Information Visualization on Mobile Environments

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ABSTRACT
The reduced display size of handheld mobile devices imposes severe usability and visualization problems. Adaptation to specific usage context is a key feature to overcome usability and display limitations on mobile devices. I intend to explore adaptive mobile visualization and develop a framework that can efficiently manage the adaptation methods used in the adaptation objects, according to the different contexts dimensions present.

Categories & Subject Descriptors
H.5 INFORMATION INTERFACES AND PRESENTATION (I.7); H.5.0 General

General Terms
Experimentation

Keywords
Geo-Referenced Information Visualization, Mobile Devices.

1. INTRODUCTION
On a previous work, we proposed visualization techniques, based on the user's preferences and position, to aid in the presentation of large amounts of information in mobile screens [1]. This work explored the simplest form of adaptation of mobile information visualization. I want to go a step further, exploring new dimensions of mobile user context and research the ones that are relevant to the visualization adaptation process, and define the appropriate methods to adjust the components of the visualization process according to changes in the context of use. Finally, I intend to develop a framework that can manage these contexts and adaptations in a reliable way.

2. CURRENT WORK
I have identified several context dimensions that are relevant to the adaptive visualization process and categorized them using a combination of categories presented by Schilit [2] and Chen [3]. Thus, I have considered a "Computation Context" which is composed of the technical specifications of the device, the network connection and resources available; a "User Context" that comprises characteristics directly related with the user, including his profile, spatial attributes and current task; a "Physical Context" that consists on the light and noise surrounding conditions, climatic conditions and neighbourhood environment; a "Temporal Context" defined by the current date and time, and finally a "Historical Context" that encompasses logs from previous uses of the application.

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Regarding the adaptation objects, and respective adaptation methods, I classified them into three categories [4]: "Information" – consisting on the information itself and methods of adapting it; "Visualization" – that consists on the graphical elements and properties, and "Interaction" – that deals with the way the user interacts with the application.

I have already started developing several of the context modules. These modules will allow me to test how several contexts can be obtained, and propose some adaptation techniques that use them. My framework prototype currently uses spatial and orientation information, obtained from a GPS device, a digital compass, a three axis accelerometer and a gyroscope; ambient light information, obtained from the devices secondary camera; stylus detection; and climatic conditions obtained from weather web servers.

3. CONCLUSIONS AND FUTURE WORK
Although preliminary, the identification of several, very diverse contexts, that are obtained in different ways, and are associated to distinct adaptation objects and methods, supports the need of a framework that can manage the adaptation to the different contexts present. Some frameworks are presented in the works of Reichenbacher [4] and Cai [5], however, these approaches may be refined in several aspects. The user context should be refined, modelling the relationship between the different context dimensions. Furthermore, it is fundamental to know beforehand the user needs and tasks. It is therefore essential to identify a user and task model for a mobile environment, to be included in the adaptive visualization framework.

4. REFERENCES
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