Abstract

The widely used mobile phone, as well as its related technologies had opened opportunities for a complete change on how people interact and build relationship across geographic and time considerations. The convenience of instant communication by mobile phones that broke the barrier of space and time is evidently the key motivational point on why such technologies so important in people's life and daily activities. Mobile phones have become the most popular communication tools.

Mobile phone technology is apparently changing our relationship to each other in our work and lives. The impact of new technologies on people's lives in social spaces gives us the chance to rethink the possibilities of technologies in social interaction. Accordingly, mobile phones are basically changing social relations in ways that are intricate to measure with any precision.

In this dissertation I propose a socioscope model for social network, relationship and human behavior analysis based on mobile phone call detail records. Because of the diversities and complexities of human social behavior, one technique cannot detect different features of human social behaviors. Therefore I use multiple probability and statistical methods for quantifying social groups, relationships and communication patterns, for predicting social tie strengths and for detecting human behavior changes and unusual consumption events. I propose a new reciprocity index to measure the level of reciprocity between users and their communication partners. The experimental results show that this approach is effective. Among other applications, this work is useful for homeland security, detection of unwanted calls (e.g., spam), telecommunication presence, and marketing. In my future work I plan to analyze and study the social network dynamics and evolution.