Analysis and Prediction of People Aggregation in Online and Offline Social Networks

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Outline

• Swiss Sense Synergy
• VIVO
• VIVO: Context Data
• Social Networks Fundamentals
• People Aggregation Classification
• Social and Mobility Analysis
• Waiting for VIVO, available Datasets
Swiss Sense Synergy

• The project aims to derive semantically-rich insights about people (activity, preferences, intentions) from low level measurements, from social interactions and from a combination of these.

• Approach: capture the interactions between users and their context, in addition to those among users, in order to have a more holistic and user-centric perspective.
VIVO

- A novel human- and sensor-based testbed based on the concept of enrolled crowdsourcing.
- A secure and privacy-respecting platform for *testbed users* to collect social, physical and environmental data.
- It allows testing algorithms and solutions, without any extra hardware requirements, by scheduling and running them in real time on *volunteers* mobile phone.

*Testbed users:*
- can dynamically deploy their own application on each volunteer’s device;
- are provided with a web user interface for uploading the source code and launching the experiments;
- receive the experimental results in a secured way.

*Volunteers*: people equipped with personal device who accept to run experiments.
VIVO Testbed

Our team in SUPSI is currently working on:

- Web User Interface
- RealVIVO Server
- RealVIVO DB
- VIVO App
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VIVO: Context Data

• **Physical Context:**
  – GPS
  – WLAN
  – Cell-ID
  – Phone sensors

• **Social Context:**
  – Bluetooth proximity
  – Call/sms log
  – Web social networks
  – Contacts
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**Mobility and tracking**

**Online VS Offline Social Network**
Social Networks Fundamentals

Social Network

• A structure of social interactions and personal relationships.
• A set of social actors (nodes) and a set dyadic ties (edges/arcs) between these actors.

Social Network Properties

– Global patterns (degree distributions, path lengths, etc.).
– Segregation patterns (node types and homophily).
– Local patterns (clustering, transitivity, etc.).
– Position in the network (neighborhoods, centrality, influence).
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Online Social Network

Offline Social Network

Why do social groups arise?
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Online Social Network

![Online Social Network Icons]

Offline Social Network

![Offline Social Network Image]

Why do social groups arise? Common identity VS Common bond theory.
People Aggregation Classification

Mobility and tracking

Online/Offline Social Network

Meeting Analysis

What do we mean by “meeting”? → Offline (physical) social aggregation of people, ranging from get-togethers to big events.
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We can distinguish four classes of aggregation:

- **“Social Events”** (e.g. concerts, sport matches, festivals, etc.)
- **“Most Visited Place (MVP) Meetings”** (e.g. @home, @work, etc.)
- **“Happening Events”** (spontaneous user aggregation: e.g. people in a square, in a park, etc.)
- **“Accidental Meetings”** (involuntary user aggregation: e.g. people waiting for a bus, people moving for personal interests, etc.)
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People Aggregation Classification

Meeting Analysis

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• “Social Events”
• “MVP Meetings”
• “Happening Events”
• “Accidental Meetings”

Features can be: duration, frequency, relevance, popularity, etc.
Social and mobility analysis

- **Offline VS Online social network:**
  - Global patterns (degree distributions, path lengths, etc.)
  - Segregation patterns (node types and homophily)
  - Local patterns (clustering, transitivity, etc.)
  - Position in the network (neighborhoods, centrality, influence)
  - Study of matching, differences, correlation, etc.
  - People aggregation VS Community.

- **Users classification, based on:**
  - Social engagement: degree of participation\involvement in a community (both online/offline).
  - Interests: points of interests, events and happenings attended.
  - Mobility entropy, as a measure of person predictability.
  - Online/Offline social group size.
  - Social contagious VS Social influence.
Social and mobility analysis

- **Homophily study, in terms of:**
  - Interests: point of interests, events and happenings attended.
  - Mobility patterns.
  - Social contagious.
  - Social influence.

- **Correlation evaluation:**
  - User position in the network VS Homophily.
  - User position in the network VS Friends attendance to an event/happening.
  - User attendance VS Event/happening popularity (social contagion).
  - Homophily VS Events/happening attendance.

- **Meetings prediction based on social (and mobility) analysis:**
  
  “Social aspects play a major role in determining the likelihood of a user to participate in an event.”
  - MVP
  - Events
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Network formation: common bonds or common identity?
Waiting for VIVO, available Datasets

- **Mobile Data Challenge (MDC) Dataset**
  - Physical and Social Context data of 100 users

- **Event-Based Social Network Datasets**
  - Meetup Dataset (4M users)
  - Plancast Dataset (93K users)

- **Social Blue Conn** (35 users)
  - Bluetooth proximity
  - Facebook friendships
  - Users self-declared interests

- **Location-Based Social Network Datasets**
  - Gowalla
  - Foursquare
Thank you for your attention!