

# Mobile Phone Platforms for CSS

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# Overview

- Context
- iPhone & J2ME Platforms
- Social Diffusion and Influence
- Experimental Results
- Summary

# Mobile Phones as Social Sensors

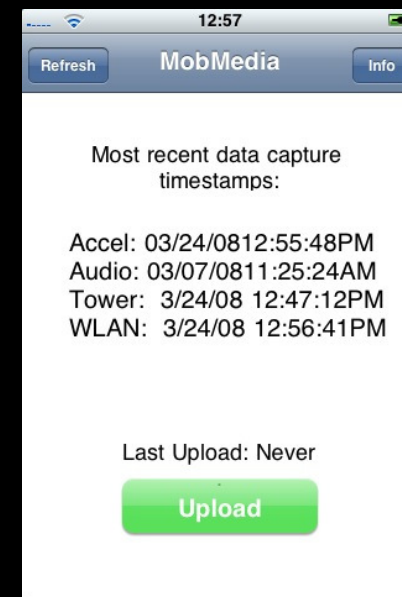
- (In)accuracy of self-reported data-- BKS and other studies (telescoping, time omission, perception bias)
- Scalability-- small experimental deployments vs. mass market
- Applicability-- from social science research to next generation, real-time mobile applications

# Mobile Phones as Social Sensors

- Reality Mining Dataset-- Eagle, Dong, Pentland
- Extend using active probes, e.g. “media diffusion”
- Issue: Observations vs. Cognitive Perceptions
  - e.g. co-location vs. friendships
  - Opportunity for machine perception tools

# iPhone Platform: Capture Interaction Data

- Open source (GNU LGPL) iPhone software stack
- Homogeneity and entropy of locations – Wireless APs and Cell Tower Ids
- Strength of social ties – call and SMS logs
- Context and user activity – 3-axis accelerometer and background audio features (energy, speaking vs. not-speaking)



# iPhone Platform: Capture Interaction Data

- Privacy sensitive approach: on-device anonymization / coding
- Automated, secure uploads of anonymized features, configurable scan times
- Symbian Series 60 / J2ME version in progress
- Real-time machine learning tools-- SVMs, decision trees, R

# Social Diffusion and Influence

- Understand link between F2F interactions and diffusion, influence, relationships and privacy-- Music sharing application as a matrix
- Can we train mobile phones & computers to automatically infer these patterns?
- Hypothesis of Social Influence:
  - Strong Social Cohesion-- possible to capture from frequency and intensity of interactions?
  - Weak Ties / Structural Equivalence-- harder to measure

# Social Diffusion and Influence

- iTunes replaced with Mob.Media music sharing application -- users can play, share, rate tracks
- To support statements about causality / eliminate mass media bias-- content sourced from out-of-town indie bands from garageband.com, myspace.com
- 17 users, 5 weeks, ~100k snapshots of location, interactions, context



# Experimental Results

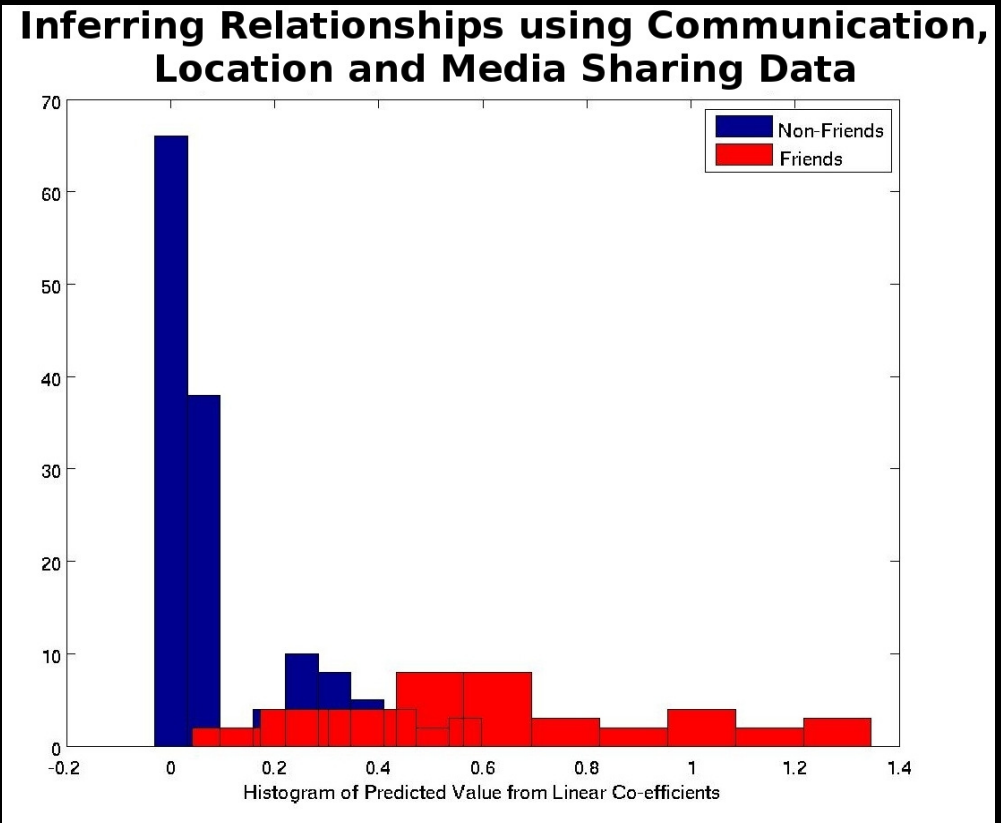
- Automated metrics of communication and location patterns are highly correlated overall with observed sharing behavior ( $r = 0.65$ ,  $p < 0.01$ )
  - total calls and total off-peak duration
  - SMS communication
  - proximity based on WLAN access points
- These automated metrics have higher correlations with sharing behavior than self-reported relationships ( $r = 0.42$ ,  $p < 0.01$  for 'mutually acknowledged friends')

# Experimental Results

- 2 types of sharing were observed:
  - 70% -- sharing between 'mutually-acknowledged friends': location and communication features are highly correlated with sharing
  - 30% -- sharing between strangers / weak ties: location and communication features are not significantly correlated with sharing... are there other features that might be? e.g. content, emails, facebook

# Experimental Results

- Inferring relationships:
  - from 'passive' location and communication metrics alone:  
 $r = 0.6$ ,  $p < 0.01$
  - from both 'passive' metrics and 'active probe' i.e. media sharing:  
 $r = 0.66$ ,  $p < 0.01$
- Discriminating between 'friends' and 'acquaintances':
  - total communication, total shares:  
positive correlation with both friends and acquaintances
  - off-peak communication, sms:  
positive correlation only with friends



# Summary & Future Work

- Open source iPhone (& Symbian) platform to capture social interactions
- Automated location and communication metrics have higher correlation with media sharing than user-stated relationships
- Automated location and communication metrics and 'active probes' of diffusion have correlation with relationships
- Need for validation of results with larger #s of participants— in progress
- Bayesian classifiers and predictive models

# Contact & Downloads

Website:

[mob.media.mit.edu/info/](http://mob.media.mit.edu/info/)

iPhone Stack download & tutorial

[mob.media.mit.edu/info/platforms.php](http://mob.media.mit.edu/info/platforms.php)

Engineering Credits:

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