

Social Sensing *with* Mobile Phone

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Study 1: F2F Social Sensing

Organizational Calling Behavior

- Data: Reality Mining dataset [Eagle and Pentland 2006], 9-month call detail records of 84 subjects

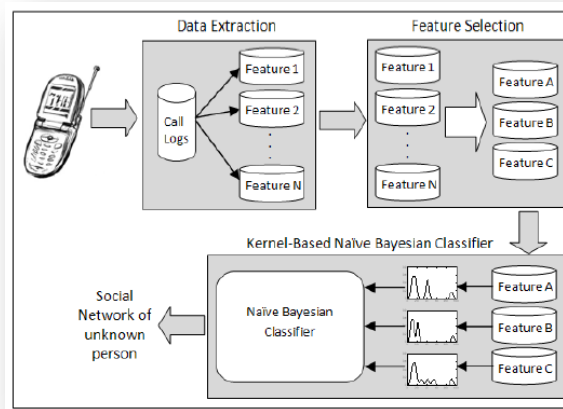


Table 3. Selected features based on normalized mutual information

Features	Normalized mutual information
All_call_time	0.169
Inc_call_time	0.220
Out_call_time	0.328
All_calls	0.357
Ent_call_time	0.388
Missed_calls	0.450

Table 4. Accuracy comparison of classifier with different methods

Methods	Accuracy rate (%)
Naïve Bayes with all features	59.09
Naïve Bayes with six selected features	68.18
Kernel-based naïve Bayes with all features	77.27
Kernel-based naïve Bayes with six selected features	81.82

Study 2: Mobile Social Sensing

Identifying Mobile Social Group Sizes' Scaling Ratio

- Data: 3-mo call logs, 30 users

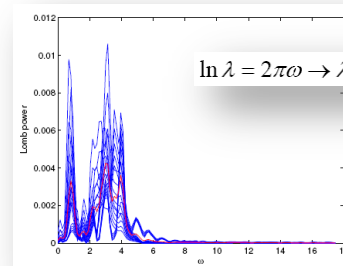


Socially Closest

Socially Near

Socially Distant

- *Social Closeness* is quantified and validated with 94%
- Based on 2 analyses
 - Simple mean size analysis
 - Generalized q -analysis
- Scaling ratio is found to be close to '8'
 - E.g. 1>8>64, 2>16>128

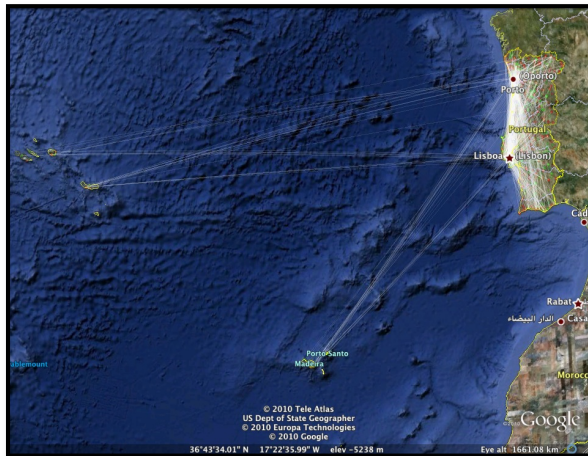


$$\ln \lambda = 2\pi\omega \rightarrow \lambda = e^{2\pi\omega} = e^{2\pi(2.99)} = 8.17 \approx 8.$$

Study 3: Sensing Social Dynamics

Out of Sight, Out of Mind – How our social network changes during migration?

- Data: 1.3 million subscribers in Portugal, 1 year



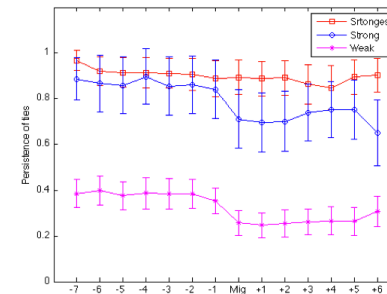
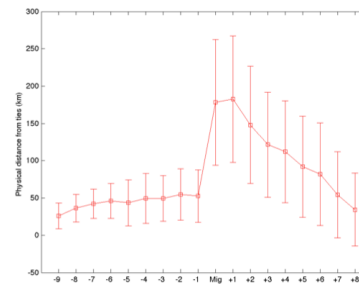
- Social strength/tie
 - Based on call duration [Onella et al. 2007]

weak tie

strong tie

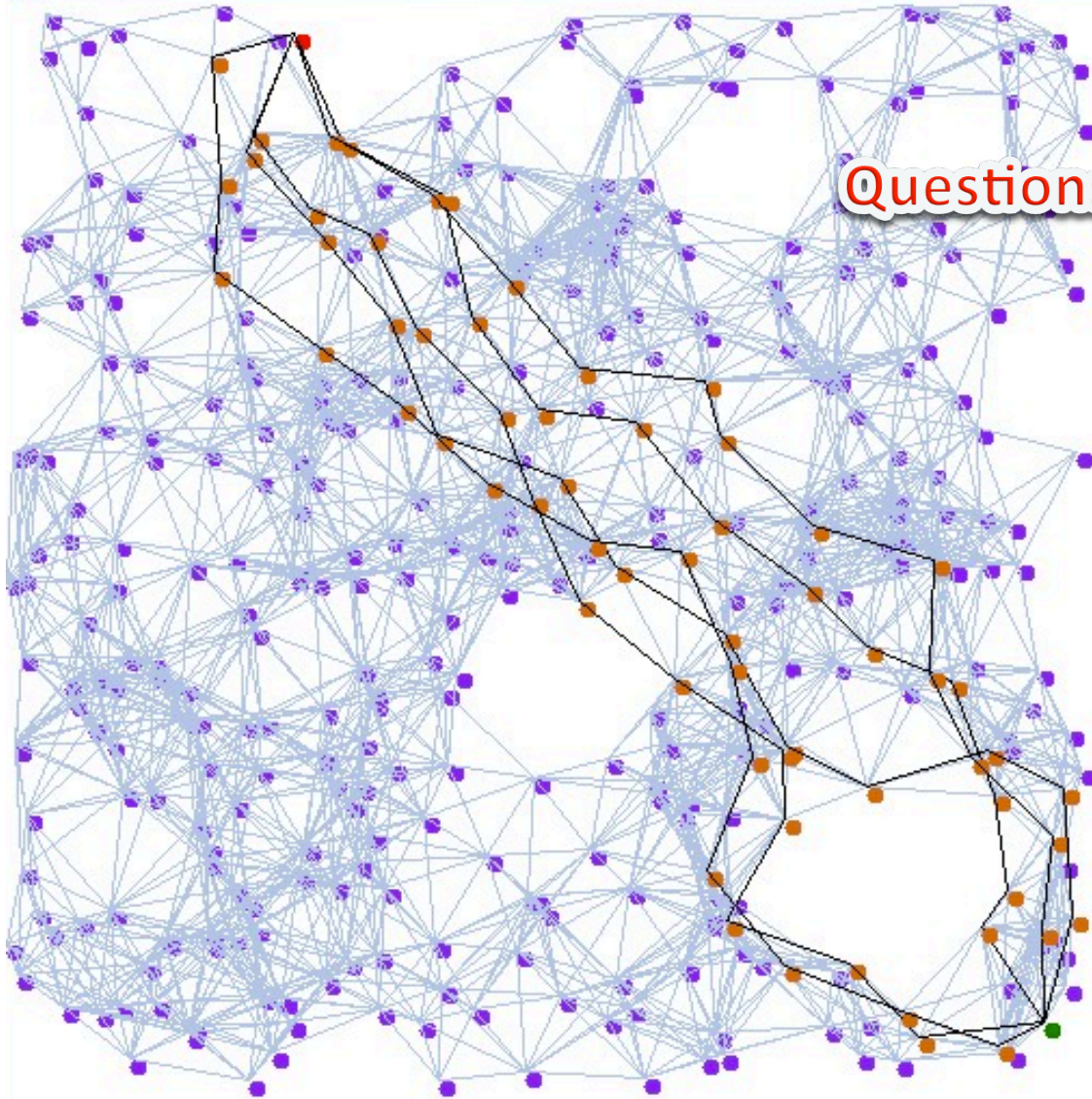
strongest tie

- Some results



$$\Phi_{\text{post}} = \left(\frac{s}{10}\right)^{1/5} - \frac{1}{10} \cdot \left(\frac{d_m}{10}\right)^{1/8}$$

Thank You!



Questions & Comments