Real Time Data Monitoring With Data Visualization on Mobile Devices

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ABSTRACT
The prevalence of mobile cameras and social media sharing services have drastically increased the volume of photos and videos, which pose a new challenge for developing efficient retrieval, mining, and visualization approaches. In real-time database system, the queries and transactions have to meet timing constraints. A strong connection has been observed between real-time database systems and multimedia database systems. For example, the audio and video data have to be synchronized. This means that certain timing constraints are imposed on the data and these timing constraints must be met. In real time data Visualization focuses on multimedia data as text, image, video & audio visualization.
Data Visualization is a challenging task and difficult or impossible with manually grasp. Data Visualization can be gain better insight. There are several methods for visualising data and show possible applications in the software visualization field.
The objective of this paper is to investigate important issues in the design & development of mobile techniques in real time data monitoring system for data visualization.

Keywords
Data Visualization, Data Monitoring System, Real-time Database Systems.

1. INTRODUCTION
Data Visualization is a vast research area in mobile computing technology which plays vital role in real time environment. Basically data is connected to the time and needed to be monitor on the data which is extracted in real time. The data visualization is related with the graphic information, remote information, real time visualization, statistical graphics and scientific visualization [1].
Actual role of the data visualization is to communicate information clearly & effectively through graphical mean in any kind of techniques, this paper focuses on real time data visualization at mobile techniques. So that data monitoring is needed for the same.
Data Visualization is define as, 'graphical representation of a data collection, often in an interactive form. Morden data Visualization tool present data to users as chart graph or maps' [1].
A typical single chart or graph cannot display more than a few dimensions (attributes such as region, time, etc.) at a time. To visualize and analyze data by multiple dimensions or attributes, one typically needs to display and dynamically link several graphs, charts, or panels. Navigating through a dimension in one panel automatically updates all visualizations on all other panels [2].
The widespread adoption of mobile phones has been the dramatic important in display technology, in mobile platform there are five types of data such as Text, Pictures, maps, Physical objects & Abstract data[3]. The conversation with mobile with the help of various techniques is examined by the data monitoring which is provided by the data visualization [4].
Data visualization is used in different application areas as organizational structures, family trees, geographical data, transport, communication and social networks, technology, information systems – hardware interconnection, software, distributed and collaborative systems and modelling [5].

2. VISUALIZATION ON MOBILE DEVICES
Earlier PC's were commonly used for information displaying. It is huge in size and its hardware is also heavy that's why it was not able to easily moved from one place to another. To overcome this type of problem, visualization technique is used in mobile devices [6].
The main purpose of mobile device is for personal communication. Mobile devices can store the information about the user activities which allows to researching a personal relationship with ubiquitous computing as per user demands [8]. Mobile visualization optimised visibility related design decisions, thus it helps designers to make it easier for users to perceive and respond visual cues & information embedded into geometric designs and provided in the signing & marking [9][13].

3. CLASSIFICATION OF VISUALIZATION
There are several categories of data visualization; some of them are as given below:

3.1 Information Visualization
It is a transformation of data in one representation to another, mostly to a representation observable by human beings. The first step of Information Visualization is preparation, which is used to identify relevant entities and events. The second step encoding deals with problems how the data will be displayed. The final phase is presentation and interaction and should answer questions about how the visualization objects are displayed and which interaction possibilities are offered to the user [4].

3.2 Visualizing Graph Structures

Visualizing graphs is not trivial and involves several theoretical and practical problems. The main problem is the size and density of the visualized graph, In general not all rules and aesthetic criteria can be fulfilled in case of especially large graphs. Interactive 3D graphics and virtual reality helps to overcome the difficulty in visualizing large data sets. IT try to increase the visual perception and help to discover facts about mutual connections between different trees, representing hierarchical structures for example companies, families or clans. Trees are displayed on different planar and semitransparent layers as displayed in Figure 1.An example graph visualization using soap bubble metaphor is shown in Figure 2 [4].

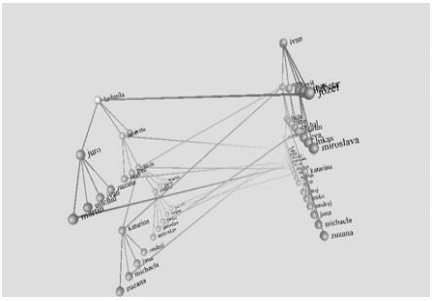

Figure 1 Trees displayed on two layers

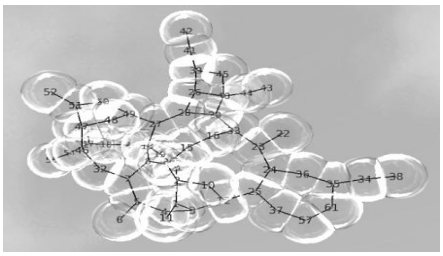

Figure 2 Graph visualized as soap bubble cluster

3.3 Software Visualization

Software can be considered as a special data type that is very suitable for visualization. The intangibility of software components makes it very difficult to comprehend all aspects of software systems which is consist of many art effects including data, algorithms, documentations, user interfaces etc. and all possible documents related to software development. Software visualization can focus on three main aspects: software structure, behaviour of executing processes and evolution of software development [4].

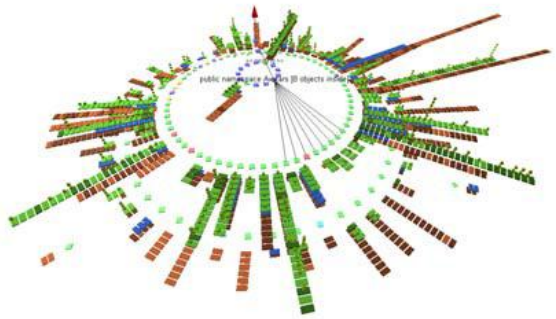

Figure A. Visualization of an existing system

A visualization of an existing system containing nearly two thousand software art effects is shown on Figure A. For visual data-mining the implemented visualization system allows to filter out not important elements and to sort them according to user preferences [4].

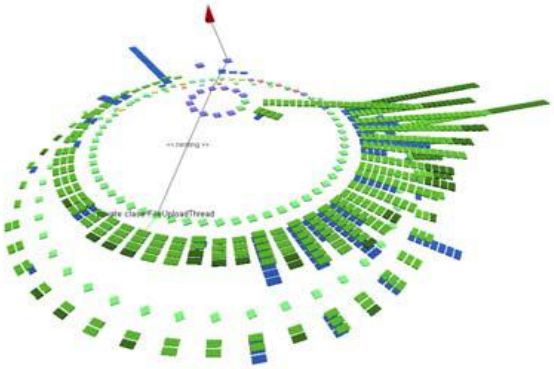

Figure B. Sorted view of classes & their methods

The Figure B. displays the visualization of the same system, but with only classes and their methods and represent relations between various types of software artefacts we developed a hyper graph-based model that allows to storing relations between semantically different software.

3.4 2D Visualization & 3D Visualization

2D and 3D Visualization may be treated as a technique for creating images, diagrams, or animations to communicate a message. Visualization through visual is imagery has been an effective way to communicate both abstract and concrete ideas since the dawn of man. 2D, it can draw line, point, dot, box, histogram graphs or vector fields. In 3D, it supports line, point and dot surfaces, with or without hidden line removal. It supports colour or gray scale surfaces and maps, even for non-equidistant and non-rectangular 3D data, otherwise it offers data gridding. The quality of a structural alignment can generally be judged by the number of matched residues (preference for long alignments), their pair wise distances in three-dimensional (3D) space (preference for small distances) and the number of gaps. Stereoscopic image displayed with the help of 3D Visualization hardware [7]. Mobile Device used 3D data for exploration of new interaction & Visualization techniques [6].

3.5 Multidimensional Visualization

Multidimensional visualization deals with vast amount of data which need to be used for graphical representations in many attractive ways. Visual representations of data hold great potential for reducing communication difficulties, with the help of this we take better decision as soon as possible such as meetings, management environment, reducing stress associated with managing large number of paper document and amplifying cognition of quantitative data [6]. To present multidimensional visualization user can be use some specific strategies like scatter plot, linked histogram, hierarchical tree and tree map layouts as shown in fig.3. Variety of interaction modes and tools supported by the visualisation information, including brushing in screen, data, and structure spaces, zooming, panning, and distortion techniques, and the masking and reordering of dimensions[11].

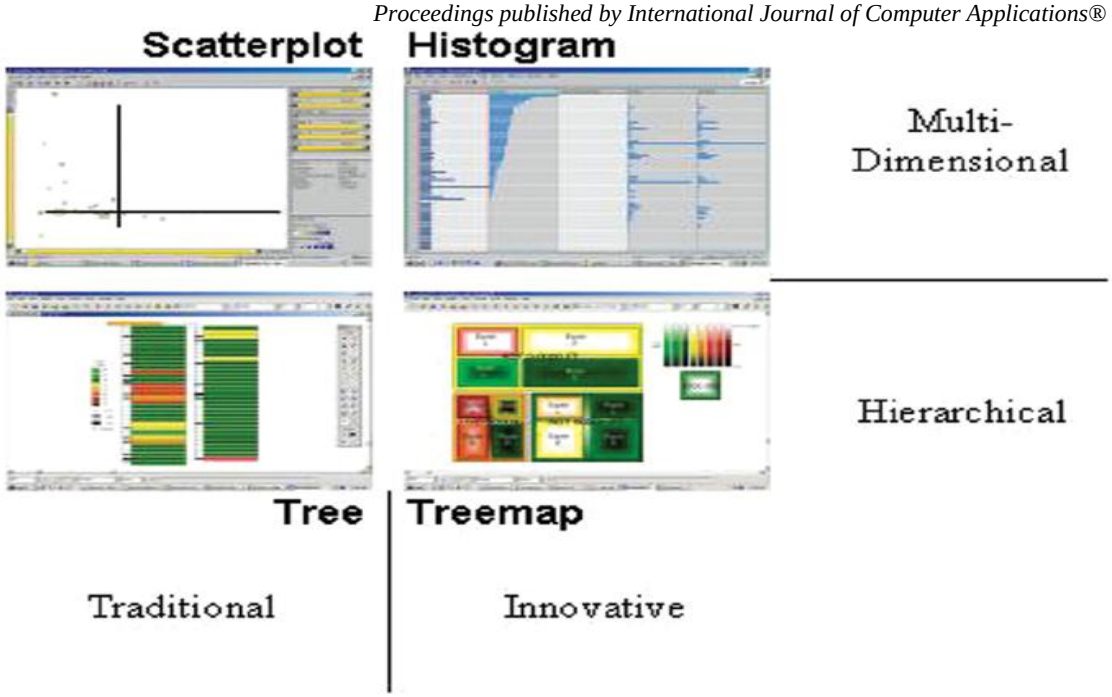

Figure 3 Visual strategies

3.6 Visualization On Abstract Data

The abstract data requires sophisticated and interactive visualization techniques because it has effective visual exploration of large and complexly structured. The amount of abstract data containing useful information is growing speedily in our day to day for example surveys, simulations, financial transaction, logs ,scientific measurements , technology are some of the many sources. Development of these techniques is the major discipline in information visualization [12][15].

3.7 Audio & Video Visualization

Audio & Video Visualization is segmented into smaller pieces. Each segment consists of a contiguous range of Audio &Video. Audio & Video Visualization is deemed conceptually similar, analyzed to derive additional data (metadata) for creating alternate representations of the video. Audio & Video improved with indices for fast searching and retrieval of segments [10].

A simple effective method for visualising large data sets is needed to analyse the result of today's recreation.

These researches agenda consider on three dimensions are as given below:

3.7.1 Data Visualization on mobile platform- Data Visualization Mobile Techniques are, personal communication techniques and sensors, which can store information about the user activities, allow researching a personal relationship with ubiquitous computing [13]. A key challenge is the integration of data mining algorithms with a visualization interface, locally on the mobile device, considering the performance of the tracking system, network and battery usage. The mobile device is also the mechanism that allows the evaluation of the system capabilities at different levels, including performance, usability and motivation [16].

3.7.2 *Information processing and the future-* The potential of data Visualization Mobile Techniques and forecasting of personal routines is tested in real time situations, with the goal of enabling adaptation to individual needs and behaviours[14].

3.7.3 The interface- In order to work on a personal, intimate level, the visualization interface offers subjective readings, allowing individual interpretation and contemplation. The representation of time in a "map" is a fundamental aspect of this interface, considering a balance between a personal view and generic readability. To research along these dimensions, we developed and evaluated an application for Data Visualization Mobile Techniques, in an iterative process that allowed to achieving the initial project objectives. [5]

During the project the mobile application went through several iterations that allowed to experiment with different visualizations. The application continuously captures GPS coordinates and based on stored data and real time information shows time based visualizations that highlight different variables. Several other time based visualizations were developed both for desktop and mobile devices [17][18].

4. PERFORMANCE EVALUATION

Most of the real time data monitoring techniques are developed with data Visualization, predicted information can be visualise with the help of mobile techniques with respect to the data as well as task, to have better prediction, new methods are needed for constructing the visualised data base system such as real time visualization that can be simplify the development process and result in better targeted applications

Visualization deals with the study of ever growing amounts of information, graphical interfaces, multi-dimensional data and real time data and other Visualization technologies. To evaluate the increasing number of simultaneous data Visualization for mobile computing or its techniques in real time environment it needs the better network, high end computing tools, better interactive supporting system and

good quality mobile computing devices. In case of Information Visualization data is transformed in to graphic representations that help viewers to understand more effectively. In Software visualization can focus on three main aspects that is software structure, behaviour of executing processes and evolution of software development. In case of abstract data visualization, data grows rapidly, and need to be visualising in a better manner. In case of multidimensional visualization, data need to visualize and analyze or attributes to display and dynamically link several graphs, charts, or panels. In this navigation, a dimension in one panel automatically updates all visualizations on all other panels.

In Audio & Video Visualization smaller pieces consists of a contiguous range of Audio & Video data and analyzed to derive additional data for creating alternate representations of the video. In case of 2D and 3D Visualization, a technique is used for creating images, diagrams or animations to communicate a message. It is used for exploration of new interaction & Visualization techniques.

5. CONCLUSION

The key challenges in mobile visualization and user interfaces relate to small displays and the limited amount of interaction hardware compare to the desktop. Visualizing large amount of graphical data and complex user interface components more effectively on small displays is a challenging task in the field of visualization on mobile devices. Therefore more research is needed in this field to meet the challenges.

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