



# Native Visualization of Mobile Activity Patterns

Bachelor Thesis in Computer Science

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September 1<sup>st</sup>, 2013



## Erklärung

Hiermit versichere ich, dass ich diese Bachelorarbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe.

I hereby declare that I have created this work completely on my own and used no other sources or tools than the ones listed.

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Aachen, September 1<sup>st</sup>, 2013

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## Part I



# Chapter 1 Introduction

Since the introduction of the smartphone and its ongoing boom in sales, those devices getting more and more important for their users. Nearly 30% of the German population have a smartphone and 50% of them use it on a daily basis [2]. Googling a question, making a phone call, sharing your location and status with your friends via facebook or just taking a snapshot of your lunch - smartphones are used in nearly every location and situation. With all these possibilities and potential in usage for everyday situations, it is getting harder and harder to keep track of when one has used its smarthphone, where it was used and most important, for what was it used. 72% of owners state that they use their smartphones at work [2]. The obvious question is, did one used its smartphone for relevant research or emailing, or was it used to chat on whatsapp or checking facebook. It would be desirable with view to productivity if by the end of the day one could check his or her smartphone activity and would see that it was mostly used to get work done.

Smartphones and  
their daily usages

Another situation in which nine out of ten users utilize their device is while they are on the move [2]. Again, it would be desirable if one had information how he or she got from place A to place B, how much time it took and what has been done in this time.

Need of a  
structured  
overview

Not only has the computation power of smartphones significantly improved, their integrated cameras are also quite satisfying and are comparable to low-end digital cameras. Since most people tend to take photographs with their smartphone nowadays, it would be helpful to get a simple overview in which one can easily see the exact position of the photographs location without taking any further investigation.

There exists a need of a structured overview to get a self reflecting impression about one's activities.



## 1.1. Objectives

### Requirements for the application

Due to the stated need of an application which provides information about one's daily activities the main goal of this bachelor thesis is to create such an application. The requirements for an application like this are high. On the one hand it should display enough information to grant the ability to draw conclusions about one's daily activities but on the other hand it should also display the data in a visual appealing and intuitive way such that the visual appearance is not to crowded with unnecessary information.

The application should also offer the possibility to take minor adjustments to fit in one's individual needs and thus making the experience with the application feel. In contrast to that those adjustments should not be too detailed and low in number to keep the options structured and understandable.

### Applications for partial solutions

As mentioned the main objective of this thesis is to create an application which provides feedback and a self reflecting view for one's daily activities. There exist applications that partially fit in the described situation and offer solutions. For example one can use Google Latitude to see where he or she has been traveled respectively which routes were taken to reach a specific place. But it will not show which applications have been used at a specific place. Also while this thesis was written the support for Google Latitude was discontinued [3]. Another partial solution is facebook. One can share his or her location and photos on facebook but this will not show a route on a map nor does every one want to public his or her whole life on facebook.

To see the most used applications of the day one could take a look at the operating systems utilization chart which displays the percentage of used battery life and shows the cpu usages in total time. Not only does it not take into account the visited location this is also a very impractical and non intuitive way of gathering information about one's daily activities.

The application of this bachelor thesis should perform as a central information provider which combines the listed objectives and displays the daily activities of the smartphone. Those information will be presented in various ways and can be filtered by different criteria within a clear, intuitive graphical user interface.





## Chapter 2 Background

In this chapter provides background information about the main topic of this bachelor thesis. First, the ongoing trend of using a smartphone in nearly every situation and thus need of keeping track of one's own mobile activities is discussed. To grant an application the possibility to give self reflecting impressions the application itself needs to be provided with personal data of the user. The second section talks about this provided data, its origin and how it is gathered. Once the origin of the information is discussed the next section talks about the representation of this it. In this context the meaning of native visualization is explained and an alternative is presented which involves a short introduction of a currently written master thesis. The last section lists and explains which hardware and software was used during the implementation.

### 2.1. Self reflection

Communication, social networks, camera, games, news, shopping, music and many more categories exists which describe a smartphone. As mentioned in the introduction, smartphones are used in nearly every situation. It is a modern multitool which is used by millions of people in Germany [2].

As advantageous as it may be in everyday situations, the downside is that most people do not know how much time they spend on their phone and thus do not know how distracting it may be. For example, checking new mails may lead the user to also check the newest facebook messages and stay within this application a few minutes longer than expected. Because at least 50% of smartphone owners use the Internet with their device [2], thus most people are always available through instant messaging services

Smartphones as  
modern multitools



like whatsapp. The result is that people write and receive messages more often. And because smartphones are capable of running diverting games, one may use its device to beat the last high-score.

#### Distraction

But a smartphone can be a great helper too. It is an easy to use digital calendar which reminds the user of all upcoming events, it can be used as a travel guide or a navigation system, it allows to quickly respond to an important email and has many more useful advantages. But the previous short examples demonstrate that a smartphone can also have a distracting influence to its owner.

At this point the idea of self reflection is needed. The concept of self reflection is the critical reflection on one's own actions and positions and coming to a conclusion. This can be used to assess the distracting influence of smartphones to its owner. But for an accurate assessment one needs to keep track of his or hers own daily activities, which is nearly impossible to do for a smartphone without the help of tools that provide background information.

#### Provide a self reflecting view

As mentioned the help of a tool is needed which provides information about the owner's mobile day in a self reflecting manner. This tool in form of a smartphone application should display the information such that the user is able to instantly see where, when and for what the device was used. If one is provided with this data, he or she is able to say, that they used their smartphone in a productive manner or if they used it for entertainment. Furthermore, one could tell if he or she used the smartphone to divert themselves from working or studying. Although the application can display the needed information, the conclusion must be drawn by the user.

#### Possible improvements in productivity

With this application and the provided information a user may be willing to rethink his or her work respectively study behavior. This then could lead to less frequent use in distracting applications, thus improving efficiency and productivity in daily tasks.

As described, there is a possible application area for such a smartphone application. It would visualize data and information about the owner's daily activities in such a way that the application could be used as a tool for self reflection.



## 2.2. Provided Data

In the last section the idea of an application which displays information in a way such that one can use it for self reflection was described. What has not been described is from what source this data arises and how it is gathered.

The application itself will not gather the data it uses, instead the data is downloaded from a server and stored internally. The reason that the information will be collected externally, is the limitation of this thesis to the visualization.

[illegible]

## Big Brother gathers data

The data Big Brother gathers, is send to a server where it can later be downloaded and used by the application developed for this bachelor thesis. The data contains amongst others information about the user's visited locations, the name of the currently used application, start and end time of used applications. This data is uploaded and stored to a web server, which is then accessed by this thesis' application.

With the revelations published by Edward Snowden in June 2013 about the U.S. American spy program PRISM one might be concerned about privacy violation by third parties. It should just be said, that this project is still an experimental phase. If it should be published for a larger audience than the developers much work would be put into encryption and ensuring the prevention of unauthorized access by third parties.

## Privacy issues

- prepare data and store only needed things
- processed data for ready for visualization



## 2.3. Native Visualization



## 2.4. Hardware and Software





## Part II





## Chapter 3 Implementation

*"It's done when it's done"*

*—An English Phrase*



## 3.1. Paper Prototype



## 3.2. Time Schedule



### 3.3. Basic Layout



## 3.4. Data Management



## 3.5. Mapview



## 3.6. Chartview



## 3.7. Timeline





## Chapter 4 Evaluation





## Part III



# Chapter 5 Conclusion

## 5.1. Review





# Appendix A Bibliography

## Online References

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