Personal Networks on Mobile Devices

bachelor/master project

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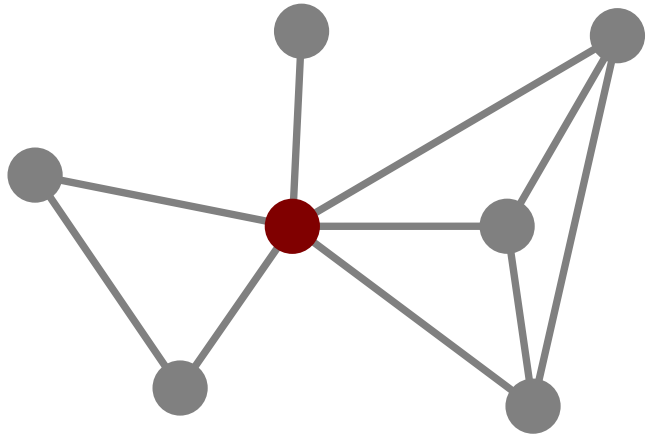
Coordination Meeting Konstanz, 17 April 2013

Personal networks.

A **personal network** consists of a focal person (**ego**),
persons known to ego (**alters**),
and **ties** between ego and alters and between pairs of alters.



Ties might encode
relations such as family ties, friendship, like/dislike or
relational events such as emails, phone calls, or meetings.

Ego, alters, and ties can have associated **attributes**.

Personal networks in empirical research.

Personal networks

- are complex variables characterizing individuals;
- supplement traditional variables such as gender, age, nationality, education, ...
- might explain individual outcome such as job performance, health, smoking behavior, longevity, delinquency, social or cultural integration, etc.

Personal network research claims that what matters is not only

- **network composition** (*who is in the network*), but also
- **network structure** (*how are they connected*).

Collecting personal networks entails a high respondent burden.

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General topic of this project.

Design and implement a software for mobile devices (smartphones, tablets)

enabling users to collect, map, browse, view, analyze their personal network

keeping data on the user's own device.

Potential advantages of a personal network app:

- allows permanent update of personal networks;
- allows to automatically collect some parts of the data (interaction events, data from online social networks, etc).

Organizational points.

General information.

Project webpage:
http://www.inf.uni-konstanz.de/algo/lehre/ss13/projekte/

Implementation is done for the **Android** platform. Software can be tested on a real Android device or on an emulator.

Every participant has his/her own topic; individual projects do not depend on the success of other projects (but may enhance each other).

Participants can get a very basic implementation of a personal network app—to be extended dependent on the topic.

Requirements and timeline.

Credit requirements: implementation, documentation (detailed comments in the java code), and presentation (slides).

Approximate schedule:

- **(by 24 April)** topic selection;
- **(3 – 7 June)** individual meeting (preliminary results and stable work plan);
- **(8 – 12 July)** individual meeting (results and plan for presentation);
- **(15 – 19 July)** presentation in a plenary session ($\approx$ 15 minutes plus 5 minutes discussion).

Topics.

Network datastructures.

Implementation of a (non-abstract) subclass of the abstract class `PersonalNetwork` (provided in the basic code); testing runtime efficiency.

Implementation via

- an **SQLite database** (preliminary code provided);
- the library **yFiles for Android**
- the java library **JUNG** (Java Universal Network/Graph Framework)
- own implementation.

Evaluating runtime of access and update operations as well as saving to and reading from permanent storage.

Network layout algorithms.

Implementation of a network layout algorithm from Brandes and Pich (2009).

Computing coordinates of nodes dependent on specified pairwise distances in a two-step process.

- Classical scaling to compute an initial layout;
- followed by stress minimization with node-by-node updates.

Varying the initial target distances and associated weights might enhance readability of the network layout.

User-interaction with a network layout.

Using touch-events and motion-events for

- zooming and panning the network;
- selecting elements and modifying the network layout;
- editing network structure.

Requires access to a real Android device with a (multi-)touch screen.

Collecting social data.

Gathering data from

- Android content providers (contacts, calendar, phone, etc)
- using Google services to get data from Google+ (*Requires access to a real Android device.*)

Interfaces to specific hardware.

- GPS sensors to store coordinates of interaction events;
- bluetooth to connect to other users running the same app;
- voice-based data entry;

Requires access to a real Android device having such hardware.