Social Networks Data Analytics

Prof. Francesco Archetti
Many data are networks
Network science

*Network science* is an interdisciplinary academic field which studies complex networks such as telecommunication networks, computer networks, biological networks, cognitive and semantic networks, and social networks.

- The field draws on theories and methods including graph theory from mathematics, statistical mechanics from physics, data mining and information visualization from computer science, inferential modeling from statistics, and social structure from sociology.

- The National Research Council defines network science as "the study of network representations of physical, biological, and social phenomena leading to predictive models of these phenomena."
Network of interaction or relationships

- On-line/internet enabled social networks
- Stanley Milgram 1968: small-world hypothesis: who hypothesized the likelihood that any pair of actors on the planet are separated by at most six degrees of separation.

- the development of online social networks has made it possible to test such hypotheses at least in an online setting.
  \[\text{the small world phenomenon}\]
- Lukovec (2008) has tested this phenomenon in the context of MSN messenger data, and he shown that the average path length between two MSN messenger users is 6.6.
Different Types of Social Networks

- Skype, Google talk, MSN, Whatsapp
- Facebook, Google+, Twitter, LinkedIn
- Flickr, YouTube, Delicious, My Space
- Sensor networks
- Foursquare, Google latitude (network di prossimità)
Twitter durante l'emergenza: il caso di #bologna #terremoto

• Le 4 P dei social media nell’ emergenza

#prevenzione
#presenza
#prontezza
#pazienza

#terremoto #bologna
20 maggio 2012 ore 4.04 am

giovanni ginocchini (@GGinocchini)

#terremoto a #bologna. andare in strada o rimanere in casa?

5.9 earthquake.usgs.gov/earthquake
#terremoto #Bologna

ore 5.13 am
#terremoto #bologna 29 maggio
29 maggio ore 9 scossa del 5.8 seguita da altre due del 5.1 e 5.3

Forte scossa di #terremoto #bologna: segnalateci danni

Reti mobili e sms off #terremoto #bologna

Aprite le reti wifi #terremoto #bologna

Le reti telefoniche sono sovraccariche/intasate: lasciatela libera per le emergenze #terremoto #bologna
Fattore Twitter

- 2847 tweet con #terremoto #bologna in 9 giorni
- 2709 click su link notizia come comportarsi in caso di terremoto

Panico da #terremoto #bologna
Credibilità acquisita, verifica fonti, rapidità di risposta

@Twiperbole cos'è la storia della scossa in arrivo? La protezione civile stava evacuando la Cassa di Risparmio di piazza Minghetti, mi dice in impiegato.

@Twiperbole banca d'Italia ha fatto evacuare gli uffici + Unipol e Carisbo e gli impiegati sono in piazza Cavour. Sapete qualcosa?

@renzi_rudy @claudia_nt Non è vero nulla e non ci sono ordini di evacuazione.

La Protezione civile dell'Emilia-Romagna smentisce le notizie che stanno circolando in rete su nuove scosse di #terremoto in arrivo

Sisma Emilia: impossibile prevedere numero e intensità di eventuali nuove scosse protezionecivile.gov.it/cms/it/View_c...
In case of emergency, use social media!

Online news is the 3rd most popular source for emergency info.

It’s BEST to call 9-1-1

18% use FB to get information about emergencies.

24% would use social tools to tell others they’re safe.

30% in metro areas would sign up for alerts.

20% in non-metro areas would sign up for alerts.

80% expect emergency responders to monitor social sites.

1 in 5 would try an online channel to get help if unable to reach EMS.

1 in 5 experienced an emergency posted something about it on a social site.

More than 1/3 expect help to arrive within 1 hour of posting need to social site.

Additional items to consider in an Emergency Supply Kit

First Aid Kit

Prescription medications

Whistle

Cell phone with charger

Social Medias Used during Emergencies

What is Social Media?
Technology enabled social interaction.
Community-based interaction.

Top 5 Social Networks

Facebook

Twitter

YouTube

Google+

LinkedIn

Top 3 Social Media Tools, FEMA

Facebook

Twitter

YouTube

Importance of Social Media in Emergency Management, FEMA

Provides the tools needed to minimize the communication gap and participate effectively in an active, ongoing dialogue.

Allows quick and specific sharing of information with state and local governments as well as the public.

Helps disseminate important information to individuals and communities.

Allows receiving of essential real-time updates from those with first-hand awareness.

Imperative to emergency management because the public uses these communication tools regularly.
Benefits of using social media in emergency

**BEFORE**
- Helps people be better prepared for a disaster.
- Helps communities understand the extent to which organizations go to keep their communities prepared.

**DURING**
- Communicate directly with disaster-impacted residents, their families, reporters and volunteer organizations.
- Rumor control becomes easier as the public can turn to your organization for validation.
- Provides the capability of sharing information as soon as it is available.

**AFTER**
- Social media tools bring the community together—everyone can easily discuss the event and share information.
- Information about aid can be dispersed and easily shared.
- Provides the ability to post pictures of damaged areas or quickly coordinate recovery efforts.

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**Types of Natural Disasters in the United States & Caribbean**

<table>
<thead>
<tr>
<th>Type</th>
<th>Year</th>
<th>Fatalities</th>
<th>Disaster</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane</td>
<td>2005</td>
<td>1,836</td>
<td>Hurricane Katrina</td>
<td>Florida, Louisiana, Mississippi, Alaska</td>
</tr>
<tr>
<td>Tornado</td>
<td>2011</td>
<td>316</td>
<td>Tornado outbreaks</td>
<td>Midwestern US, Southern US, Southern Atlantic</td>
</tr>
<tr>
<td>Tsunami</td>
<td>2009</td>
<td>1</td>
<td>Samoa earthquake</td>
<td>American Samoa and nearby islands</td>
</tr>
<tr>
<td>Earthquake</td>
<td>2010</td>
<td>316,000</td>
<td>Haiti earthquake</td>
<td>Haiti</td>
</tr>
<tr>
<td>Flood</td>
<td>2010</td>
<td>20</td>
<td>Mississippi River floods</td>
<td>Mississippi River Valley</td>
</tr>
<tr>
<td>Wildfire</td>
<td>2007</td>
<td>14</td>
<td>California wildfires</td>
<td>California</td>
</tr>
</tbody>
</table>

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**US Government Agencies that use social media**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Dept</th>
<th>Facebook</th>
<th>Twitter</th>
<th>YouTube</th>
<th>Flickr</th>
</tr>
</thead>
<tbody>
<tr>
<td>White House</td>
<td>White House</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>USDA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Commerce</td>
<td>DOC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Defense</td>
<td>DOD</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Education</td>
<td>ED</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>Energy</td>
<td>DOE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>NASA</td>
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<tr>
<td>Interior</td>
<td>DOI</td>
<td>✓</td>
<td>✓</td>
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<td></td>
</tr>
<tr>
<td>Justice</td>
<td>DOJ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

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**Social Media in the Most Recent Disasters in the US**

<table>
<thead>
<tr>
<th>Disaster Type</th>
<th>Twitter</th>
<th>Facebook Page</th>
<th>Likes</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Coast Earthquake</td>
<td>40,000 Tweets</td>
<td>National Hurricane Center</td>
<td>15,000 Likes</td>
</tr>
<tr>
<td>Hurricane Irene</td>
<td>12,000 Tweets</td>
<td>Hurricane Irene “Community” Page</td>
<td>16,000 Likes</td>
</tr>
</tbody>
</table>

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**Social Media on Major Catastrophes Worldwide**

- **Japan Earthquake**: People used social media to determine the whereabouts and well-being of their loved ones.
- **Haiti Earthquake**: Donors are using Twitter, Facebook, and blogs to ask questions about their giving and endorse favorite charities.
Smartphone Apps, the Next Step for Social Media and Emergency Management?

Posted on January 9, 2013 | 3 Comments

Post by: Kim Stephens

One thing we are hearing loud and clear from the January, 2013 Australian bushfire disaster is that people are turning to social media for information. This is demonstrated by a quote from Stuart Howie of “The Border Mail” in an article titled “Opinion: Social media a life saver.”

Indeed yesterday, as bushfires swept across large tracts of land in New South Wales and destroyed properties in Victoria, social media helped save lives. Just as it is hard to predict what the winds of change will do

http://idisaster.wordpress.com/
Uses of SNS for Emergency Management

When asked what an online social network would be good for where respondents could select from among a list of features, the outcome was:

- Share Docs, files, digital resources
- Communicating with Other
- Locating Experts
- Sharing Information
- Networking
- Uploading Videos
Different people from different places could work together and share information.

One primary problem with an emergency is that the people in charge must interact on an ongoing basis with the media giving updates.

- This is very time consuming and means that everyone in charge has to be somewhere at one time and devote this time when other responsibilities that may be critical await their attention.

Using a SNS to post videos and announcements to update the public would be more time and cost efficient than using traditional media outlets.

Ad-hoc group formation, the collaboration of experts from different agencies and the ability in general to have cross-agency communications were also seen as advantages of using SNS in the emergency domain.

Subjects were particularly interested in finding experts in the field, especially when the need is immediate.

Matching specialty skills to help quickly identify and locate those who would be most useful to handle the exigencies of the moment was seen as vitally important.

The SNS was seen as beneficial during an emergency as well as in preparation for and in response to it.
A Framework for Disaster Research on Social Networks

Social network disaster research following Hurricane Katrina: social network analysis of survey data from a random sample of New Orleans residents:

- The nodes in these networks define roles
- Edges represent a help relationship, indicating whether a node supplied assistance to another node
- Over time, the kind of help needed and the sources of assistance changed, and selected covariates are important in describing this change

Analyze the network for potential points of failure and adjust resource allocations accordingly

Organizations within the Petroleum, Transportation, Animal, and Forestry sectors were closely coordinating among themselves but not with the overall Emergency Management effort.

In/Out/ Seeker/ Provider (IOSP) framework: identifies the categories in which we might study disasters and the impact both on the networks and the impacts to the networks

Human disease network
Internet enabled smart cities

• Energy, traffic, water, health care, logistics are supported by internet enabled applications
• We now have the ability to measure, sense and monitor the condition of almost everything

30 billion
By 2010, 30 billion RFID tags have embedded into our world and across entire ecosystems.

1 billion
More than 1 billion camera phones in existence.

85%
85% of new automobiles contain event data recorders.
Analysis of painting

• **Pollock, Jackson** (1912-56). American painter, the commanding figure of the Abstract Expressionist movement.

1950 (350 Kb); Oil on canvas, Oil, enamel, and aluminum on canvas; 221 x 300 cm (7 ft 3 in x 9 ft 10 in); National Gallery of Art, Washington, D.C.

Number 8, 1949 (detail)
1949 (280 Kb); Oil, enamel, and aluminum paint on canvas; Neuberger Museum, State University of New York
GNUTELLA network
(a Peer-to-peer (P2P) file-sharing networks)

Snapshot of a local gnutella peer network in a particular neighbourhood.

Legend

\( p \) servant looking for a resource
\( s \) servants willing to offer the requested resource

- **Nodes** represent hosts in the Gnutella network topology
- **Edges** represent connections between the Gnutella hosts.
A key aspect of many of the online social networks is that they are rich in data, and provide unprecedented challenges and opportunities from the perspective of knowledge discovery and data mining. Two kinds of data analyzed in the context of social networks:

- **Linkage-based and Structural Analysis**: analysis of the linkage behavior of the network in order to determine important nodes, communities, links, and evolving regions of the network. Such analysis provides a good overview of the global evolution behavior of the underlying network.

- **Adding Content-based Analysis**: Many social networks such as *Flickr*, *Message Networks*, and *Youtube* contain a tremendous amount of content which can be leveraged in order to improve the quality of the analysis. For example, a photograph sharing site such as Flickr contains a tremendous amount of text and image information in the form of user-tags and images. It has been observed that combining content-based analysis with linkage-based analysis provides more effective results in a wide variety of applications.
Main issues

• Analisi statistica di SN:
  – connettività, struttura
• Ranking:
  – page rank
  – Google
• Community detection and content analysis
• Node classification
• Reti dinamiche:
  – come cambiano nel tempo le reti e le comunità?
• Analisi di influenza:
  – come modelliamo l’influenza tra gli attori? come si diffonde? chi sono gli attori più influenti?
• Scoperta degli esperti in un Network
• Link prediction:
  – links dinamici?
• Privacy
• Visualizzazione
How social intelligence can guide decisions

• Many people who have expert knowledge and shape perceptions about markets are freely exchanging data and viewpoints thru social platforms

• Primary sources
  – expert, competitors, employees, suppliers

• Secondary sources
  – published data, competitors, employees, suppliers
Social media and the Intelligence cycle

- Early signals are far too weak for traditional web analysis to spot by key word scanning: argument mining or semantic extraction would have exposed the trouble at an early stage.
New Analytical Tools

- Social analyst to engage an on-line community of trend spotters to become hunters rather than gatherer of information.

- **New generation of analytics:**
  - network mapping and influence—rating metrics

- Moving away from published and proprietary sources to the chaotic world of social platforms

- New skills and a willingness to engage in social conversations rather than only assembling information

<table>
<thead>
<tr>
<th>Objective</th>
<th>Traditional tool kit</th>
<th>Social-intelligence tool kit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry dynamics</strong></td>
<td>• Porter’s five forces (analysis of forces at work)</td>
<td>• Network intelligence: analyzing real-time reactions across industry players, responses to changes</td>
</tr>
<tr>
<td></td>
<td>• Structure, conduct, performance (SCP)</td>
<td>• Examples: Alterian, TweetReach</td>
</tr>
<tr>
<td></td>
<td>• Value chain analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Analysis of consolidation/fragmentation</td>
<td></td>
</tr>
<tr>
<td><strong>Competitive landscape</strong></td>
<td>• War game and game theory analysis</td>
<td>• Real-time competitive intelligence: tracking revenue growth and product usage, marketing success, brand mentions</td>
</tr>
<tr>
<td></td>
<td>• Benchmarking</td>
<td>• Examples: BoardReader, Radian6, SociaLite, SociaLite, SociaLite, SociaLite, SociaLite, SociaLite</td>
</tr>
<tr>
<td></td>
<td>• Cost structure comparison</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Psychological profiling</td>
<td></td>
</tr>
<tr>
<td><strong>Future trends</strong></td>
<td>• Trend interaction analysis</td>
<td>• Crowd intelligence: tapping into followers and fans for new insights and innovations</td>
</tr>
<tr>
<td></td>
<td>• Granular opportunities</td>
<td>• Weak-signal analysis: identifying emerging trends early</td>
</tr>
<tr>
<td></td>
<td>• Scenario planning</td>
<td>• Examples: Facebook, LinkedIn, Glassdoor.com</td>
</tr>
<tr>
<td></td>
<td>• Competitive trend exposure (benchmarking exposure to trends vis-à-vis peers)</td>
<td></td>
</tr>
<tr>
<td><strong>Opportunity/ market sizing</strong></td>
<td>• Market sizing by triangulation</td>
<td>• Live testing: getting direct feedback from users on new products/ideas</td>
</tr>
<tr>
<td></td>
<td>• Estimation of achievable customer base in a previously undefined market</td>
<td>• Data mining: using text-analytics to estimate market size</td>
</tr>
<tr>
<td></td>
<td>• Penetration of addressable market</td>
<td>• Examples: Attensity, Autonomy</td>
</tr>
<tr>
<td><strong>Customer insights</strong></td>
<td>• Focus groups and customer interviews/surveys</td>
<td>• Sentiment analysis: estimating buzz around product or service</td>
</tr>
</tbody>
</table>
• Alterian empowers organisations to create relevant, effective and engaging experiences with their audience that help build value and reinforce commitment to their brand, through the use of the Alterian Integrated Marketing Platform.
• Alterian drives the transformation of marketing and communications, making it practical and cost-effective for companies to orchestrate multichannel engagement with the individual.
• Alterian’s unprecedented integration of analytics, content and execution through industry leading tools, such as the Dynamic Messenger email platform, SM2 Social Media Monitoring platform and the award winning Content Management solutions, enables companies to build integrated communication strategies which create a true picture of the individual.
• Alterian works with marketing services partners, system integrators and agencies who recognize the need to plan and deliver coordinated customer engagement services in partnership with their clients.
Social intelligence toolkit: industry dynamics

Need to measure the reach of your brand, marketing campaign or event on Twitter? TweetReach can help! Thousands of agencies, marketers, event producers, and publicists use TweetReach to measure the impact of their Twitter campaigns. And you can, too.

http://tweetreach.com/

WHAT DOES TWEETREACH MEASURE?

REACH
What is the size of your potential audience? Measure the scope and impact of conversation about your campaign.

ENGAGEMENT
How are people talking about your campaign? Learn more about conversation flows and interactions.

CONTENT
What are people talking about? Understand which topics are generating the most buzz.

CONTRIBUTORS
Who is talking about your campaign? Discover influencers and advocates who drive the conversation forward.
Social intelligence toolkit: competitive landscape

boardreader™
Connecting Communities through Search

http://boardreader.com/

A search engine for Forums and Boards.

Salesforce Marketing Cloud empowers brands to succeed in today's new marketing landscape with the world's only unified social marketing suite. It unites the capabilities of the industry leaders in social marketing and social listening – Buddy Media and Radian6 – to help brands make better business decisions in marketing, sales and service.

http://www.radian6.com/
http://www.socialbakers.com
Facebook monitoring helps to improve your business and social media marketing strategy in every country. Currently, there are 23,123,620 Facebook users in Italy, which makes it #11 in the ranking of all Facebook statistics by Country.

Also, feel free to try our professional social media monitoring tool Analytics PRO – monitor the situation on the market, track and analyze your fans’ engagement on your Facebook page, identify key influencers, response rates, and much more. Easily generate the data, compare them with your competitors or with the top brands in your field.

Are you active in multiple markets? Monitor your target audience across markets based on their interests with Market Insights!

**TOP 5**

<table>
<thead>
<tr>
<th>#</th>
<th>Page</th>
<th>Fans</th>
<th>PTA</th>
<th>ER</th>
<th>RR</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nutella</td>
<td>4,591,646</td>
<td>64,033</td>
<td>0.034%</td>
<td>N/A</td>
<td>47%</td>
</tr>
<tr>
<td>2</td>
<td>Kinder Cioccolato</td>
<td>2,461,093</td>
<td>16,131</td>
<td>0.824%</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>3</td>
<td>Disaronno</td>
<td>2,001,079</td>
<td>23,468</td>
<td>0.133%</td>
<td>N/A</td>
<td>66%</td>
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<tr>
<td>4</td>
<td>Pan di Stelle</td>
<td>1,632,748</td>
<td>3,888</td>
<td>0.277%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>Novia Italia</td>
<td>1,003,309</td>
<td>67,475</td>
<td>0.008%</td>
<td>N/A</td>
<td>64%</td>
</tr>
</tbody>
</table>

**TOP 5 Places**

<table>
<thead>
<tr>
<th>#</th>
<th>Page</th>
<th>Fans</th>
<th>PTA</th>
<th>ER</th>
<th>RR</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A.C. Milan</td>
<td>13,494,322</td>
<td>302,138</td>
<td>0.133%</td>
<td>N/A</td>
<td>76%</td>
</tr>
<tr>
<td>2</td>
<td>Juventus</td>
<td>4,720,313</td>
<td>159,322</td>
<td>0.365%</td>
<td>N/A</td>
<td>74%</td>
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<tr>
<td>3</td>
<td>F.C. Internazionale Milano</td>
<td>1,896,682</td>
<td>49,416</td>
<td>0.030%</td>
<td>N/A</td>
<td>29%</td>
</tr>
<tr>
<td>4</td>
<td>AS Roma</td>
<td>1,425,248</td>
<td>77,985</td>
<td>0.189%</td>
<td>N/A</td>
<td>62%</td>
</tr>
<tr>
<td>5</td>
<td>SSC Napoli - Official Page</td>
<td>720,128</td>
<td>5,473</td>
<td>0.042%</td>
<td>N/A</td>
<td>34%</td>
</tr>
</tbody>
</table>
### Analyst Salaries in Milano (Italy)

Updated Dec 4, 2012 - Salaries posted anonymously by employees and employers.

<table>
<thead>
<tr>
<th>Company</th>
<th>Avg Salary</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accenture</td>
<td>€24,075</td>
<td>€23k</td>
<td>€25k</td>
</tr>
<tr>
<td>Business Analyst</td>
<td>€24,638</td>
<td>€23k</td>
<td>€27k</td>
</tr>
<tr>
<td>Programmer Analyst</td>
<td>n/a</td>
<td>Details hidden to protect anonymity</td>
<td></td>
</tr>
</tbody>
</table>

**More Accenture Analyst Salaries**
- 9 Salaries for 5 Job Titles in Milano (600 in Italy)

### Looking for a job? See featured jobs below or try Analyst Jobs in Milano

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance Analyst - Fixed Term</td>
<td>State Street - Milano (Italy)</td>
</tr>
<tr>
<td>Compliance Analyst, Officer</td>
<td>State Street - Milano (Italy)</td>
</tr>
</tbody>
</table>

**Avanade Salaries**
- 2 Avanade Salaries in Milano (61 in Italy)

**Deloitte Salaries**
- 2 Deloitte Salaries in Milano (42 in Italy)

**UniCredit (Italy) Salaries**
- 1 UniCredit (Italy) Salary in Milano

**McKinsey & Company Salaries**
- 1 McKinsey & Company Salary in Milano

[http://www.glassdoor.com](http://www.glassdoor.com)

An inside look at jobs & companies!

[http://www.linkedin.com](http://www.linkedin.com)
Opportunity, marketing sizing

Real-Time Social Media Data Feed for the Enterprise
The Attensity Pipeline delivers fully annotated social data in seconds.

Attensity

http://www.attensity.com/

Autonomy, an HP company, is a market-leading software company that helps organizations all over the world understand the meaning in information. A pioneer in its industry, Autonomy's unique meaning-based technology is able to make sense of and process unstructured, 'human information,' and draw real business value from that meaning.

http://www.autonomy.com/
Leader in applying social media to solve marketing problems

http://nmincite.com/
Real-time social media search and analysis

http://socialmention.com

allows you to set up social media alerts so you can measure awareness for specific keyword

SocMetrics Topical Influencer Platform

“We provide a Web-based self-service platform that helps you to Identify existing influencers, Understand the most promising advocates Engage your target list in authentic ways, Drive your desired messages and actions Monitor and analyze campaign ROI”

Discover the influencers who matter most to you.
The "noise" generated online grows exponentially as the conversation migrates to social media. Instead of helping you access the timely, accurate, and actionable information you need, media databases and social media monitoring tools contribute to burying the signal into the noise of social content. Traackr identifies people, not meaningless activity. We instantly deliver the influencers that matter most to you, based on your targeted keywords, using our unique three-dimensional analysis for each influencer: Reach (audience size), Resonance (ability to engage their community), and Relevance (to your specific context).