Nomatic: Location {by, for, of} Crowds

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Talk Overview

Nomatic
Position to Place

Nomatic
NMCDB
Instant Messenger
Nomatic*Gaim
Nomatic Overview

- “Nomad” + “Automatic”
- Associating Context Semantics to Positions
  - “tags” instead of ontologies
  - Using situated semantics
  - Using many to many mappings
- It is an online service
- Supports context-aware applications
Nomatic Overview

Context that we are interested in:
- Place Descriptions
- Activity Descriptions
- Social Situation

Nomatic “pins” context descriptions to geographic positions.
Place descriptions are a solution to the position to place problem.
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NMCDB
Position to Place?

Position are Coordinates

- Exact
- Unambiguous
- Not well suited to human communication

Examples

- (33.64358308333 N, 117.843358458333 W)
- 5 miles south of IKEA on I-5
Position to Place?

- Place implies meaning
  - Inexact
  - Ambiguous
  - Intuitive in communication
- Examples
  - Room 136
  - Meeting room
  - UCI campus
Position to Place

Public Universities

UC Campuses

Irvine

O.C.

Republican Counties

Places where I go

USA

Coastal States

CA

GPS

Work
Where can we get position to place mappings?

- U.S. Census database
- Reverse Address Lookup/Reverse Geocode
- Amazon.com
- Satellite imagery
- Lots of Web 2.0 solutions
- Custom Databases
Solution:
Collect situated data rather than prospective data
Instant Messaging (IM)

- The problem with IM
  - over 13% of desktop IM is spent negotiating availability
  - New patterns of mobile IM usage promise to make that worse
  - “Available” “Not Available” fails
- This is an opportunity
Instant Messaging

- Use IM as a vehicle for collecting situated place descriptions
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- Context-enhanced IM client
- Cross-platform, cross-protocol
  - based on Gaim
- Position from Place Lab
- Place description from the user
Nomatic*Gaim

Send a Nomatic Status Message

Nickname: Don

Describe your location: Don is: on campus

Describe your activity: Don is: prepping for OCCHI

Describe your social situation: Don is:

☑ Make these the default choices?
☑ Report Place Lab Location?
☑ Alternate Place Lab with Context Info?

Cancel Set
Buddy List

Donald Patterson
Available

Donald Patterson
Don @ 33.6442628125, -117.8413546875

Sandy Patterson

Gerome Miklau

nomaticcontext

Buddy List

Donald Patterson
Available

Donald Patterson
Don is on campus prepping for OCCHI

Sandy Patterson

Gerome Miklau

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Talk Overview
Proof of Concept

Deployment
- Custom AP wardrive
- 3 people over two weeks
- Deployed on laptops

User Interface
- 5 person paper prototyping
Deployment Results
% Messages per protocol

A

B

C

Person
Unique Access Points Found

Person

A
B
C

# of AP's

0 5 10 15 20 25 30

Not in Database
In Database
Deployment Discussion

- Place Lab is designed for a technical audience
- We are going to move it to the server
- Known AP coverage is poor
- AP location learning
- Manual wardrive tool
- 30m-50m accuracy in practice
User Study Results
User Study Discussion

- Time of day matters
- Activity influences place descriptions
- Users want a fast cut-off switch
- Location disclosure varied by groups of recipients
Confirmation of:

- Instant Messaging appears to need more context disclosure
- It can be a vehicle for collecting position to place mappings
- More work needed on interface
Talk Overview
Crowds: the whole point

- NMCDB: Nomatic Mass Collaboration Data Base
- Machine Learning
- Statistical Power
- Leveraging Other Peoples Data
- Software Context Services
- Instant Messenger as a client
- Real-time queries
- Context Maps
Talk Overview

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NMCDB
Choose the best place label, “L∗”
given:
- an observed position “z”
- a hidden true location “x”
The labels observed at x, “Data(x)”

\[ L^* = \arg\max_{L \in \text{Places}} \int_{x} P(L \mid Data(x)) P(x \mid z) \]
Instant Messaging as a client of Nomatic

You can treat your data and others data differently

\[ L^* = \arg\max_{L \in \text{Places}} \int_x P(L \mid \text{Data}_{\text{user}}(x), \text{Data}_{\neg\text{user}}(x))P(x \mid z) \]
Instant Messaging as a client of Nomatic

\[ P(L_0 | \hat{z}) > \alpha \] set the place automatically

\[ P(L_0 | \hat{z}) > \beta \] set the place automatically and confirm

\[ P(L_0 | \hat{z}) > \gamma \] present an ordered list of places

\[ P(L_0 | \hat{z}) \leq \gamma \] open a dialog box for manual entry
Real-Time Queries

- Where are UCI students now?
  - 90% of UCI students are “at home”

- Where is my sales force after the tsunami?
  - 10% of my sales force is “at work”

- 50% many of my assisted living residents went to a “store” this weekend.
Conclusion

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NMCDB

Instant Messenger
Future Work

- Interface Redesign
- 100 person user study
- Develop machine learning algorithms to solve equations
- Other situated data collection
- Nomatic* AID
Questions?