Mobile, Context and Entities

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Motivation

• Context - “any information that can be used to characterize the situation of an entity”
  • Entity could be a relevant person or place

• Mobile devices
  • Portable, Ubiquitous, Data rich
  • Apps have different aspects of user’s context

• Using phone data for context-aware solutions
Presentation


• Sebillo, Monica, et al. "Combining personal diaries with territorial intelligence to empower diabetic patients."
Interoperability

• Apps
  • “Ivy called 3 times, texted 10 messages, is on 34 photos”
• Spatial data
  • “Where was I when Ivy called”
• Web data
  • “IFFT wants to know about Ivy”
• Between phones
  • “Ivy’s phone is 100 yards away”
State of the Art

• Domain specific APIs
  • apps provide API to data silos
  • too generic, inflexible

• Semantic web
  • RDF and SPARQL, model structured data
  • Suited for multimedia data

• Interoperability with web applications
  • “Google Maps would like to access your location”
  • Calendar, Contacts, Camera
  • Storage on device. HTML5 webstorage
Architecture
Application Layer

- Incorporates all applications
- Web interface abolishes separation with Local
- Consume data from bottom layers
Data Provisioning Layer

- API Local data sources
- GPS, Camera
- Adaptors are vendor provided
- Considered trusted
- Inter-device Interface
- Communicates with neighboring devices
Data Management Layer

• Hosts the Integrated Resource and Context Repository
• Provides interoperability at data level
• Data Management Interface
  • accepts SPARQL query
  • event-based interaction for dynamic data
  • binary interaction mode for adaptors
Data Model

• For interoperability model must have some properties
  • Flexibility
    • application specific to generic
  • Linkage
    • applications can relate resources
  • Spatial Data
    • data should be annotated with data
• RDF used as data model
RDF

- Resource Description Framework
  - w3c standard for metadata exchange
- Supports relations as first-class objects
  - \((\text{subject, predicate, object})\) - triples
- Covers metadata level
  - resources grouped by “class”
  - some standard, others defined
Access Control

- RBAC model
  - granularity by class, properties, or resources
  - group them hierarchically
- Application prompted on install
  - holds the right forever
  - Web application lose theirs after a period
- Access rights checked on query
  - rights joined with results
  - domain adaptor queries not checked
Resource Repository

- Integrated Resource and Context Repository
- Extends RDF to RDF-3X
  - maps literals to index in memory
  - appends location information
Conclusion

• Evaluation
  • 100 RDF classes, 200 access roles, 300 apps, Nokia N900
  • Queries executed in 0.01 to 0.18

• Positives
  • Some feasibility

• Negatives
  • Old phone, Old OS (Maemo)
  • Little detail
  • None on inter-device interaction
Diabetes Assistant

- Patient-centered care
  - Productive life
  - Suited for patients in need of continuous monitoring
- User-centered solutions
  - Context-aware applications
  - Transforming information into knowledge
- Exploiting mobile sensors
  - Using location to curate care
Architecture

- Server-client architecture
- Backend
  - Get client information, process and provides feedback
  - Performs computations
- Frontend
  - Made of several internal modules
  - Communication module sends data to server
    - provides API for mobile app
Metadata module

- Only metadata is stored
  - “how long was the call with Jill”
- Scans and classifies data from data sources
  - translates SQL like queries to internal representation
  - placeholders for time and space
    - allows filtering
myDDiary

- Application that allows diabetes management
- Extensible by design
  - additional data sources could be added
- Automation of repetitive tasks
  - For example “Gym from 7 to 8pm all week”
    - check time and location of user
- Automation of tedious tasks
  - Instead of food calories, snap picture of plate
Conclusion

• Allows patient to manage their diabetes
• Patient has fine-grained control over data
  • location sharing at specific instances
• Converting complex data with spatial attributes
• Future work
  • User evaluation
  • Crowdsourcing possibilities
Thank You