Chapter 12
Gathering Road Safety Critical Information From Users

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ABSTRACT

Traffic roads are a core element of GIS and many volunteered systems like openstreetmaps have the goal to make road data publicly available. Road users collecting geographical information and sharing them according some rules are a great opportunity to make our roads a safer place. Traffic accidents are a major cause of death and with increase in urbanization and motorization the risk is expected to rise higher. Research regarding road safety is mostly reactive; sections of the road where a lot of accidents has already happened are investigated and possibly causes are identified and then improved. This means, that people have to die in order to make those road sections safe. The system described in this chapter is a proactive method and can be operated by the community or some responsible authority. The gathered data is also very useful for different research areas like social sciences or civil engineering.

INTRODUCTION

Traffic roads are a core element of GIS and many volunteered systems like openstreetmaps have the goal to make road data publicly available. Road users collecting geographical information about the road and sharing them according some rules are a great opportunity to make our roads a safer place.

Traffic accidents are still a major cause of death and with increase in urbanization and motorization the risk is expected to rise even higher. (World Health Organization 2015) Research regarding road safety is mostly reactive; sections of the road where a lot of accidents has already happened (black spots) are investigated and possibly causes are identified and then improved. This means, that people have to die in order to make those road sections safer.

Another approach is the proactive traffic conflict technique. Here a road section is observed for a few days and depending on the conflicts among road users, the safety of the section is evaluated. A conflict hereby is defined as a situation where an accident nearly happened but was evaded in the last second by the interaction of one of the drivers (breaking, dodging or similar). The most important quality of

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this technique is that one can detect high risk sections on the road before an accident happens. But it is impossible to observe the whole road network by traffic safety experts.

There are some work utilizing image processing to use video footage of road cameras to automatically detect conflicts. But there are some limitations, like the need of good quality video cameras over the whole network. Also the algorithms behind the image processing have some pre-requirements, which cannot always be expected.

Volunteered Geographic Information presents a new opportunity for road safety research. Every conflict is observed by at least one user, namely the one involved. Most of the times there will be two users involved and several users witnessing the traffic conflict. Those are a valuable source of information. At this point the need for a system arises, where this information can be gathered.

There are several approaches to how this information flow can be managed. The first option would be an authority which operates the system and evaluates the information provided by the road users. The other option would be an open platform operated by the users themselves with public access to all provided data. Both approaches have their pro and cons.

In this chapter the primary outline of such a system that is required to make safety research possibly is discussed and a technical guideline for the implementation is drawn. Also the mentioned operating options are discussed in detail and a recommendation is given.

Another important point is that the system is easy to use. So, beside the technical needs of the system also some ideas about the user interaction are given. Also the motivation of participants has to be taken into account. The chapter ends with an outline of possible safety and research opportunities and a conclusive discussion.

BACKGROUND ON ROAD TRAFFIC SAFETY

Traffic is the movement of humans or goods, either by vehicle or on foot. Humans always strived for mobility, while the means of moving changed over time and advanced with the technological progress. The first roads would be the worn out paths, simply being created by frequent passage. With the invention of non-motorized carriages pulled by animals, more sophisticated roads were built to enable the wheels run smoothly. With growing vehicles which also became faster, safety on the road became an issue. Rules were set in order to prevent accidents and in case of an accident, to be able to determine the guilty ones.

Today, one distinguishes between traffic in the air, on the water and on the ground. While each have their safety issues, this chapter concentrates on traffic on the ground. With motorization of the vehicles and the increasing number of vehicles in traffic, the safety issue is more eminent than ever. According to the World Health Organization (2015, p. 2 ff), traffic accidents are among the top ranking causes of death, and in some countries even the number one cause of death.

There are three factors as part of the road traffic which have an influence on the safety. (Figure 1) First comes the human, whose need for mobility made the traffic in the first place. A human can have different roles in the traffic, like the driver of a vehicle, a passenger, a cyclist or a pedestrian. The biggest risk is the driver who often causes an accident. 90% of all accidents have in the chain of events that lead to that accident a human error or some law violation. (Hobbs, 1987, p.494) The human is a complex and unpredictable being and many things like his physical condition, his psychological attitude towards safety and rules, his state of mind have an influence on his errors. Making the roads safer with focus on the humans is therefore important, but not the topic of this chapter. Psychological work in this area

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