Micro-Blog: Sharing and Querying Content Through Mobile Phones and Social Participation

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Motivation

• Sensor Networks
  – Inexpensive
  – Gather data over large area
  – Mobile phones

• “Virtual Information Telescope”
  – Goal: High-resolution view of the world
Micro-Blog

- Microblog
  - Blog: pictures, audio, text, sensor data
  - Time
  - Location

- Query
  - Human Response
    - Questions
  - Automatically Sensed
    - WiFi spots, accelerometer data
Applications

• Tourism
  – Internet map
  – Query for parking, WiFi, restaurant reviews etc.

• Micro-News
  – Bloggers are the journalists
  – Automatically sensed news
Localization Service

• Selects appropriate localization scheme
  – Accuracy Requirements
  – Energy Requirements

• Phones periodically update Micro-Blog server with location
  – Used for query targeting
  – Push updates to subscribers
Energy-Aware Localization

- Uses Place Lab for WiFi localization
- Stop moving
  - WiFi fingerprint doesn’t change
  - Get GPS data once to use for blogging
- Moving
  - Linearly interpolate with GPS/WiFi to estimate distance moved
  - Get GPS data after threshold is passed
  - Works for WiFi/GSM as well
Energy Awareness

• Use GPS when creating microblogs
  – Accuracy important

• Use GSM/WiFi for location reporting
  – Energy Efficient
  – Tolerates inaccuracy

• Don’t upload microblogs when energy is low
  – Wait until later
Incentives

• Social Networks
  – Friends don’t need incentives
  – Discourages public communication
  – Bad idea

• “Give and Take”
  – Query credits
  – Cheating
    • New accounts
    • Can detect some cheaters
  – Bad idea
Privacy

• Lots of location information stored
• Three Modes
  – Private: Only User
  – Social: User’s Friends
  – Public: Anyone
• Trust Micro-Blog service
• Obfuscation of location
Spam

• Limit queries per user
  – From social network
  – From public

• Doesn’t solve the problem
  – Limit can be used up by spam queries
Content Inaccuracy

• Reputation system
  – Users can be rated
  – Don’t publish blogs by people with low ratings

• Can help with spam too
  – If you spam, your rating goes down
Evaluation

• Battery Life vs. Accuracy
• GPS-WiFi
  – WiFi with periodic GPS correction
• WiFi-GSM
  – GSM with periodic WiFi correction
  – Best balance of battery and accuracy
  – Default setting in Micro-Blog
Case Study

• Blog in free time
• Most blogs are private
  – No meaning to outsiders
• Text vs. Voice
  – Voice is too personal to share online
• Evenings are the best times
  – Could be hard to query at certain times
Contributions and Related Work

- Design challenges not unique to Micro-Blog
- Automatic query response
  - Traffic congestion
- Lifeblog (Nokia)
  - Timeline of activities
  - Multimedia
Future Work

- Accelerometers for localization
  - Improved accuracy for low energy cost
- Removing bad content
- Social network integration
  - Twitter, Facebook already widely used
  - One application for blogging
  - Essential
- Share GPS data
  - One phone can provide location information to nearby phones
- Security
  - Everyone’s location is being stored on one server
  - Huge security risk
Questions?