there is a navigation bar with the Attensity logo, a language selector set to 'English', and links for 'Contact', 'Resources', 'Support', and 'Blog'. A search bar is also present. Below the navigation, there are tabs for '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.' A 'Learn More' button is located below the quote. To the left of the banner is a vertical menu with categories: 'Social Analytics', 'Social Response', 'Customer Analytics', 'Industry Solutions', and 'Why Attensity'. To the right of the banner are several dashboard snippets showing various analytics, including a bar chart titled 'Comparison of Feedback Over Different Time Periods' and a 'Twitter Accounts' list. At the bottom of the page, there are several promotional boxes: 'Attensity for Marketing', 'Attensity for Customer Service', 'Attensity for IT', 'Success Story' (featuring JetBlue Airways), 'About Attensity' (describing the company as a leading provider of social analytics), and 'Watch Video' (with a 'Command Center Video' player).

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

Sentiment Analysis

vs.

Subjectivity Analysis

Sentiment Analysis	Subjectivity Analysis
Positive	Subjective
Negative	
Neutral	Objective

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"

Business Insights
with
Social Analytics

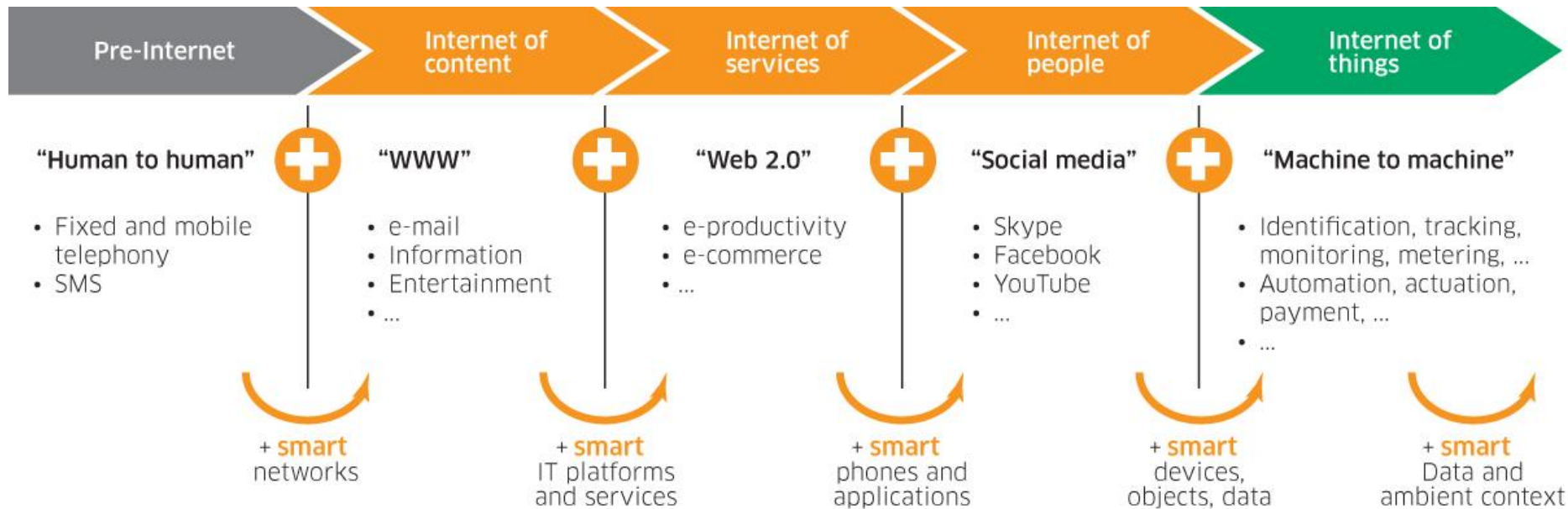
Social Computing

- Social Network Analysis
- Link mining
- Community Detection
- Social Recommendation

Internet Evolution

Internet of People (IoP): Social Media

Internet of Things (IoT): Machine to Machine

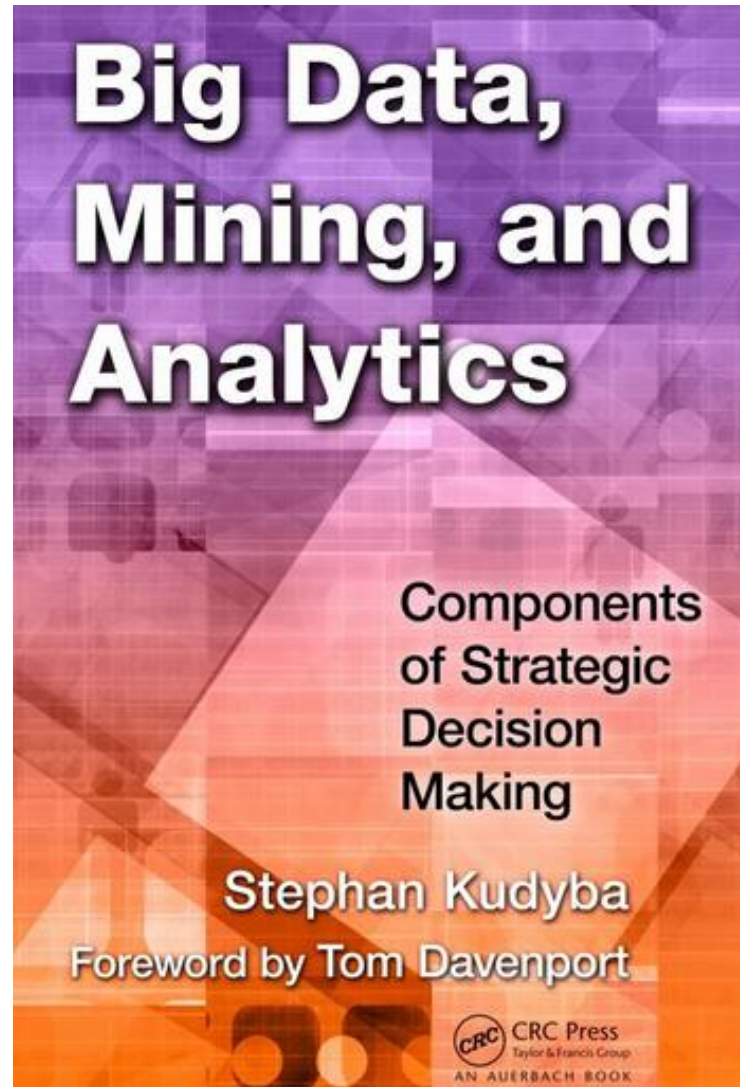


Source: Marc Jadoul (2015), The IoT: The next step in internet evolution, March 11, 2015

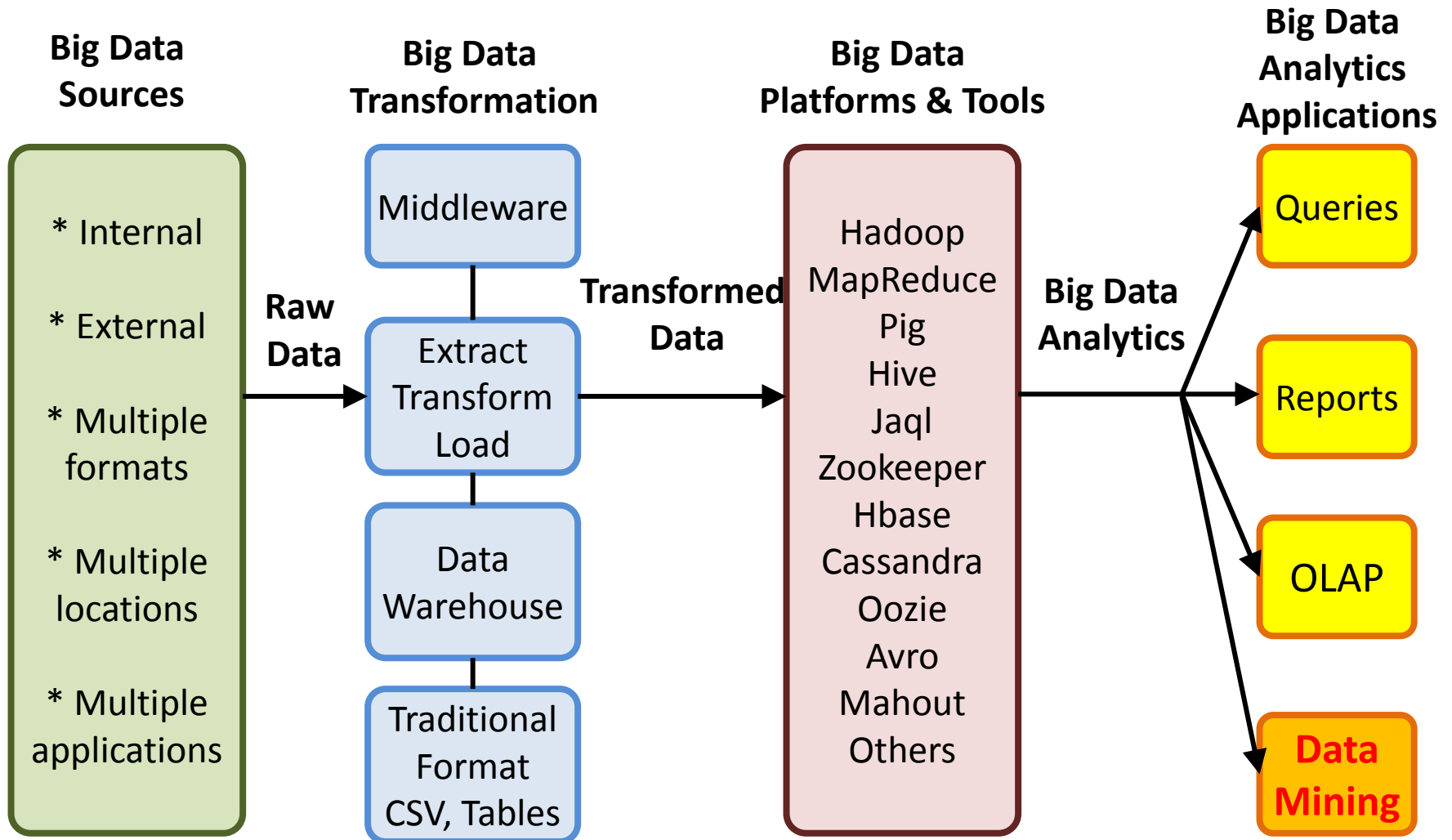
<http://www2.alcatel-lucent.com/techzine/iot-internet-of-things-next-step-evolution/>

Big Data
Analytics
and
Data Mining

Stephan Kudyba (2014),
Big Data, Mining, and Analytics:
Components of Strategic Decision Making, Auerbach Publications



Architecture of Big Data Analytics

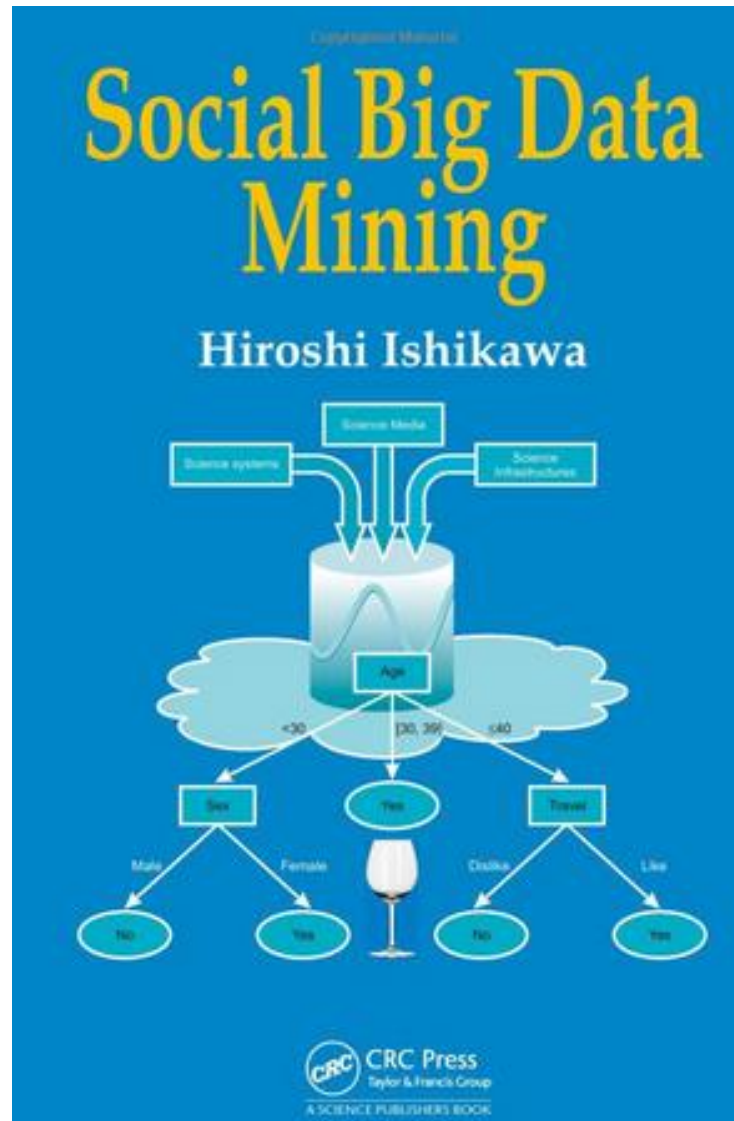


Architecture of Big Data Analytics



Social Big Data Mining

(Hiroshi Ishikawa, 2015)

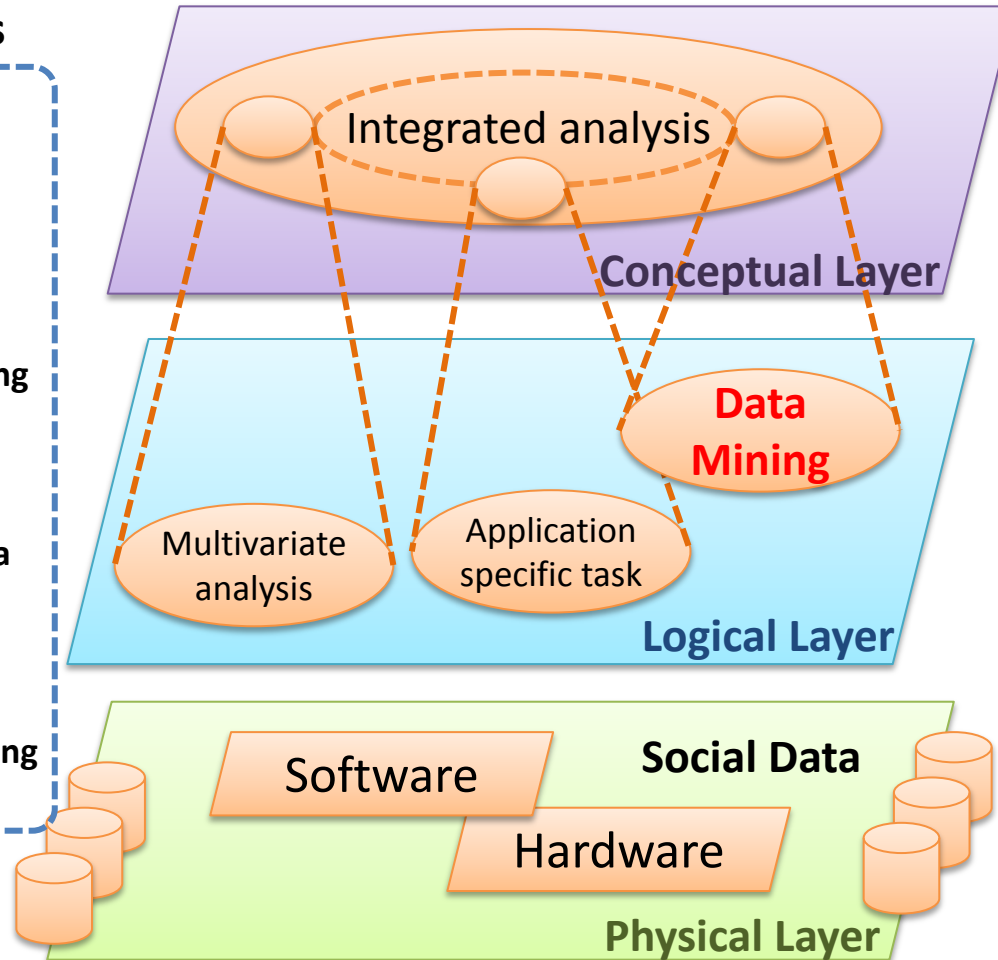


Architecture for Social Big Data Mining

(Hiroshi Ishikawa, 2015)

Enabling Technologies

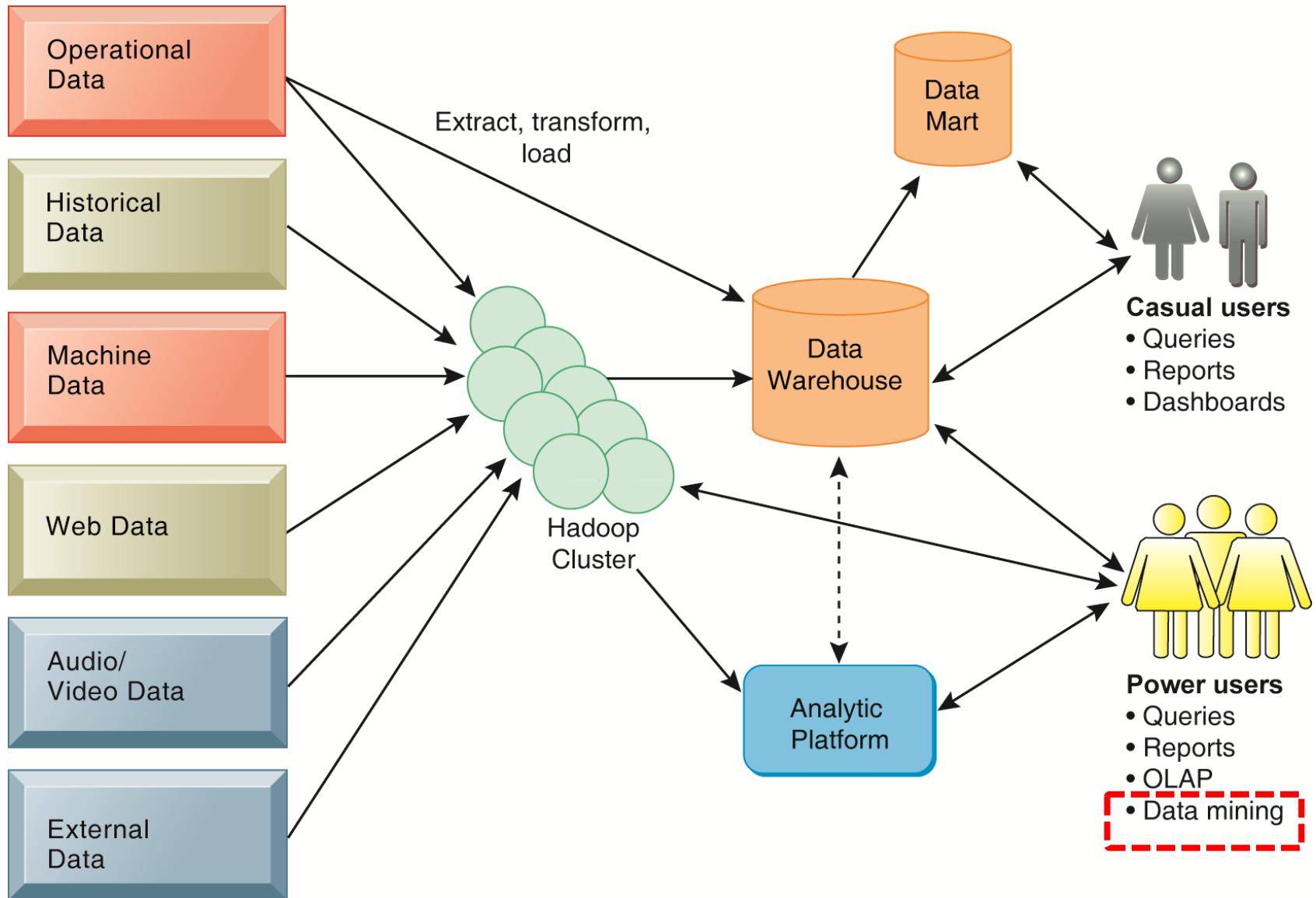
- Integrated analysis model
- Natural Language Processing
- Information Extraction
- Anomaly Detection
- Discovery of relationships among heterogeneous data
- Large-scale visualization
- Parallel distributed processing



Analysts

- Model Construction
- Explanation by Model
- Construction and confirmation of individual hypothesis
- Description and execution of application-specific task

Business Intelligence (BI) Infrastructure



Deep Learning

Intelligence from Big Data



Big Data



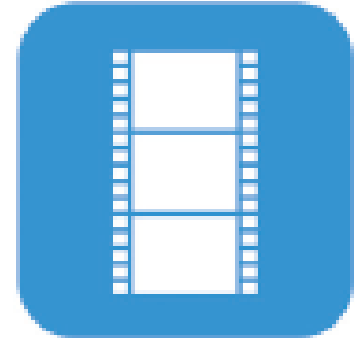
**Mobile
Sensors**



**Social
Media**



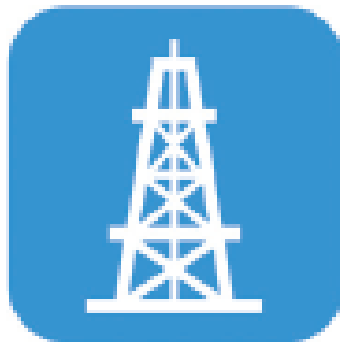
**Video
Surveillance**



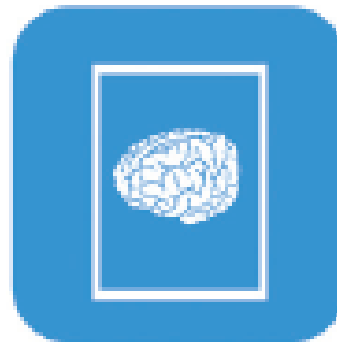
**Video
Rendering**



**Smart
Grids**



**Geophysical
Exploration**



**Medical
Imaging**



**Gene
Sequencing**

Data Scientist: **The Sexiest Job** **of the 21st Century**

(Davenport & Patil, 2012)(HBR)

Data Scientist:

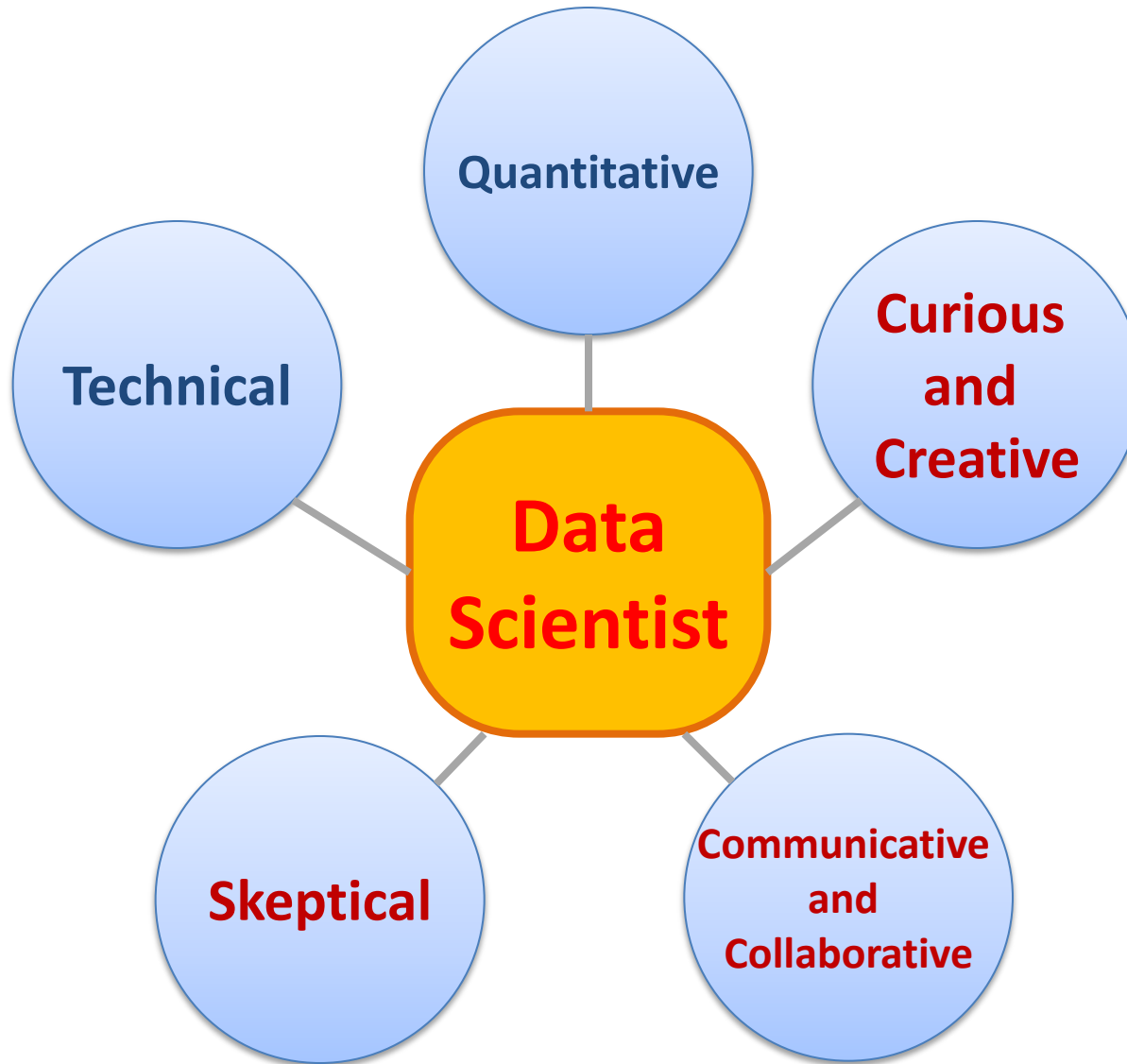
The Sexiest Job of the 21st Century

**Meet the people who
can coax treasure out of
messy, unstructured data.**

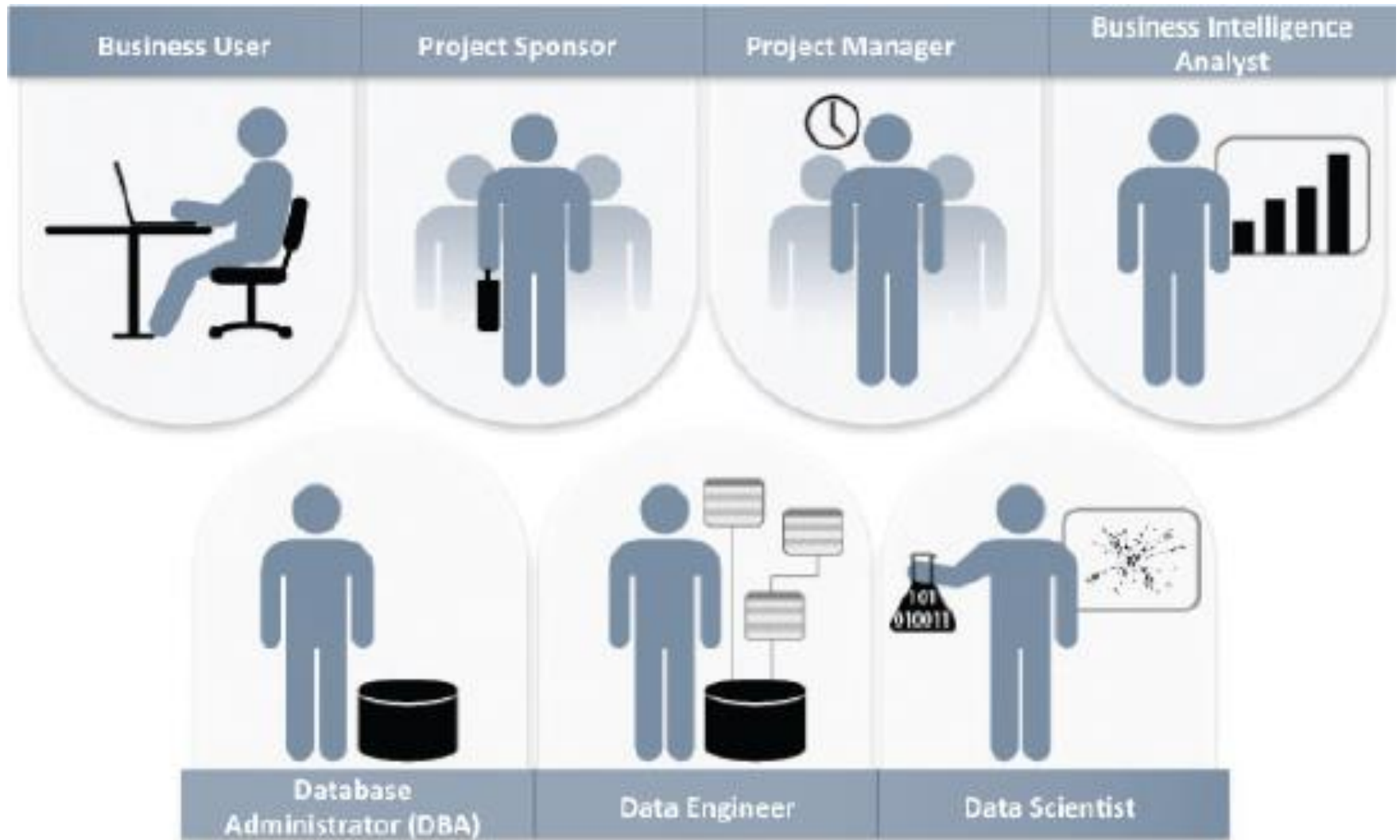
*by Thomas H. Davenport
and D.J. Patil*

When Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited their friends and colleagues to join. But users weren't seeking out connections with the people who were already on the site at the rate executives had expected. Something was apparently missing in the social experience. As one LinkedIn manager put it, "It was like arriving at a conference reception and realizing you don't know anyone. So you just stand in the corner sipping your drink—and you probably leave early."

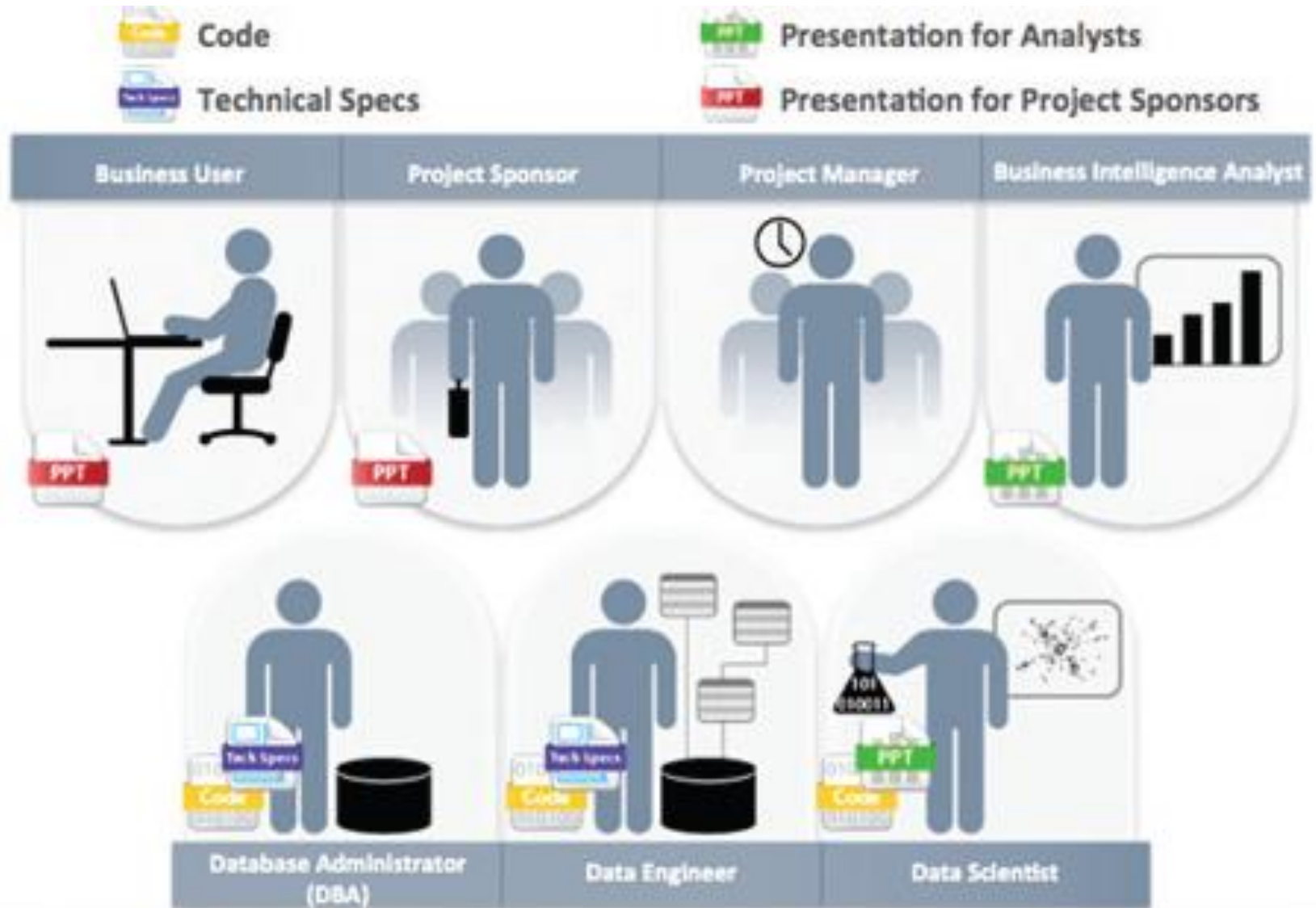
Data Scientist Profile



Key Roles for a Successful Analytics Project



Key Outputs from a Successful Analytics Project



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

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

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 is a navigation bar with the Attensity logo on the left, a language selector set to 'English', and links for 'Contact', 'Resources', 'Support', and 'Blog'. A search bar is located on the right. Below the navigation bar, a secondary menu lists '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.' A 'Learn More' button is positioned below the quote. To the left of the banner is a vertical menu with categories: 'Social Analytics', 'Social Response', 'Customer Analytics', 'Industry Solutions', and 'Why Attensity'. To the right, several dashboard components are shown, including a bar chart titled 'Comparison of Feedback Over Different Time Periods', a pie chart, and a social media feed titled 'ATTENSITY RESPOND' showing tweets. At the bottom of the page, there are four distinct sections: 'Attensity for Marketing' and 'Attensity for Customer Service' (partially obscured), 'Success Story' featuring JetBlue Airways with a 'DOWNLOAD NOW' button, 'About Attensity' with the text 'Attensity is the leading provider of social analytics and engagement solutions.', and 'Watch Video' with a 'Command Center Video' player.

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

Clarabridge: Sentiment and Text Analytics Software

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

The image shows a screenshot of a web browser displaying the Clarabridge website. The browser's address bar shows the URL www.clarabridge.com. The website features a navigation menu with links for Home, About Us, News & Events, Blog, Login, and Contact Us. Below the navigation is a dark grey menu with categories: WHY TEXT ANALYTICS, PRODUCT, SERVICES, CUSTOMERS, PARTNERS, RESOURCES, and ABOUT US. The main content area has a blue background with the headline "The First Sentiment and Text Analytics Solution Built Specifically for Business." and a sub-headline "The Clarabridge sentiment and text analytics software provides enterprises with a universal view of their customers." A "Learn more about how Clarabridge works >" link is positioned at the bottom right of this section. Below the main content is a "Customers" section displaying logos for Nissan, Best Buy, Marriott, Sage, H&R Block, Choice Hotels International, Wendy's, GWLORD HOTELS, BE ERDFORCE, and DOLL, followed by a "More >" link. The footer contains three promotional boxes: "Clarabridge Text Analytics", "Choose Your Edition" (with a sub-section for "Clarabridge for Enterprises" described as ideal for enterprise-class text analytics solutions), and "Clarabridge Webinar" presented by Hypatia Research Group on Social.

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

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

Social Media Monitoring x

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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.

f

t

YouTube

g+

radian6 Community

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

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

Social Media Monitoring x

www.sas.com/software/customer-intelligence/social-media-analytics/

Log In Worldwide Sites Contact Us Follow Us

NEWS EVENTS CONSULTING CAREERS RESOURCE CENTER

SEARCH

Home Products & Solutions Customer Success Partners Company Support & Training

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](#)

Product Demo

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](#)

The screenshot shows a web browser window with the URL www.tweetfeel.com/index.php#iPhone4s. The page features the 'tweetfeel' logo with a blue bird icon. A search bar contains the text 'iPhone4s' and a yellow 'Search' button. Below the search bar, it says 'Try some Twitter trends: [Tomorrow is June](#) [H&M](#) [Defense of Marriage Act](#) [Diddy's](#) [Bloomberg](#) [UCLA](#) [ESPN](#)'. A sentiment analysis graphic shows a green smiley face with '40' below it, a red frowny face with '41' below it, and an equals sign followed by '51%'. Below this, a message reads: '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.](#)'

Below the message are six tweet snippets, each with a small profile picture and text:

- 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.

The footer contains links for 'Read our FAQ', 'Legal Stuff', '100% Guarantee', and 'Share'. It also includes social media icons for 'Follow us' and 'Email us', and logos for 'conversion' and 'Powered by twitter'.

Browser window: Tweet Sentiments - Know ' x

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

Language: Eng

Logo: **tweet** Sentiments v0.8.6

Navigation: Dashboard Analyze Recent Top 1000 Users Maps Charts About Login

Tweet Sentiment Analysis

Search:
 User Topic

Feedback

Sentiments

Index[0-100]: 50.00

Positive: 8

Negative: 1

Neutral: 13

Total Analyzed: 0

Profile


Education:

Flamboyance:



Slang:



Gender:



Age:







50.00

 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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Internet Buzz Research Center

--議題分析--

Home 議題分析 排行榜 研究專題 數據報告 產品服務 解決方案

7-ELEVEN

連結類型	百分比
照片連結	73%
文章連結	10%
影片連結	17%
純發文	0%

議題分析

血汗醫院全民皆慌 網路熱門

研究專題

便利商店衝人氣 臉書加持少

數據報告

永慶房屋得據房仲龍頭 資訊

f 臉書粉絲團排行榜

更多

政治人物	名人	演藝人員
馬英九總統 粉絲數 1419591	蔡英文 Tsai 粉絲數 669928	蘇貞昌 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	FORD (FIESTA)
--	-----	---------------

進口車

- 吵了這麼久，就是不要「超速」起車，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」起車，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

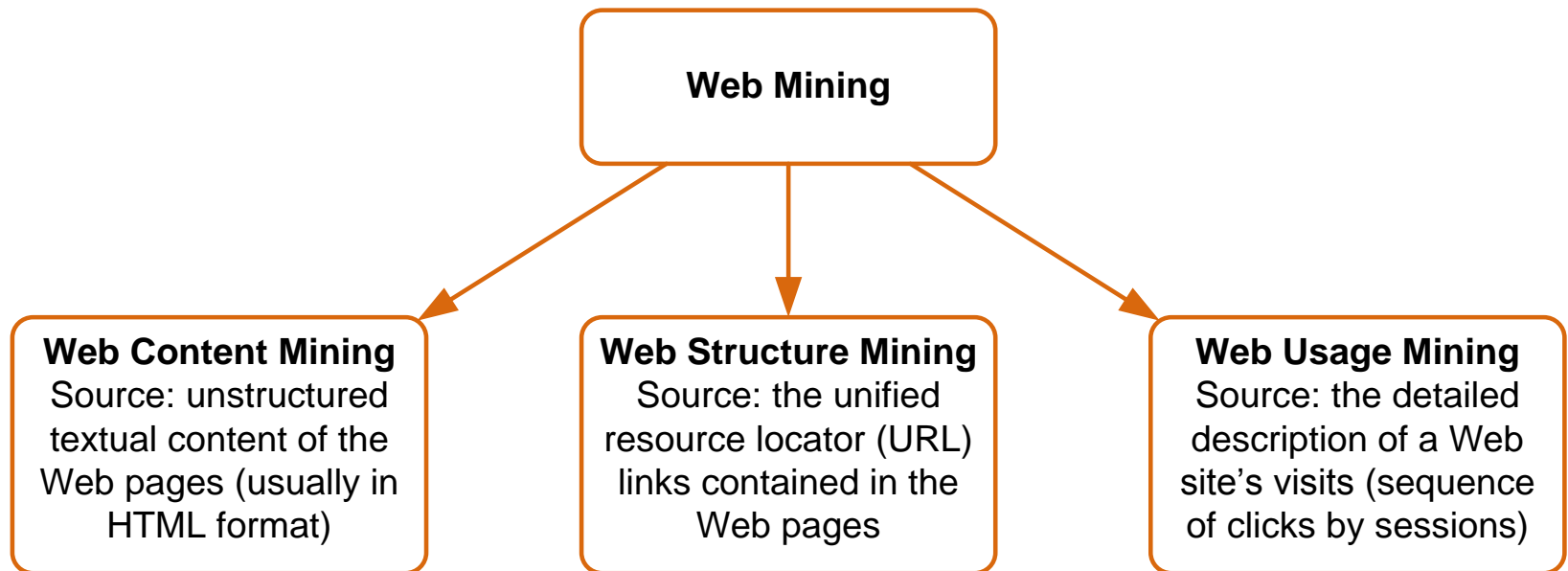
The screenshot shows a web browser window with the URL www.eland.com.tw/solutions. The page features a navigation bar with the eLAND logo and menu items: 產品, 雲端服務, 壹銀標專區, 我們的客戶, 新聞與活動, 支援, and 關於意藍. The main content area has a large banner for "OpView Service" with the subtitle "您的輿論觀測站" and the text "連上OpView · 品牌形象、輿論觀點監測好輕鬆". Below this are five circular icons representing different aspects of the service. To the right is a 3D-style image of the OpView software interface. A sidebar on the right contains a search bar, a "相關文件下載" section with links to "OpView Insight DM", "OpView品牌口碑雷達 DM", and "OpView品牌口碑雷達訂購單", and a "更多" link.

Web Mining Overview

- Web is the largest repository of data
- Data is in HTML, XML, text format
- Challenges (of processing Web data)
 - The Web is too big for effective data mining
 - The Web is too complex
 - The Web is too dynamic
 - The Web is not specific to a domain
 - The Web has everything
- Opportunities and challenges are great!

Web Mining

- Web mining (or Web data mining) is the process of discovering intrinsic relationships from Web data (textual, linkage, or usage)



Web Content/Structure Mining

- Mining of the textual content on the Web
- Data collection via Web crawlers
- Web pages include hyperlinks
 - Authoritative pages
 - Hubs
 - hyperlink-induced topic search (HITS) alg

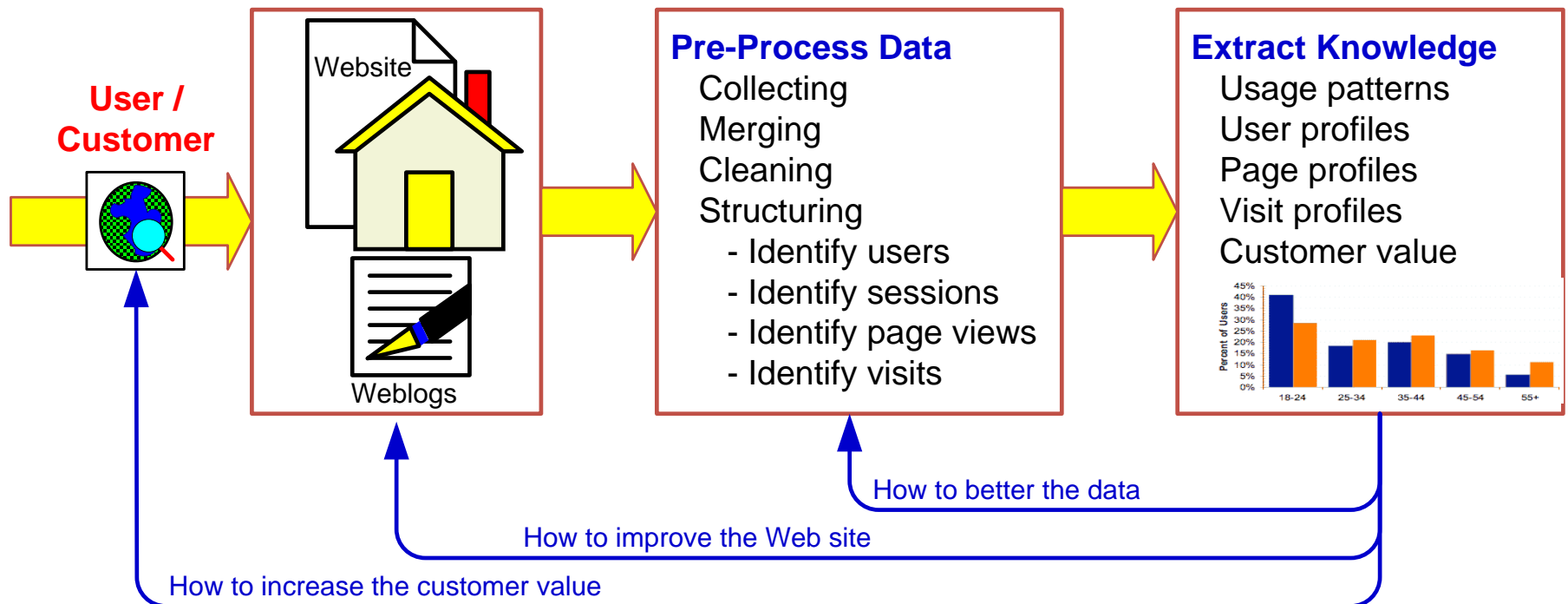
Web Usage Mining

- Extraction of information from data generated through Web page visits and transactions...
 - data stored in server access logs, referrer logs, agent logs, and client-side cookies
 - user characteristics and usage profiles
 - metadata, such as page attributes, content attributes, and usage data
- Clickstream data
- Clickstream analysis

Web Usage Mining

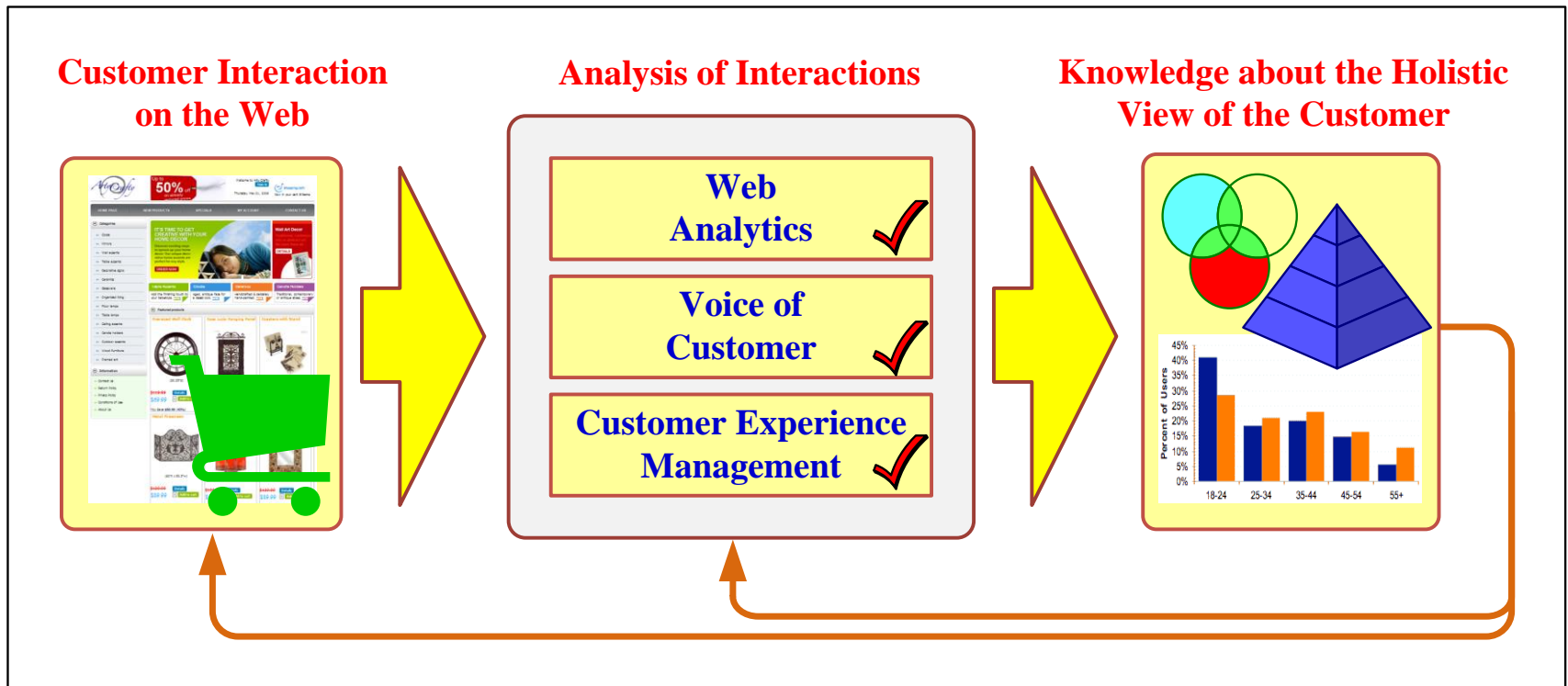
- Web usage mining applications
 - Determine the lifetime value of clients
 - Design cross-marketing strategies across products.
 - Evaluate promotional campaigns
 - Target electronic ads and coupons at user groups based on user access patterns
 - Predict user behavior based on previously learned rules and users' profiles
 - Present dynamic information to users based on their interests and profiles...

Web Usage Mining (clickstream analysis)



Web Mining Success Stories

- Amazon.com, Ask.com, Scholastic.com, ...
- Website Optimization Ecosystem



Web Mining Tools

Product Name**URL**

Angoss Knowledge WebMiner

angoss.com

ClickTracks

clicktracks.com

LiveStats from DeepMetrix

deepmetrix.com

Megaputer WebAnalyst

megaputer.com

MicroStrategy Web Traffic Analysis

microstrategy.com

SAS Web Analytics

sas.com

SPSS Web Mining for Clementine

spss.com

WebTrends

webtrends.com

XML Miner

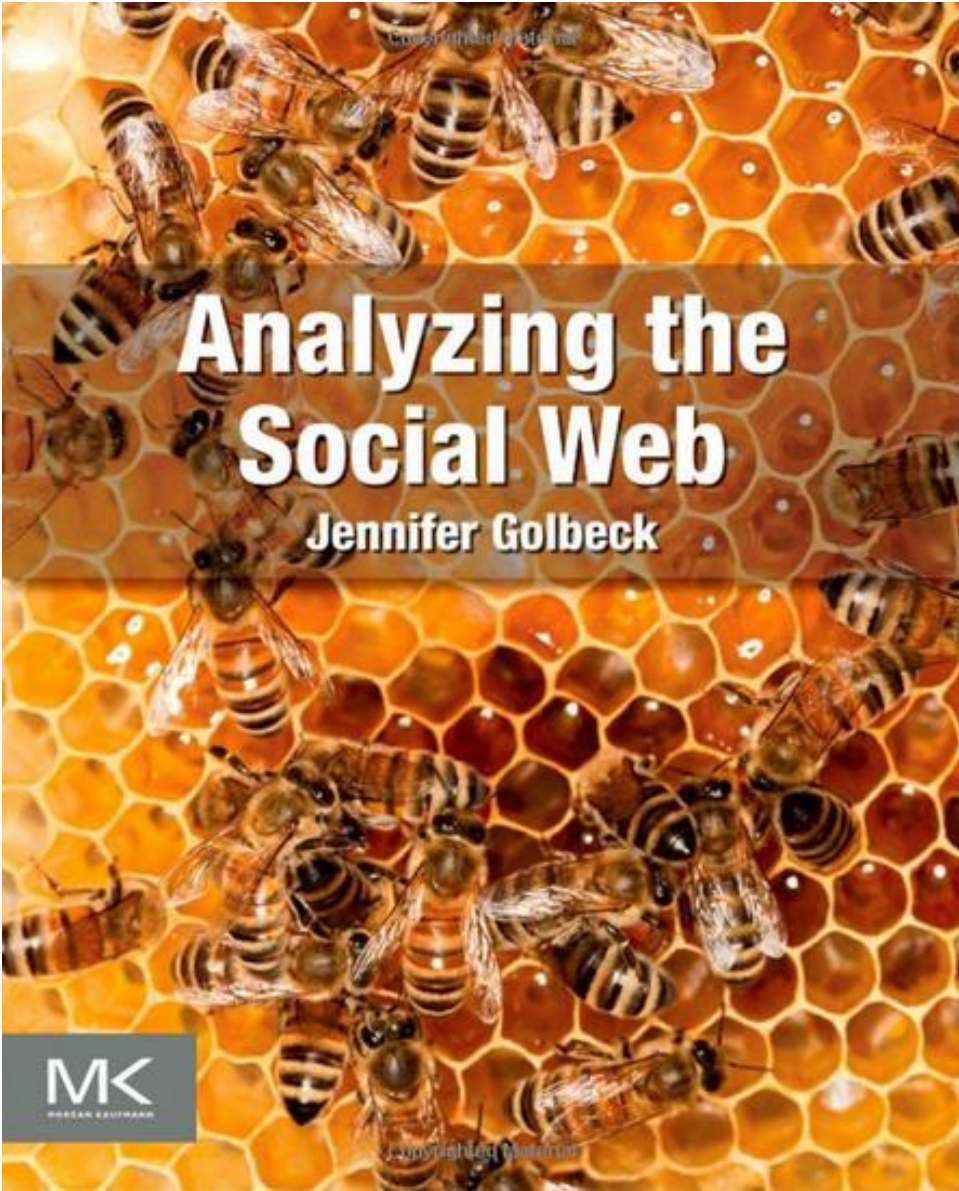
scientio.com

Evaluation of Text Mining and Web Mining

- Evaluation of Information Retrieval
- Evaluation of Classification Model (Prediction)
 - Accuracy
 - Precision
 - Recall
 - F-score

Analyzing the Social Web: Social Network Analysis

Jennifer Golbeck (2013), *Analyzing the Social Web*, Morgan Kaufmann



Social Network Analysis (SNA)

Facebook TouchGraph

TouchGraph Photos x

box.touchgraph.com/facebook/TGFacebookBrowser.php?&signed_request=Gi-L3_6HrZ0S3SjxAXGdHR0rhMzqBjUnvFJ9vE4W6vg.eyJhbGdvcm00aG0iOiJITUFDI☆

Profiles Networks

Min-Yuh Day
 Networks: None
 Mutual Friends: 681

Facebook Profile

Show Top 100 Friends Show All Friends Upload Advanced Restart

Zoom:
 Spacing:

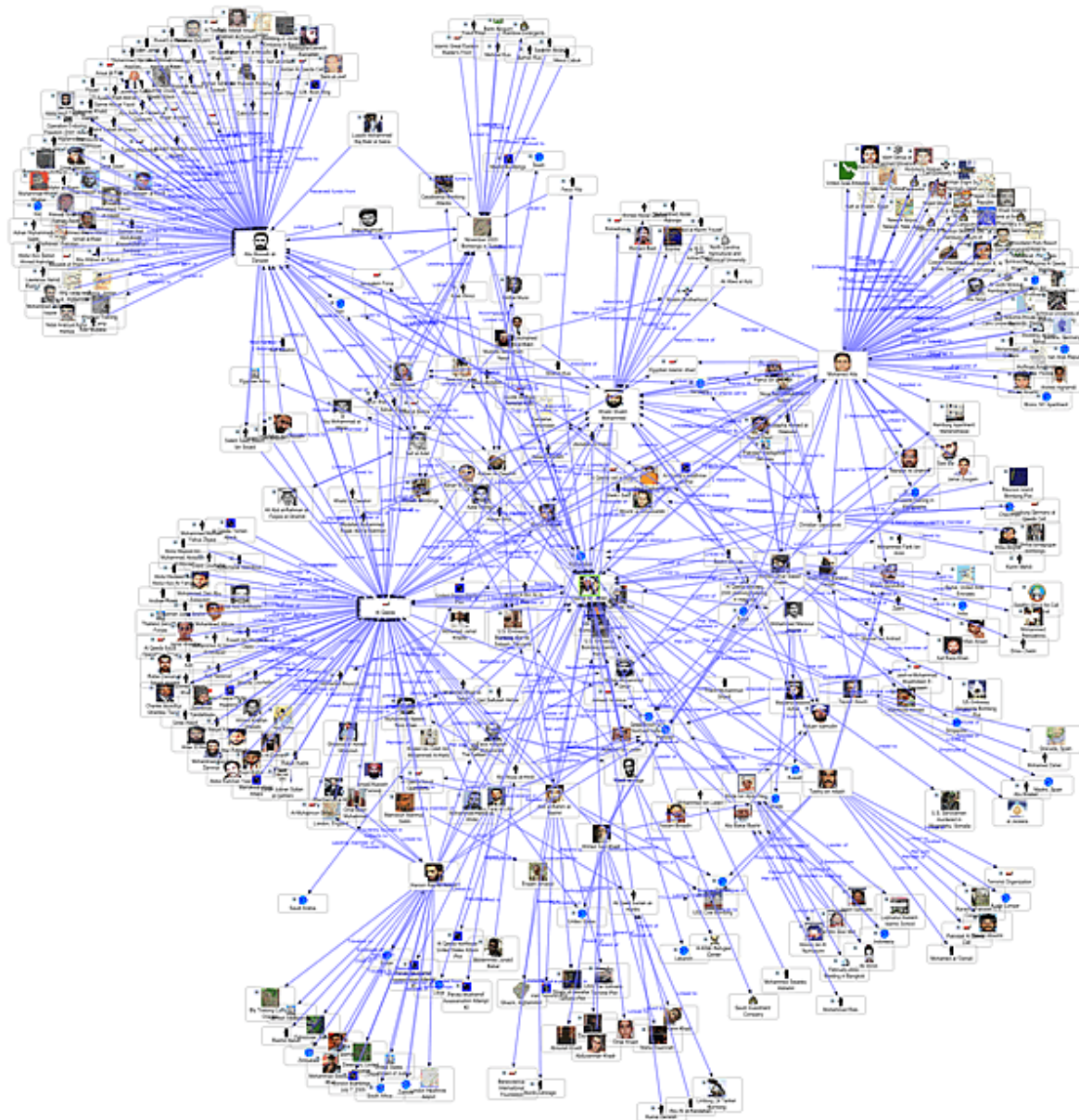
Network All All List Photo

Name	Rank #	Friend #
Min-Yuh Day	1	681
Gladys Hsieh	2	85
黃西田	3	74
施盛賓	4	67
John Lee	5	104
Kevin Tu	6	61
Yung Yu Shih	7	45
Wei Chen	8	107
Chichang Jou	9	50
Allen Green	10	81
黃煒勳	11	65
梁德昭	12	44
Eric Chen	13	51
吳錦波	14	39
Jessica Tien	15	49
蔡名宜	16	112
Enrico Lu	17	59
YaHan Hsieh	18	64
王慧雯	19	56
薛聖譚	20	80
蝦米	21	73

ICCU

powered by TouchGraph

Social Network Analysis



Social Network Analysis

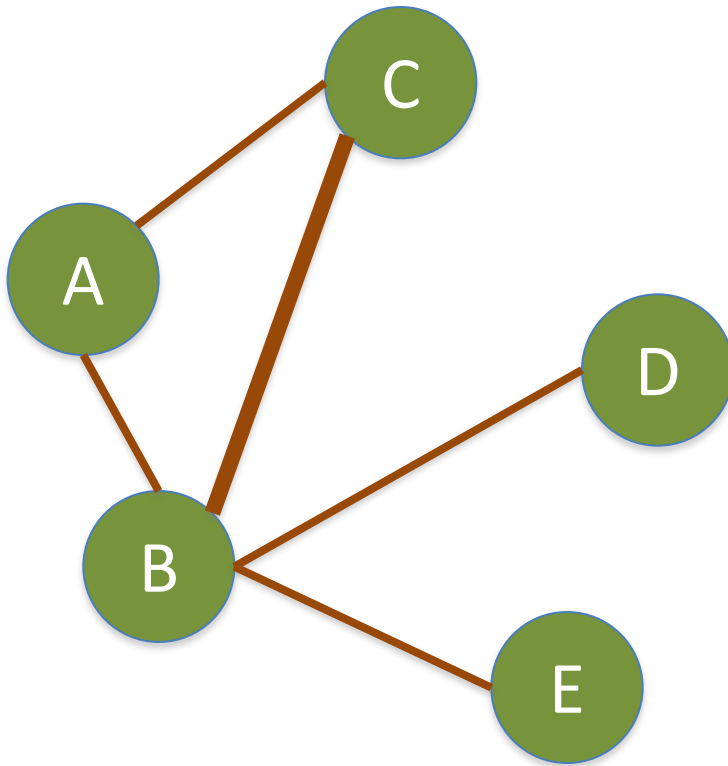
- A **social network** is a social structure of people, related (directly or indirectly) to each other through a common relation or interest
- **Social network analysis (SNA)** is the study of social networks to understand their structure and behavior

Social Network Analysis (SNA)

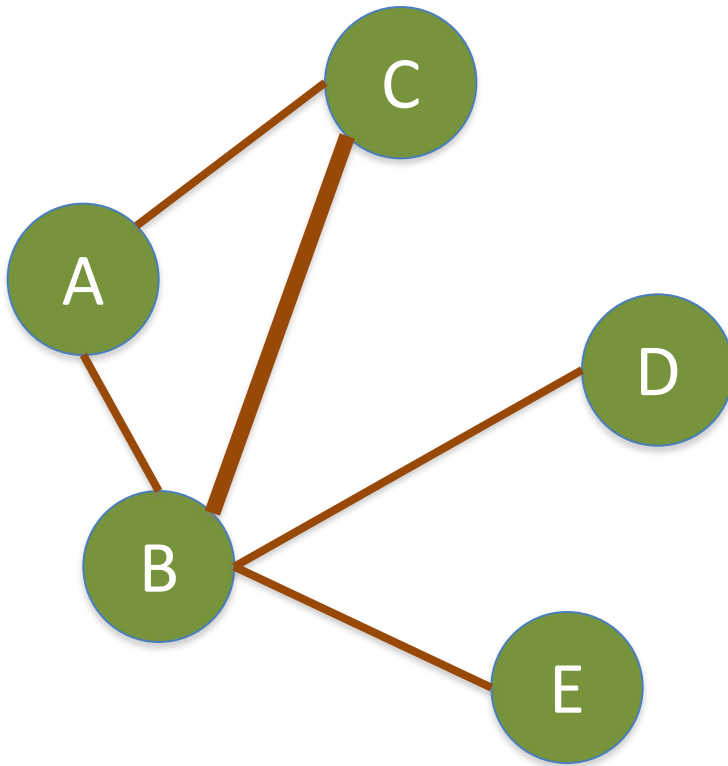
Centrality

Prestige

Degree

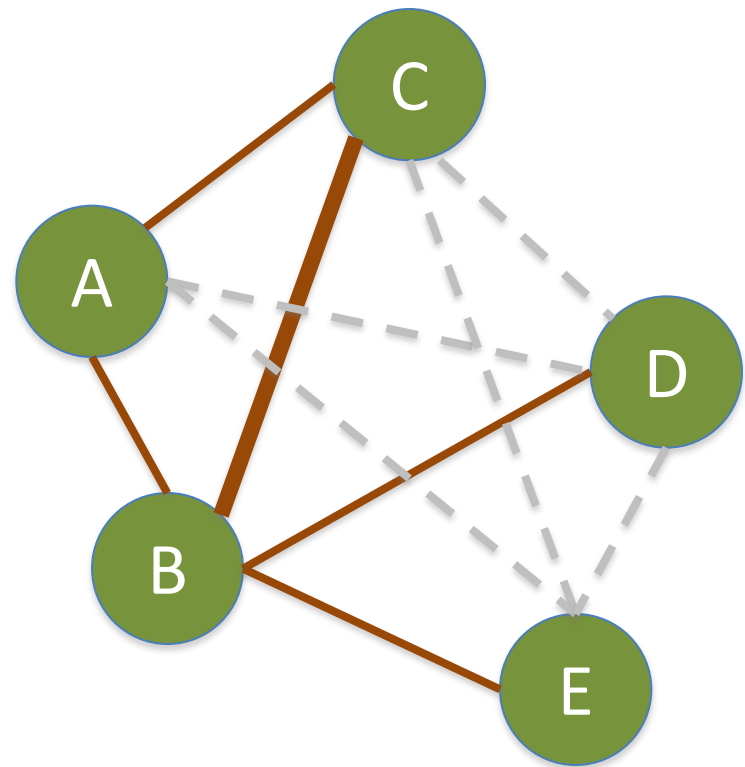


Degree



A: 2
B: 4
C: 2
D: 1
E: 1

Density

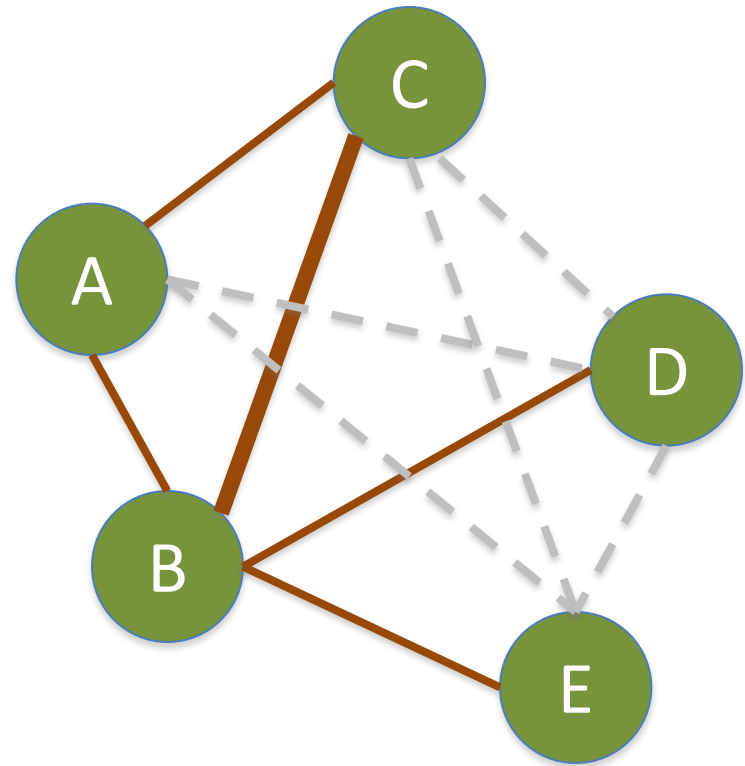


Density

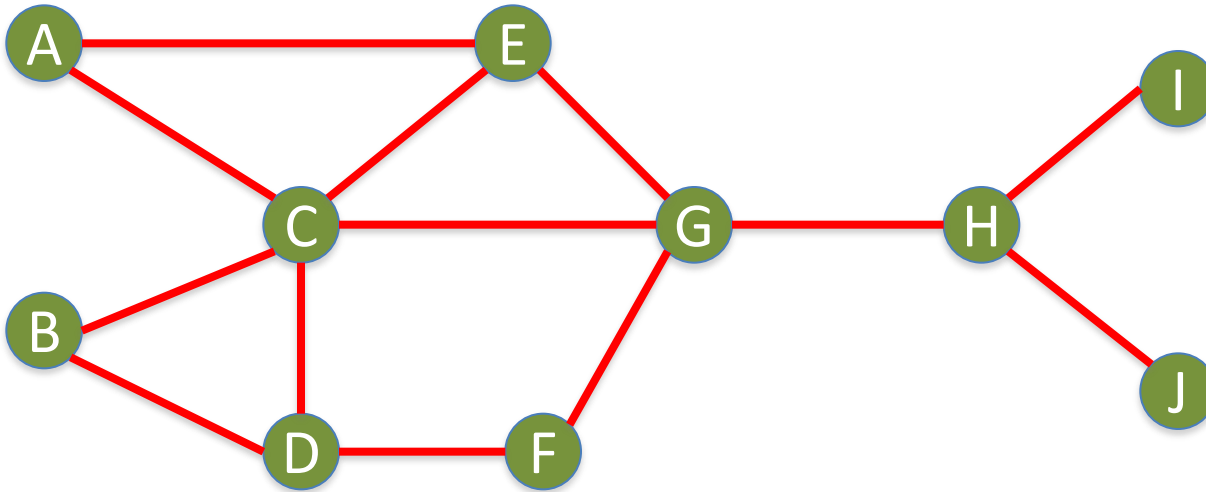
Edges (Links): 5

Total Possible Edges: 10

Density: $5/10 = 0.5$



Density



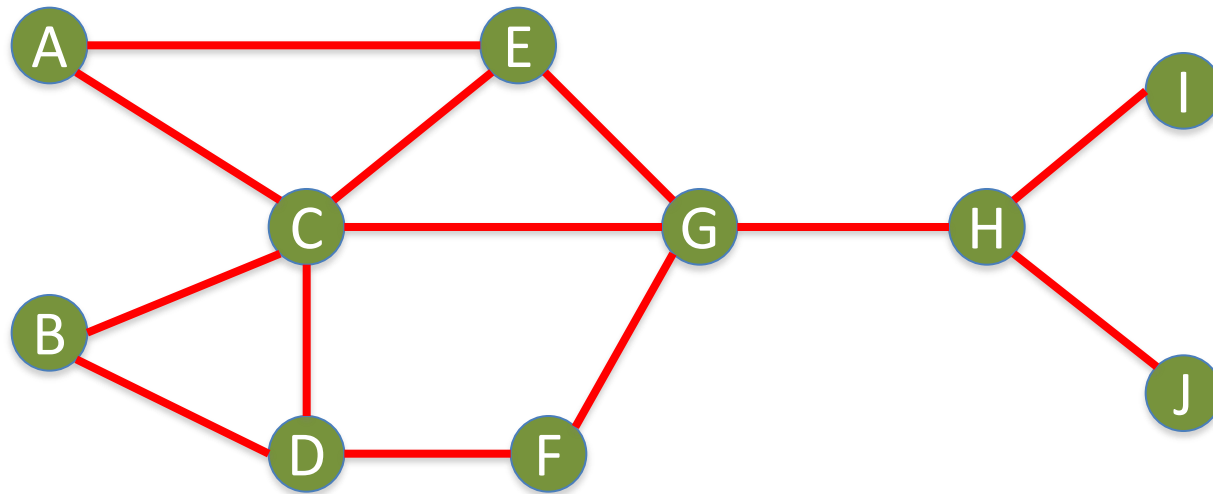
Nodes (n): 10

Edges (Links): 13

Total Possible Edges: $(n * (n-1)) / 2 = (10 * 9) / 2 = 45$

Density: $13/45 = 0.29$

Which Node is Most **Important**?



Centrality

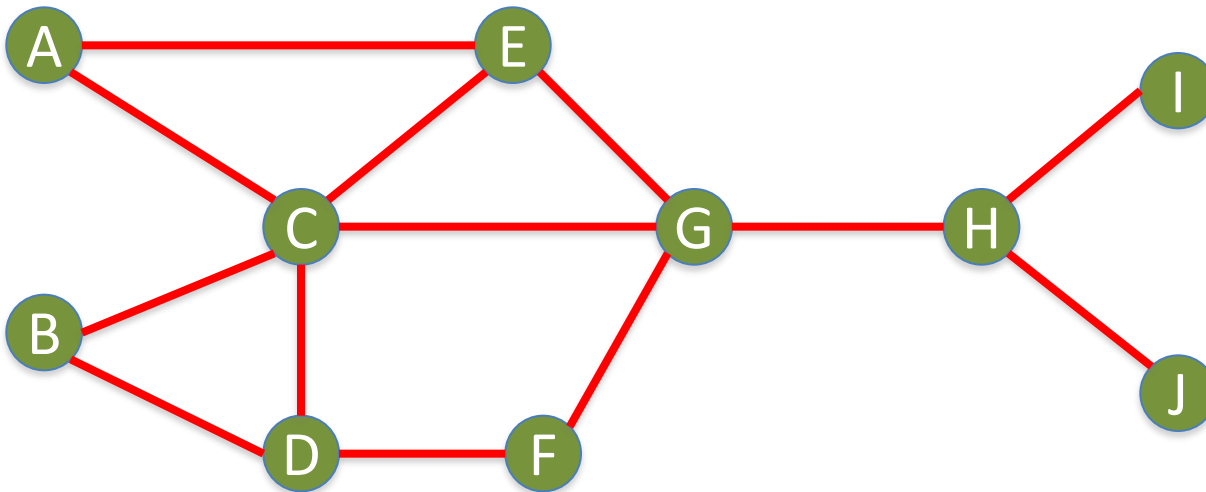
- **Important or prominent actors** are those that are linked or involved with other actors extensively.
- A person with extensive contacts (links) or communications with many other people in the organization is considered more important than a person with relatively fewer contacts.
- The links can also be called **ties**.
A **central actor** is one involved in many ties.

Social Network Analysis (SNA)

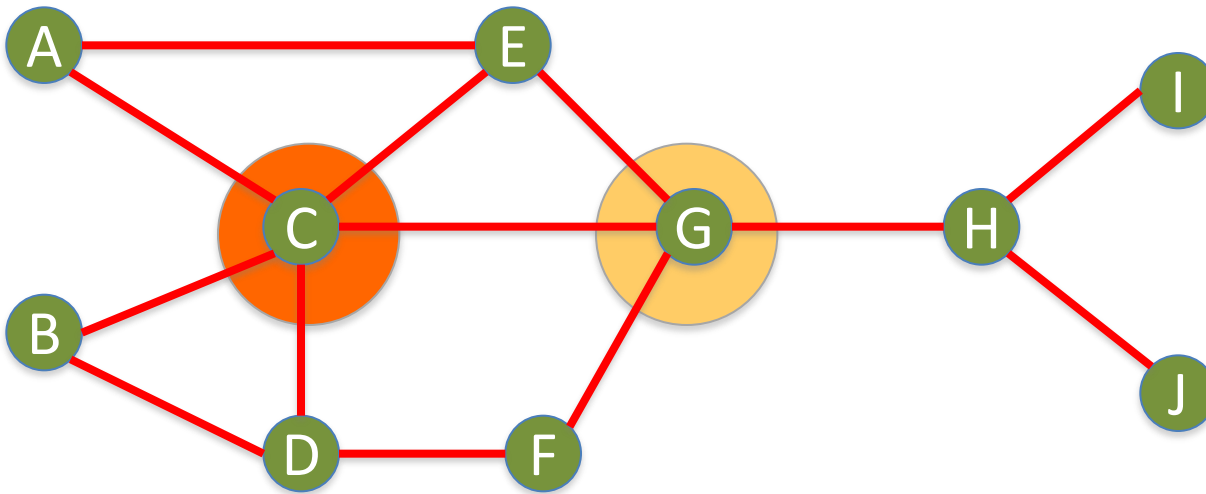
- Degree Centrality
- Betweenness Centrality
- Closeness Centrality

Degree Centrality

Social Network Analysis: Degree Centrality



Social Network Analysis: Degree Centrality



Node	Score	Standardized Score
A	2	$2/10 = 0.2$
B	2	$2/10 = 0.2$
C	5	$5/10 = 0.5$
D	3	$3/10 = 0.3$
E	3	$3/10 = 0.3$
F	2	$2/10 = 0.2$
G	4	$4/10 = 0.4$
H	3	$3/10 = 0.3$
I	1	$1/10 = 0.1$
J	1	$1/10 = 0.1$

Betweenness Centrality

Betweenness centrality:

Connectivity

Number of shortest paths
going through the actor

Betweenness Centrality

$$C_B(i) = \sum_{j < k} g_{ik}(i) / g_{jk}$$

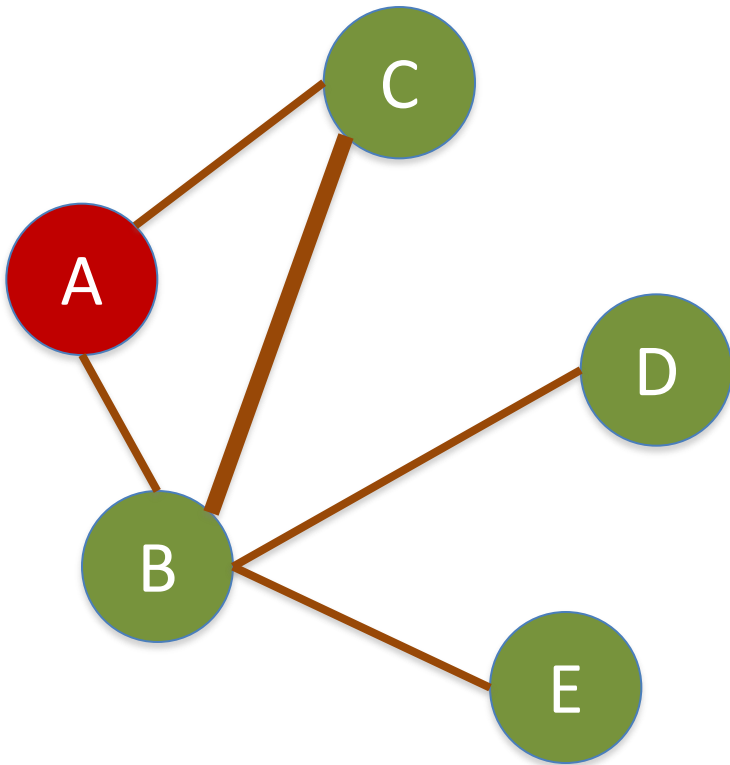
Where g_{jk} = the number of shortest paths connecting jk
 $g_{jk}(i)$ = the number that actor i is on.

Normalized Betweenness Centrality

$$C'_B(i) = C_B(i) / [(n-1)(n-2) / 2]$$

**Number of pairs of vertices
excluding the vertex itself**

Betweenness Centrality



A:

$$B \rightarrow C: 0/1 = 0$$

$$B \rightarrow D: 0/1 = 0$$

$$B \rightarrow E: 0/1 = 0$$

$$C \rightarrow D: 0/1 = 0$$

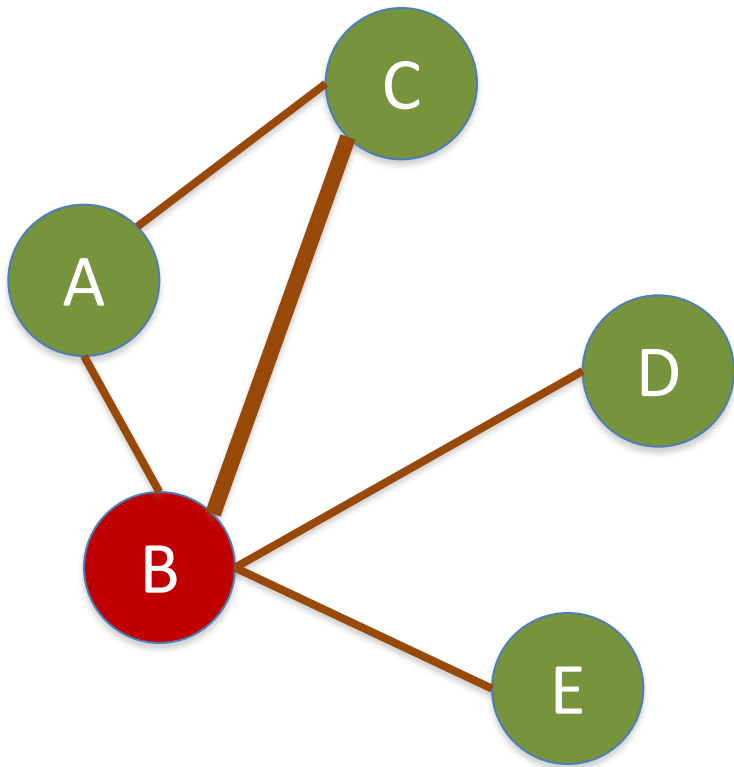
$$C \rightarrow E: 0/1 = 0$$

$$D \rightarrow E: 0/1 = 0$$

Total: 0

A: Betweenness Centrality = 0

Betweenness Centrality



B:

$$A \rightarrow C: 0/1 = 0$$

$$A \rightarrow D: 1/1 = 1$$

$$A \rightarrow E: 1/1 = 1$$

$$C \rightarrow D: 1/1 = 1$$

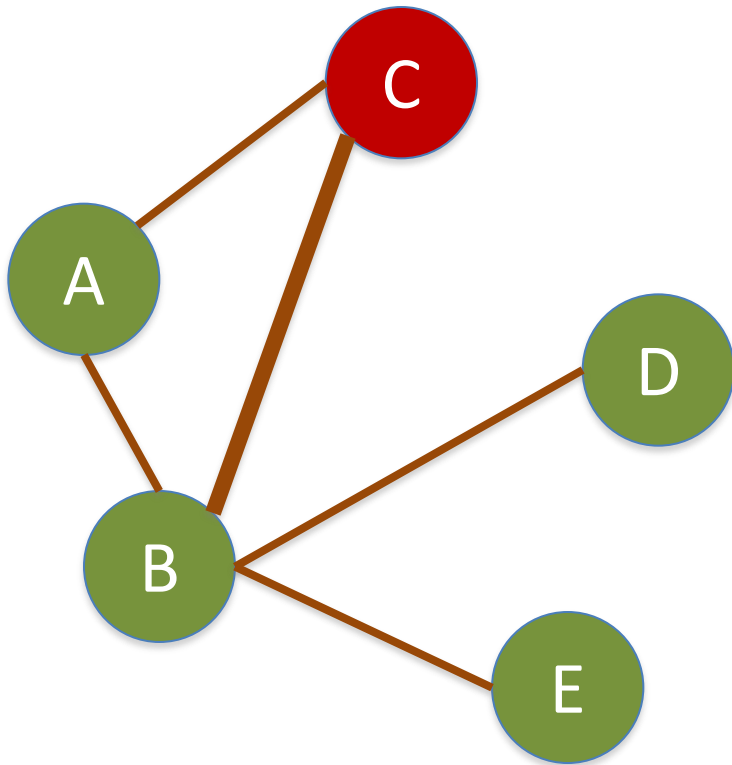
$$C \rightarrow E: 1/1 = 1$$

$$D \rightarrow E: 1/1 = 1$$

Total: 5

B: Betweenness Centrality = 5

Betweenness Centrality



C:

$$A \rightarrow B: 0/1 = 0$$

$$A \rightarrow D: 0/1 = 0$$

$$A \rightarrow E: 0/1 = 0$$

$$B \rightarrow D: 0/1 = 0$$

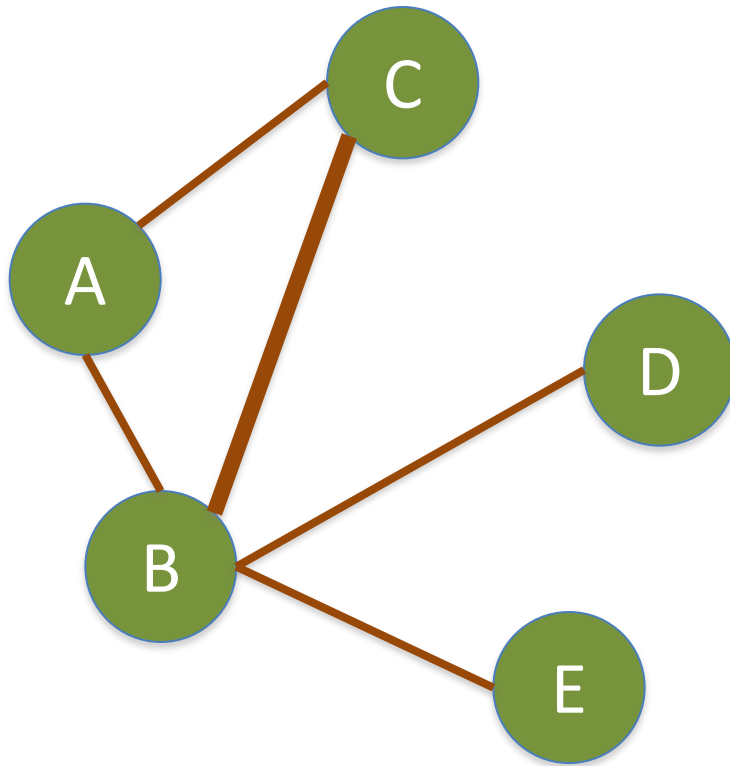
$$B \rightarrow E: 0/1 = 0$$

$$D \rightarrow E: 0/1 = 0$$

Total: 0

C: Betweenness Centrality = 0

Betweenness Centrality



A: 0

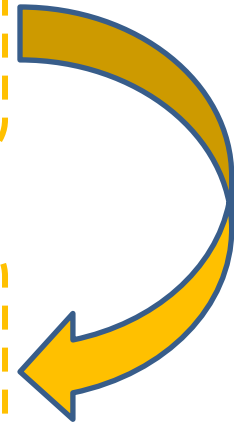
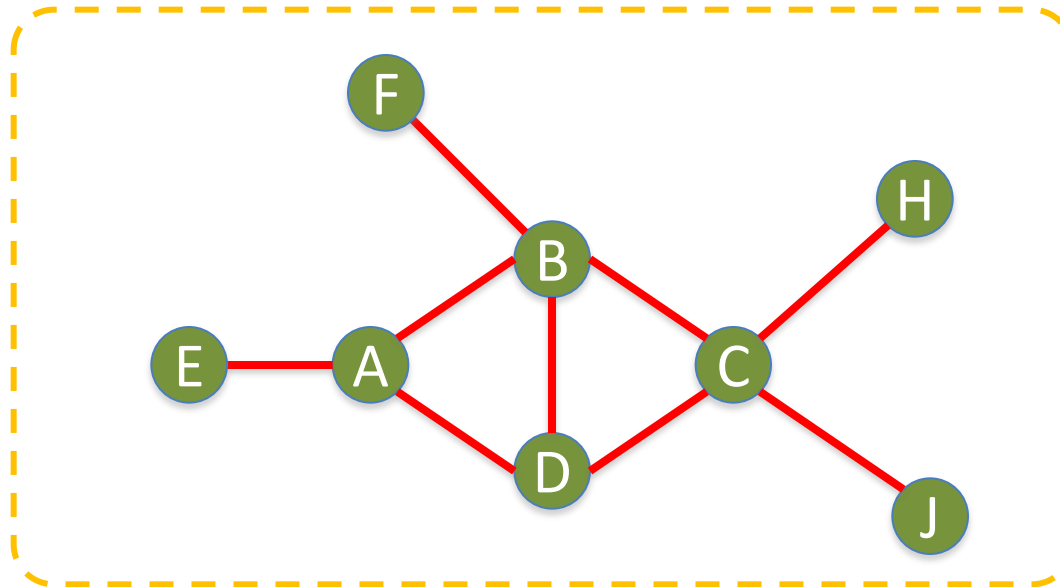
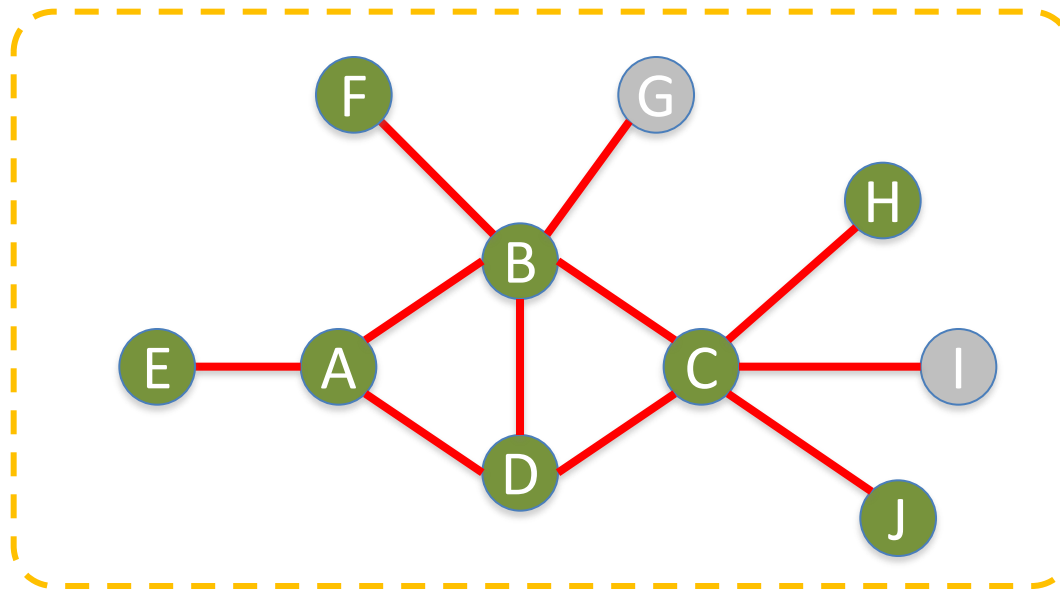
B: 5

C: 0

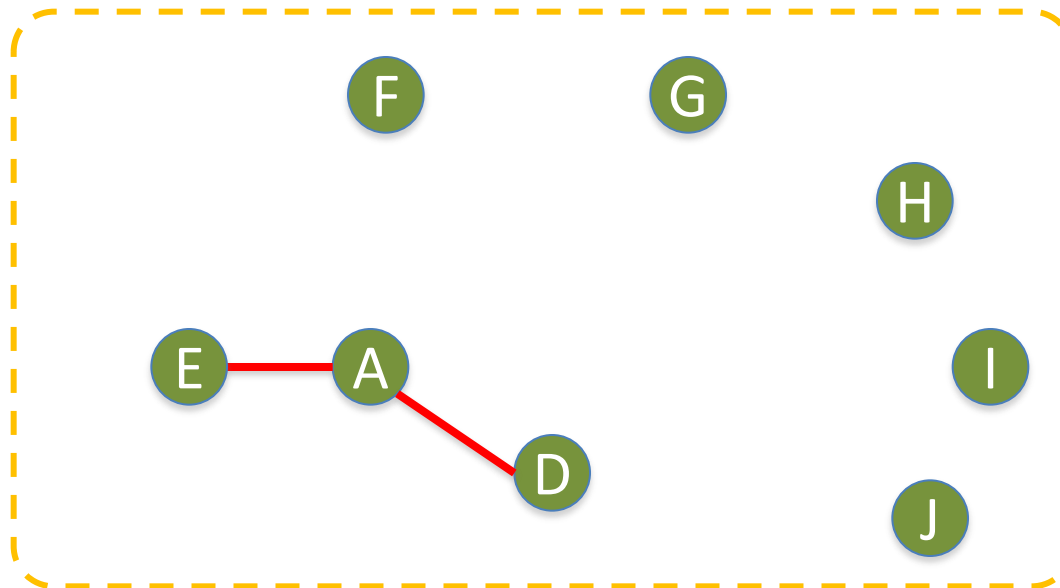
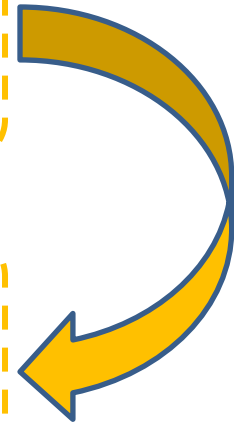
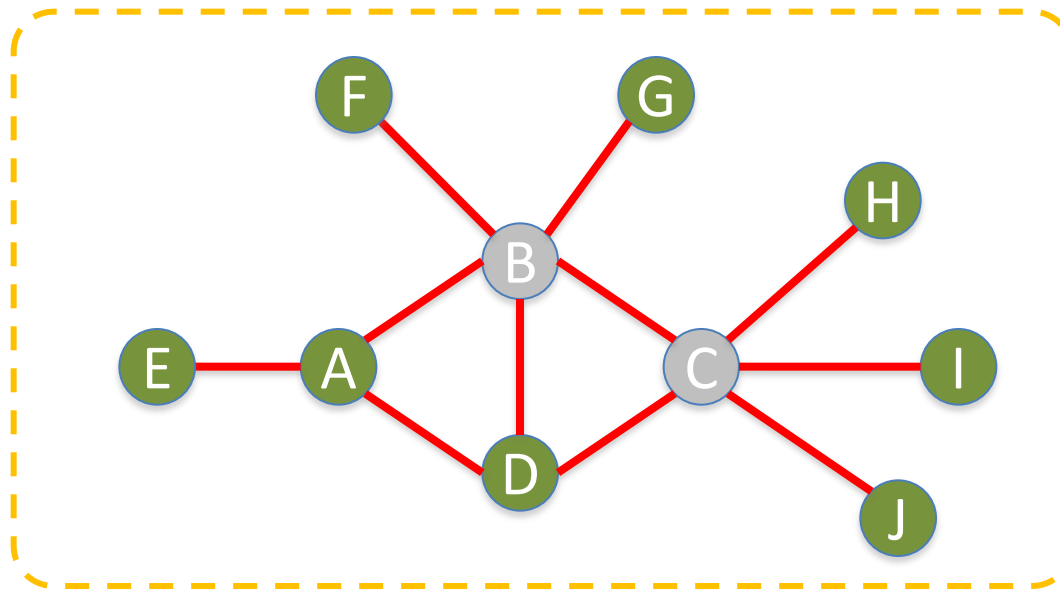
D: 0

E: 0

Which Node is Most **Important**?

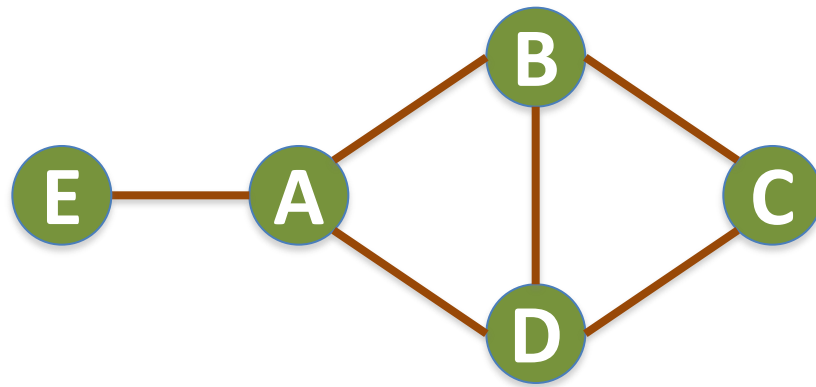


Which Node is Most **Important**?

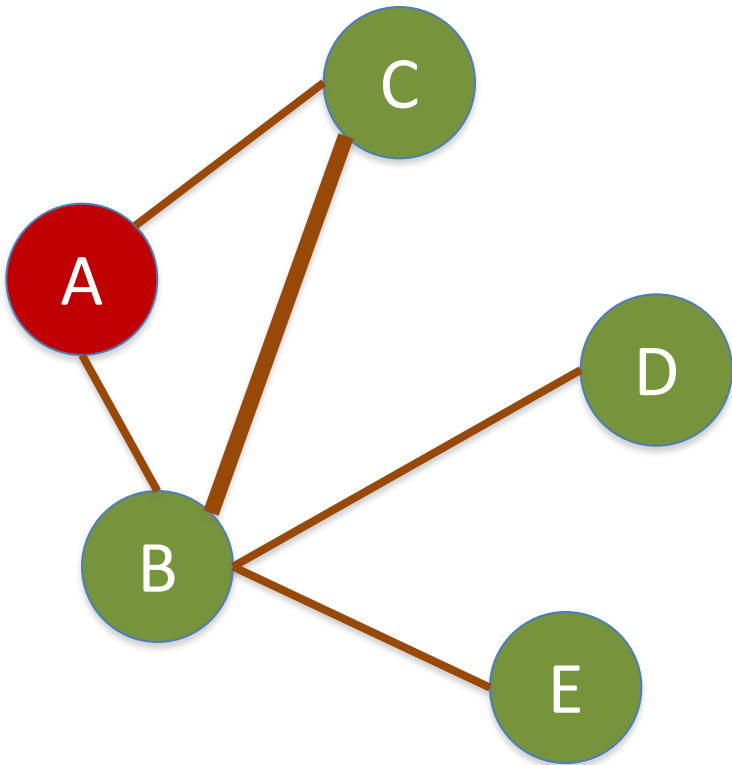


Betweenness Centrality

$$C_B(i) = \sum_{j < k} g_{ik}(i) / g_{jk}$$



Betweenness Centrality



A:

$$B \rightarrow C: 0/1 = 0$$

$$B \rightarrow D: 0/1 = 0$$

$$B \rightarrow E: 0/1 = 0$$

$$C \rightarrow D: 0/1 = 0$$

$$C \rightarrow E: 0/1 = 0$$

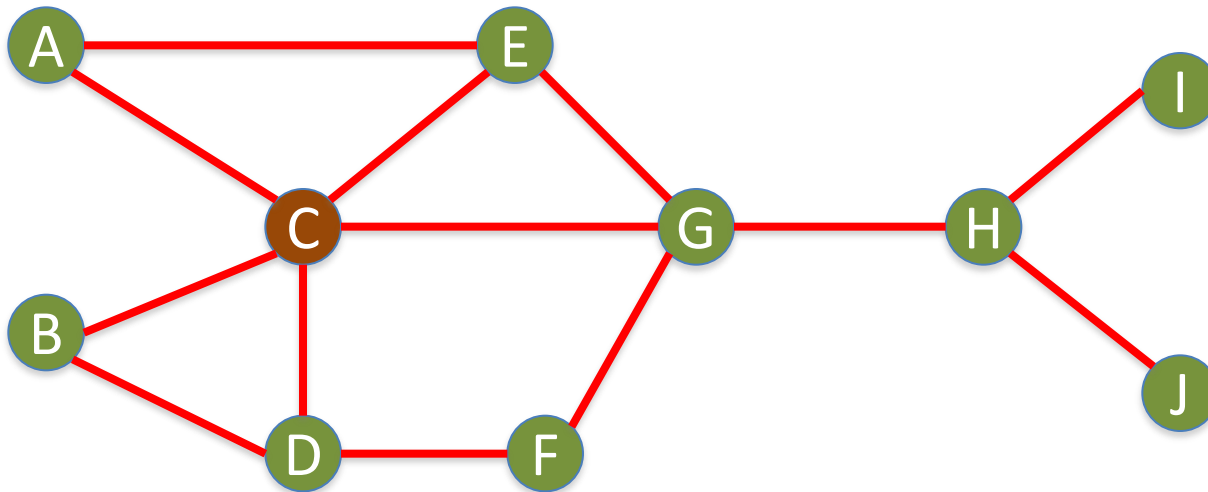
$$D \rightarrow E: 0/1 = 0$$

Total: 0

A: Betweenness Centrality = 0

Closeness
Centrality

Social Network Analysis: Closeness Centrality

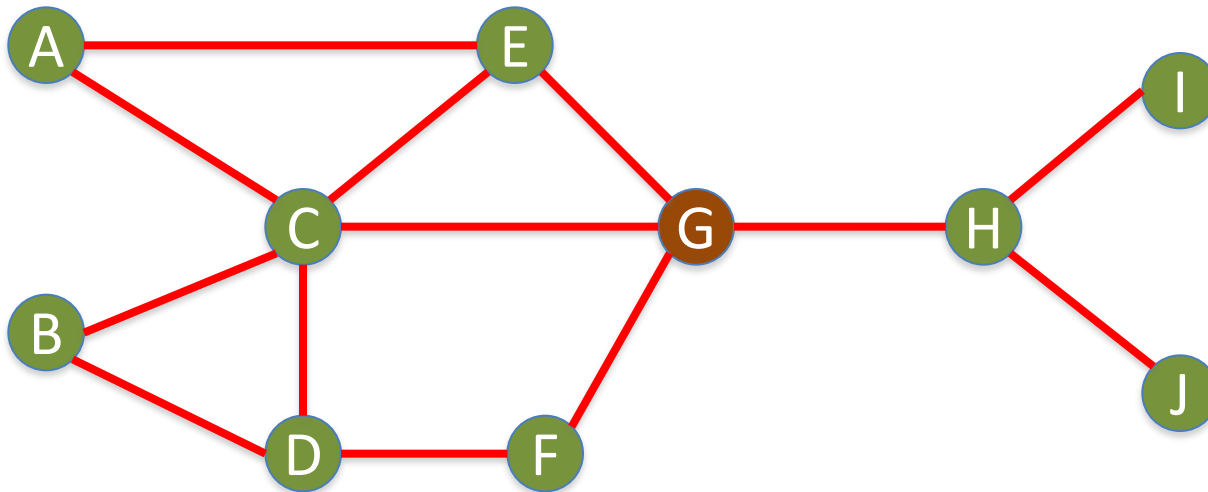


C→A: 1
C→B: 1
C→D: 1
C→E: 1
C→F: 2
C→G: 1
C→H: 2
C→I: 3
C→J: 3

Total=15

C: Closeness Centrality = $15/9 = 1.67$

Social Network Analysis: Closeness Centrality

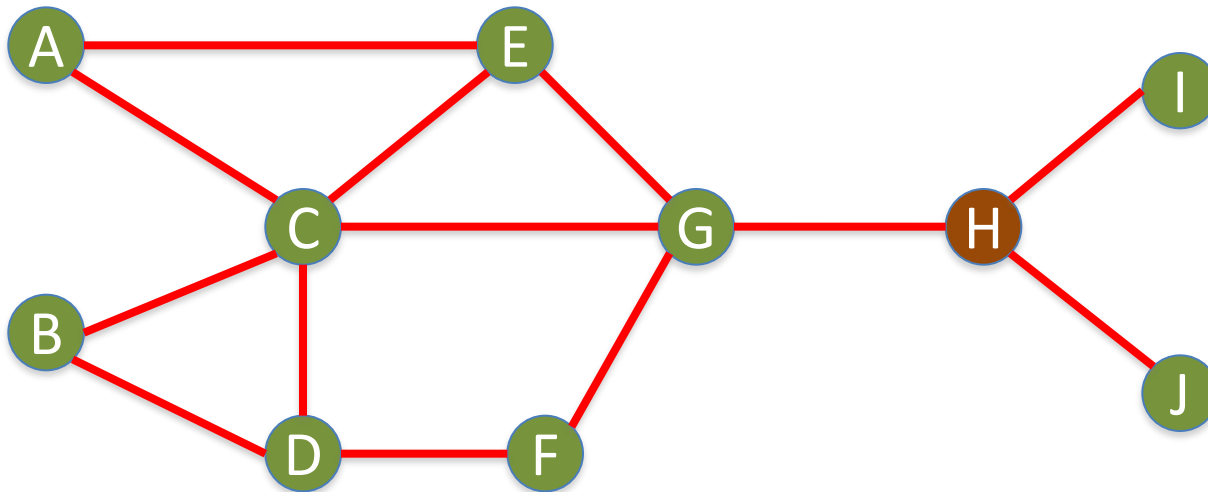


G→A: 2
G→B: 2
G→C: 1
G→D: 2
G→E: 1
G→F: 1
G→H: 1
G→I: 2
G→J: 2

Total=14

G: Closeness Centrality = $14/9 = 1.56$

Social Network Analysis: Closeness Centrality

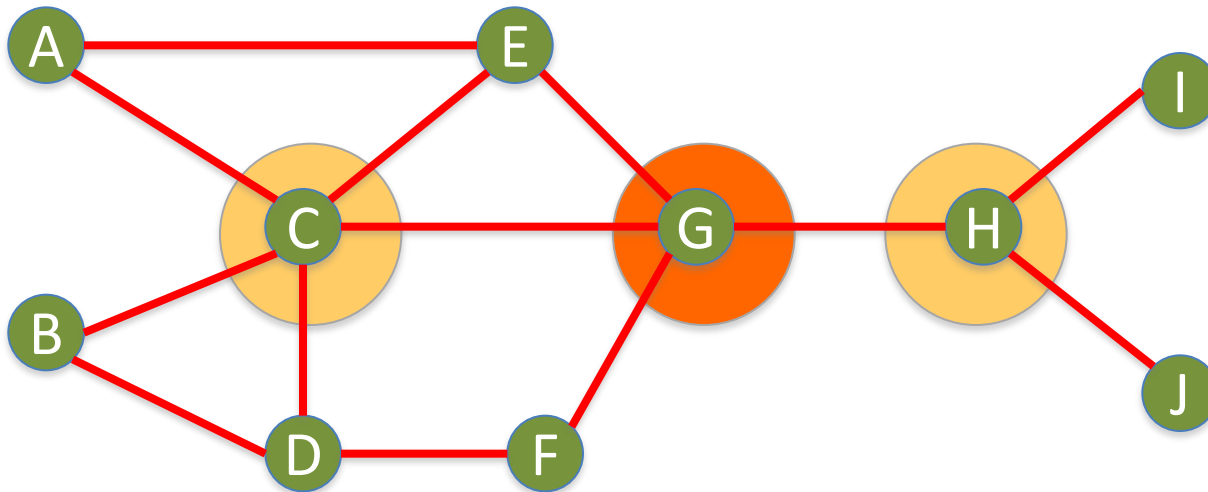


H→A: 3
H→B: 3
H→C: 2
H→D: 2
H→E: 2
H→F: 2
H→G: 1
H→I: 1
H→J: 1

Total=17

H: Closeness Centrality = $17/9 = 1.89$

Social Network Analysis: Closeness Centrality



G: Closeness Centrality = $14/9 = 1.56$ ①

C: Closeness Centrality = $15/9 = 1.67$ ②

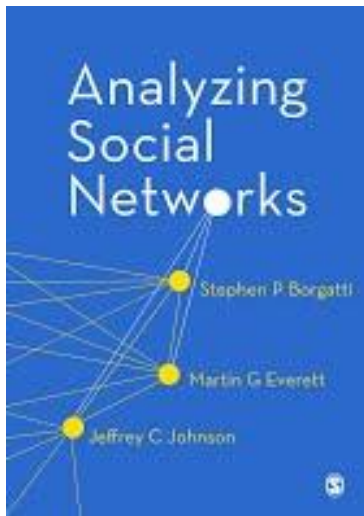
H: Closeness Centrality = $17/9 = 1.89$ ③

Eigenvector centrality:

Importance of a node
depends on
the importance of its neighbors

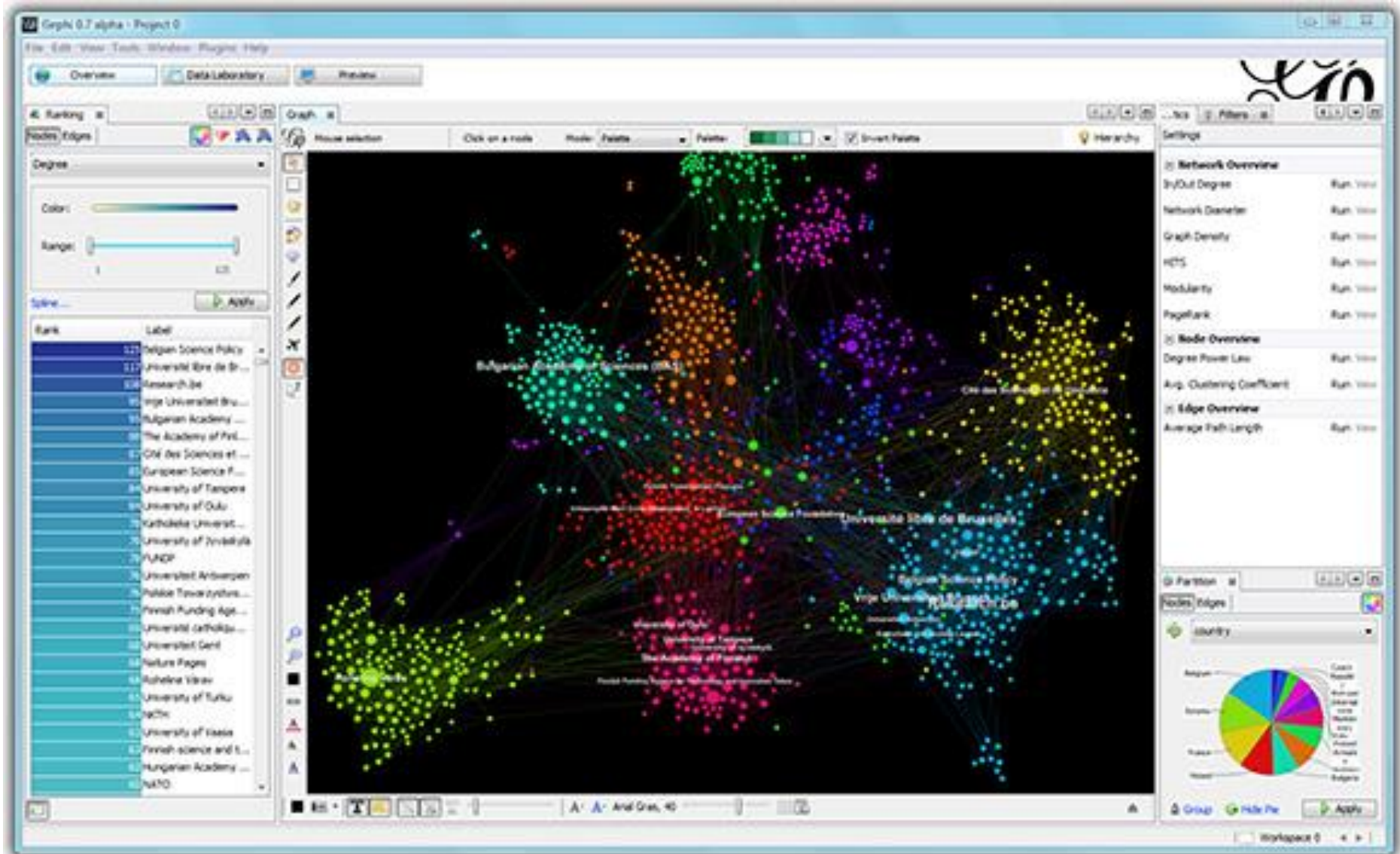
Social Network Analysis (SNA) Tools

- **NetworkX**
- **igraph**
- **Gephi**
- **UCINet**
- **Pajek**



Gephi

The Open Graph Viz Platform



References

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<http://www.search-engines-book.com/>