PROSPECTIVE IN MULTIMEDIA SEARCH

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To Understand Future of Search:

Name 3 most popular companies that emerged in the last 3 years.

- YouTube
- Facebook
- Twitter
This is a growth pattern I have never seen in terms of speed - not in the nearly 25 years I've been watching this industry. --- John Battelle
Name 3 most popular Internet concepts in the last 3 years.

- Social Networks
- Micro-blogging (Ambient Awareness)
- Tags

Interestingly, they did not come from GYM or Academia.
Interesting!!!

- YouTube
- Facebook
- Twitter

- Social Networks
- Microblogging
- Tags

What does this tell us?
Message for Multimedia Search
Community

People want:

- New media: Text based media is not enough.
- Experiences: People want to experience and share experiences – with minimal latency.
- Socialize: Family and friends remain a strong influence in all facets of life.
  - Family and friends are closer to each other today than ever!!!
Emerging Landscape of Search

- People, particularly media and venture capitalists, like to talk about the NEXT GOOGLE.
Swine Flu Epidemics

While it was later discovered that the disease, called Legionnaire’s Disease, was caused by a relatively unknown bacteria, and was in no way connected to swine flu, the press had already played its part. First of all, it would be ridiculous to renounce the NIIP because the swine flu never occurred.

www.haverford.edu/biology/edwards/disease/viral_essays/warnervirus.html

Swine Flu and the Fog of Epidemics | CDC EID

In the case of swine flu, we may have acted too soon. Read the book by Neustadt and Fineberg (3) for a full account of our perceived folly in regard to swine flu. Throughout the spring and summer, we monitored carefully for swine flu elsewhere in the world, particularly in the Southern Hemisphere, where it was winter.

www.cdc.gov/ncidod/EID/vol12no01/05-1152.htm

CDC - Swine Influenza (Flu) | Key Facts About Swine Influenza...

In follow-up studies, 76% of swine exhibitors tested had antibody evidence of swine flu infection but no serious illnesses were detected among this group. What other examples of swine flu outbreaks are there? Probably most well known is an outbreak of swine flu among soldiers in Fort Dix, New Jersey in 1976.

www.cdc.gov/flu/swine/

Swine Flu Virus Turns Epidemic | swine influenza virus (SIV)

Home » Magazine Articles » Swine Flu Virus Turns Epidemic.

Swine Flu Virus Turns Epidemic

As we look at genetic differences between the various swine flu virus strains isolated in our practice area, and within farms, we will see the virus change.
Real Time Search

Twitter search results for "UCI Gun" showing various tweets related to the topic.
What are you doing?

Latest: ex duracet chairman to lead new chrysler. sorry this doesn't keep going and going and going http://bit.ly/1H8tW about 11 hours ago

Real-time results for Swine Flu

37 more results since you started searching. Refresh to see them.

frenchie http://www.newst.in.co.uk/tag/uk/122595571 NO! Marc has Swine Flu?!
less than 5 seconds ago from web

el_friendo RT: @TheOnion Swine Flu Season Is Really Flu-ing
less than 20 seconds ago from web

cybillegayle Swine Flu in the Phillipines. OH NO http://bit.ly/3dr1V
half a minute ago from web

wurdsmyth H1N1 (swine flu) susceptibility linked to common levels of arsenic exposure- http://twuri.nl/kmi50v
1 minute ago from TweetDeck

Mountiehunter wonder if I caught swine flu on the boat or in Amsterdam hmmm
2 minutes ago from Power Twitter
Maryland Has 33 Confirmed Swine Flu Cases - Health News Story - WBAL Baltimore...

BALTIMORE — Maryland health officials said the number of confirmed swine flu cases in the state has risen to 33. Health department spokeswoman Karen...

http://www.wbal.com/health/10492526/detail.html

YouTube - Mass. Readies For Martial Law Over Swine F...

4:31 mins

YouTube

BBC NEWS | Americas | Teacher with swine flu dies in ...

Tributes have been paid to Mitchell Wiener. An assistant headteacher with swine flu has died in New York - the city's first death linked to the disease...

http://news.bbc.co.uk/2/hi/americas/8056204.stm
Swine influenza

Swine influenza is a kind of influenza caused by those strains of influenza virus, called swine (SIV), that usually infect (is endemic in) pigs. As of 2009 these strains are all found in Influenza C virus and the subtypes of Influenza A H1N2, H3N1, H3N2, and H2N3. Swine influenza is common in pigs in the midwest United States (and occasionally in other states), in America, Europe (including the United Kingdom, Sweden, and Italy), Kenya, Mainland China, Taiwan, Japan and other parts of eastern Asia. Transmission of swine influenza virus from pigs to humans is not common and does not always cause human influenza, often only result in antibodies in the blood. The meat of the animal poses no risk of transmitting the virus when properly cooked. If transmission does cause it, it is called zoonotic swine flu. People who work with pigs, especially people with intense exposures, are at increased risk of catching swine flu. Identification of influenza subtypes became possible, which allows accurate diagnosis of transmission to humans. Since then, fifty transmissions have been recorded. Rarely, these strains of swine flu can pass from human to human. In humans, the symptoms of swine influenza and of influenza-like illness in general, namely chills, fever, sore throat, muscle pains, severe headache, coughing, weakness, and discomfort.

The 2009 flu outbreak in humans, known as "swine flu", is due to a new strain of influenza A virus subtype H1N1 that contains genes close to influenza. The origin of this new strain is unknown. However, the World Organization for Animal Health (OIE) reports that this strain has pigs. This strain can be transmitted from human to human and causes the normal symptoms of influenza.

Pigs can become infected with human influenza, and this appears to have happened during the 1918 flu pandemic and the 2009 flu outbreak.

Contents

1 Classification
   1.1 Influenza C
   1.2 Influenza A
2 Surveillance
3 History
   3.1 1918 pandemic in humans
   3.2 1976 U.S. outbreak
   3.3 1988 zoos

1 Classification

1.1 Influenza C
1.2 Influenza A

2 Surveillance

3 History

3.1 1918 pandemic in humans
3.2 1976 U.S. outbreak
3.3 1988 zoos
WolframAlpha computational knowledge engine

Input interpretation:
H1N1 (Influenza A)

Totals as of May 14, 2009:

<table>
<thead>
<tr>
<th></th>
<th>cases</th>
<th>deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>world</td>
<td>7728</td>
<td>69</td>
</tr>
<tr>
<td>United States</td>
<td>4298</td>
<td>3</td>
</tr>
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</table>

Daily new reports for world:

<table>
<thead>
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<th>date</th>
<th>cases</th>
<th>deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday, May 15, 2009</td>
<td>7728</td>
<td>69</td>
</tr>
<tr>
<td>Thursday, May 14, 2009</td>
<td>7454</td>
<td>65</td>
</tr>
<tr>
<td>Wednesday, May 13, 2009</td>
<td>6302</td>
<td>63</td>
</tr>
<tr>
<td>Tuesday, May 12, 2009</td>
<td>5691</td>
<td>61</td>
</tr>
<tr>
<td>Monday, May 11, 2009</td>
<td>4779</td>
<td>53</td>
</tr>
</tbody>
</table>
Searchme, the first multimedia search engine

Search for information, videos, music, images, news and more, and find the most relevant results displayed in a comprehensive blend of multimedia and non-multimedia web pages.
Swine Flu News

Current Tweets about 'swine flu' on twitter.com

http://search.twitter.com/search?q=%22swine%22
Emerging Landscape of Search

- User Generated Content (Multimedia)
- Real Time/Live Sensor
- Answers/Stories
Let's talk about Multimedia Search

- Historical Perspective
- Current Research
- Re-Defining the problem
- Challenges
- Some examples
History of Multimedia Search: A personal perspective

- Databases of images
- My personal interest
  - Feature indexed hypothesis
- NSF workshop in 1991
  - Jain and Petkovic in Redmond, CA
- VIMSYS and Xenomania (at U. Michigan)
- QBIC, Virage, Query by Pictorial Example
- Features, Video Segmentation, Tags
- MPEG 7, LSCOM, COMM

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Current Approaches

- Feature-based indexing: remains strong.
- Tags: initial resistance; quite popular now.
- Text-based approaches: Gained popularity.
- Context: Started receiving attention.
- Social networking: becoming popular.
Observations: ACM MIR2008 Submitted (264) Papers

- Most papers are on media processing. In particular, most papers address single media processing. Most common topic was images, followed by image sequences, and then by audio. In fact, in a similar list for a conference on similar topic in 1998, topics of many papers will be the same. Clearly, there is a big overlap between media processing and computer vision.

- Most papers dealt with archived media. There were a few papers that talked about live applications related to surveillance and monitoring and immersive media. Even in these cases, live MIR was not the major emphasis.

- Machine learning approaches remain popular for annotation and concept detection. Manual tags and Folksonomy is receiving some attention.
Observations: ACM MIR2008

- Semantic Gap is mentioned by many papers. It appears that many papers allude to that, but no paper addressed the issue of semantic gap directly.
- Web environment is considered by many papers.
- Semantic Web tools are slowly finding their way into this community. Influence of TRECVid is clear on video processing [39].
- Query environment remains dominated by keywords and query by pictorial examples. There is some attention to interactivity at query time. It is clear that ‘search’ based on one query remains a dominant theme.
- Presentation and distribution environment is considered similar to the dominant environment in text search. Research has started in mobile, but here also, the approaches seem to be early straightforward extension of existing approaches.
Observations: ACM MIR2008

- **Indexing** is almost an unknown problem.
- Influenced by success of ‘word’ and ‘Bag of Words’, some effort has started in defining visual words and BoW models.
- Personal photo album is becoming an important topic. This and some video problems have resulted in popularizing the role of human faces.
- I particularly liked that very few papers talked about Corel Data set. People are emphasizing other datasets. Flickr dataset is becoming more common than Corel – a very good development for the long-term health of the field.
- **System building** is not very popular. Most papers address a very narrow aspect of MIR.
What is the Real Problem in (MM) Search?

SEMANTIC GAP
Data
The Challenge

Data

Connecting

Users

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Semantic Gap

The semantic gap is the lack of coincidence between the information that one can extract from the (visual) data and the interpretation that the same data have for a user in a given situation. A linguistic description is almost always contextual, whereas an (image) may live by itself.

Content-Based Image Retrieval at the End of the Early Years
Found in: IEEE Transactions on Pattern Analysis and Machine Intelligence
Arnold Smeulders, et. al., December 2000
Transformations

Users

Semantic Gap

Lists, Arrays, Documents, Images …

Alphanumeric Characters

Bits and Bytes

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Modeling the World

- Data (Semantic Web)
- Objects (Search Companies, ...)
- Events (Relationships among objects and attributes)

Both Objects and Events are essential to model the world.
What is Multimedia: Elephant and the Blind Men

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Multimedia Information

- Images
- Sequences
- Audio
- Mail
- Text
- Photos

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Multimedia Information: Retrieval Today

Indexing audio, images, and video has been extremely difficult.
Events, Experiences, and Multimedia

- Experiences are associated with Events.
- Events take place in the real world.
- We experience using our sensors and capture them using multimedia data.
  - Multimedia data is a just medium to understand real world events.
Bridge: Unified Indexing

Images
Sequences
Audio
Mail
Text
Photos

Index
Index
Index
Index
Index

Events
Future Internet:

Can we take the Web beyond the Cyberspace?

- Can things in real world be connected to other things?
- Does this even make sense?
Connectors

- My 5 *Senses* are connectors between ‘me’ and the world.
- We use our sensors (vision, audio, ...) to experience the world.
- Sensors could be the interface between the Cyberspace and the Real World.
- Sensors are placed for ‘detecting events’.
  - How do you decide what sensors to put at any place?
  - Would you put a sensor if nothing interesting ever happens at a place?
Continuing the Evolution of the Web

- Consider a Web in which each node
  - Is an event
  - Has informational as well as experiential data
  - Is connected to other nodes using
    - Referential links
    - Structural links
    - Relational links
    - Causal links
  - Explicit links can be created by anybody
- This EventWeb is connected to other Webs.
<table>
<thead>
<tr>
<th>Content</th>
<th>Contenxt</th>
<th>Context</th>
</tr>
</thead>
</table>

- Contenxt = Content + Context

- Context is as powerful as, possibly more than, content in understanding audio-visual information.

- Events facilitate utilization of context.
Towards EventWeb

- Isolated Events are good, but
- Things really become interesting when we create an EventWeb.
Potential Questions that use EventWeb

- How is a sheep herder in Mongolia affected by actions of Californians? *(Answer in recent Wall Street Journal.)*

- What does Roe Vs. Wade has to do with reduction of crime in US cities? *(Answer in Freakonomics)*
MMSE: 3 Key Guidelines

- Should be able to deal with ‘multimedia’
  - Photos
  - Audio
  - Video
  - Text
  - Information and data
  - ...
- Searching based on events, objects, and media.
- Provide Answers/Stories using appropriate media.
Event Cycle: Searching Based on Events

- Event Presentation/Navigation
- Story Telling
- Explore
- Search
- User Annotations
- Event Ontology
- Photo stream Segment
- Event Grouping, Linking, Assimilation
- Atomic Event Entry
- Multimedia Events
- EXIF
- Features
- Tags/Context

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Event Mash-up Interface

Composite Events

Event Digestor

Clustering
Annotation
Event Ontology

Atomic Events

Event Ingestor

EXIF Extractor
Text Parser
Calendar Parser

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BREN:ICS
INFORMATION AND COMPUTER SCIENCES

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Sentient EventWeb

- Use sensors to create events.
  - This conference
- Infrastructure to create and link all such events.
  - Index
  - Search
  - Present
- Capture events and put them on the Web.

Imagine each sensor tweeting.
Joint Situation Model

Env. 1

JSM 1

Env. 2

JSM 2

Env. 3

JSM 1

Env. 4

JSM 2

Env. 5

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These Concepts are already finding applications for ‘Folk Computing’ using *Mobile Phones*.

TATA Consultancy Services started a working project in this area.

(Disclosure: I am working with them.)
## Farmer’s Queries

<table>
<thead>
<tr>
<th>My Soil</th>
<th>My Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which crop I should grow?</td>
<td>Which seeds I should buy?</td>
</tr>
<tr>
<td>Which fertilizer I should apply?</td>
<td>Should I spray pesticide?</td>
</tr>
<tr>
<td>In what quantity? When?</td>
<td>Which one? When?</td>
</tr>
<tr>
<td>Can I grow grapes?</td>
<td>Leaves look Yellowish? What should I do?</td>
</tr>
<tr>
<td>I plan to dig a well. Will it hit water?</td>
<td>Can I get Rs 25000 loan in a week for sowing operation?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Produce</th>
<th>My Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the rate for cotton in nearby market?</td>
<td>Where can I find doctor nearby?</td>
</tr>
<tr>
<td>How can I get better rates?</td>
<td>My son will complete high school this year? Should he do computer courses?</td>
</tr>
<tr>
<td>Is there a space in nearby warehouse for storage for a month?</td>
<td>How I can earn additional income?</td>
</tr>
</tbody>
</table>
Bridging the Gap

Government Servers

Weather Servers

Bank Servers

Expert Advice from Agriculture Universities & Research Institutes

Internet

National Commodity Exchanges

CDMA Network

Village Knowledge Center

Local Markets

Soil Sensors

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Solution Architecture

1. Sensors collect soil data
2. Consolidate
3. Parse information and retrieve accurate advice
4. Prepare and send SMS in local Language.
5. SMS to farmer in local language

Agriculture expert database

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Copernican Revolution in Computing

Who is the King:
Content (Data) or User?

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All Information is Available, BUT

Google

YouTube

facebook

twitter

WSJ.com

BBC

IEEE

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Right Information, at Right Time, at Right Place.
Exciting Directions

- Information/Experiences are important – medium is just that the medium.
- In the days of abundance of data, user-centric approaches are critical.
- Real time (Live) multimedia data is becoming the norm.
- Events are critical for bridging the semantic gap.
Thanks.

For more information, contact:

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“I don’t know what I’m doing—this is pure research!”