Social Life Networks:
Ontology-based Recognition

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Relevant Trends

• Social Networks and their role in communication
• Micro-blogs becoming major source of News.
• Internet of Things is emerging.
• More than 75% of the world population owns a mobile phone.
Social Networks

Connecting People
From Micro Events to Situations

From Tweets to Revolutions
The World as seen through Mobile Phones

- **Top 1.5 Billion**
  - Most attention by Technologists – so far.

- **Middle 3 Billion**
  - Middle of the Pyramid (MOP): Ready, BUT …

- **Bottom 2 Billion**
  - Not Ready
Social Life Networks

Aggregation and Composition
Situation Detection
Information
Alerts
Queries
Swine flu social image and its segmentation into ‘high’ and ‘low’ activity zones.
Situational Recommendation System

Macro situation

Date=12/09/10

Alert Level=High

Micro event
e.g. “Arrgggh, I have a sore throat”
(Loc=New York, Date=12/09/10)

Situational controller
- Goal
- Macro Situation
- Rules

Control Action
“Please visit nearest CDC center at 4th St immediately”

Level 1 personal threat + Level 3 Macro threat -> Immediate action
Real Time Situation Analysis

- Level 0: Raw data
  - e.g. tweets, cameras, traffic, weather, RSS, check-ins, www

- Level 1: S-t-t Data
- Level 2: S-t-t aggregate
  - e.g. Emage
- Level 3: Events

Transformations

Less abstraction, Less detail

More abstraction, More detail

Characterizations

Properties

Situation Recognition

Representations

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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
Models bridge the Semantic Gap.
Models

• A model in science is a **physical**, **mathematical**, or **logical** representation of a system of entities, phenomena, or processes. Basically a model is a simplified abstract view of the complex reality.

• Models in software allow scientists to leverage computational power to simulate, visualize, manipulate and gain intuition about the entity, phenomenon or process being represented.
Ontology

An ontology is a formal representation of knowledge as a set of concepts within a domain, and the relationships between those concepts. It is used to reason about the entities within that domain, and may be used to describe the domain.

From http://en.wikipedia.org/wiki/Ontology_(information_science)
The purpose of description is to re-create, invent, or visually present a person, place, event, or action so that the reader may picture that which is being described.
Ontologies have been used mostly for description of domain knowledge.
Recognition

Recognition is identification of something already known
Creating R-Ontology

Upper Ontology

Domain Ontology-1

Augmented Ontology-1

Context-1

Augmented Ontology-n

Context-n

Domain Ontology-n

Augmented Ontology-1

Context-1

Augmented Ontology-n

Context-n

Trip to Beijing

Visiting Summer palace

visiting forbidden city

Trip to Huangshan

visiting Yellow Mountain

visiting Huangshan Geopark
Recognition using R-Ontology

Model

Ontology

(Upper and Domain)

Context

Augmented Ontology Model for Recognition

Data

(time, loc, visual, ...)

clustering

Match/Classification
Conclusion

- Ontology for a specific situation augmented with available contextual information.
- Augmented Ontology used for recognition of situation from multiple sources of data.
- Ontology allow explicit specification of models that could be modified using context information to provide very flexible models to bridge the semantic gap.
Thanks for your time and attention.

Pepper . . . and Salt

THE WALL STREET JOURNAL

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

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