DATA REPRESENTATION OF CRIME ANALYSIS BY USING
INFORMATION VISUALIZATION

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SAYA RAHILLDA NADHIRAH NORIZATY BINTI RAHIDDIN

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DATA REPRESENTATION OF CRIME ANALYSIS BY USING INFORMATION VISUALIZATION

RAHILLDA NADHIRAH NORIZZATY BINTI RAHIDDIN

The report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (System Development) with Honour

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2015
DECLARATION

I hereby declare that this project report entitle

DATA REPRESENTATION OF CRIME ANALYSIS BY USING
INFORMATION VISUALIZATION

Was my original work and not copy from any resources except a few parts that were
mention in references section.

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ABDULLAH)
DEDICATION

To my beloved family, I love you all. To my supervisor, thank you so much for the assist and help. To my all my friends, thank you for your hardship and support.
ACKNOWLEDGEMENT

First of all, praise upon Allah for giving me strength and patient to complete the PSM throughout this semester. Special thanks to my beloved parents for their pray and blesses to me. I also would like to express my gratitude and honour to my dedicated supervisor, Madam Rosmiza Wahida Binti Abdullah that always guide and conducting me through the completion of this project.
Crime Visualization System (CVS) is a system that visualizing the crime data in Malacca map, statistic graph, pie chart and spacetree. On Malacca map, the numbers of crimes are visualized using color on map. The statistic graph shows the number of crime happened in each district and state where the location of the crimes. While pie chart shows the percentage of category in each location. For spacetree, it displays the division of crime happened in Malacca. CVS has three types of user levels which are administrator, IPK staffs and public users. Each user can view different functionalities. The methodology used in CVS development is Object-Oriented Analysis and Design (OOAD). The system is a web-based system.
ABSTRAK

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CHAPTER I

INTRODUCTION

1.1 Project Background

Crime activity reports available from victims, governmental organizations, news press, and social networks play a significant role in public safety, including crime prevention, suppression and investigation, uniformed patrol and response. The public also worried about their belongings and housing area.

With this project, we help the authorities to increase public awareness about the crimes that happened in their housing area and state. So they can be more careful. The project will help them viewing the crime analysis by information visualization technique, view the state map, view the statistic and summarize the crime that happened. The information and statistic show the actual information from IPK Malacca staffs.
1.2 Problem statement(s)

The problem statements in the project are

- Disability to visualize the big picture of crime.
- Lack of information reliability.
- Late updating of crime information and police officer difficult to patrol the dark areas.

1.3 Objectives

The objectives in the project that need to be achieved are

- To represent crime information in more interesting and easier to understand.
  - The authority can get better understanding to seeing the big picture and overcoming the challenge of detecting and preventing crime.

- To provide more accurate and trusted information.
  - The purpose of this project is to help to prevent mistake or inaccurate information from IPK staff and help the authority get the right information.

- To assist authority to monitor crime cases effectively and decision making.
  - With the system, public can take a step on how to prevent the crime that will happen around them. Police department can increase the number of policemen in dark area and authority can make on duty call to guard their housing area.
1.4 Scope

There are three level users involve which are system administrator, IPK Malacca staffs and public users. For system administrator and IPK Malacca staffs, they need to login before enter the system. System administrator can manage IPK Malacca staffs, view crime statistic, view crime map, manage IPK staff, manage crime events and manage crime range. For IPK Malacca staffs can view crime statistic, view crime map, manage crime events and manage crime category. But for public users, they only can view crime statistic and view crime map.

1.5 Project significance

The benefits that gain in the project are crime information are representing in more interesting and easier to understand. The IPK staff and authority can get better understanding about the information. The project also helps to decrease the mistake or inaccurate information from IPK staff and help the authority get the right information to monitor crime cases effectively.

1.6 Expected Output

The outcome of the project is a web-based system to visualize the crime analysis data by information visualization technique.
1.7 Conclusion

As the conclusion, the output from this project can overcome all the problems that have been state in the problem statement and can achieve the all objectives. Hopefully this project also can be completed in the time duration given. For the second chapter, the things that will be discusses are about the related previous research, proposed solution and the project schedule and milestone.
CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

In this chapter 2, it will focus on literature review and project methodology. The literature review is focused on the research of the existing system and the new system that will be developed. The purpose of a literature review is to convey the reader about the knowledge and also can established the ideas have been on a topic and what are the strengths and weaknesses.

This section is started by existing system. It will discuss and review about approach and related research, reference about this system. In project methodology section, selected approach or methodology will be described the activities that may do in every stage. All the requirements in this system will be explained in high level project requirements and followed with project schedule and milestones.
2.2 Fact and findings

2.2.1 Domain

Crime is divided into two comprehensive concepts which are legal and non-legal sense. Legal crime is breaking criminal law and aimed at protecting lives, property and right of citizens of belonging to that jurisdiction. Crime is an offence against a person, their properties or State regulation. A set of acts that violate socially accepted rules of human ethical or moral behaviour known as non-legal crime.[1]

A single detective officer may has different tasks such as assist investigating officers by analyzing crime patterns and identifying links between individual or group of offenders with series of crimes.[2]

In computer science research, the term visualization describes the field of study that uses interactive graphical tools to explore and present digitally represented data that might be simulated, measured, or archived [3]. Information visualization seems to be most effective for specialists doing data analysis. It is also used for creating computer graphs or animations to present information, data, scientific results, or concepts to facilitate communications or decision making processes. It can be used to render abstract information in a visual form that allows for interactive exploration and brings new insights in complex data [4].

Several of techniques in information visualization can be applied to represent the data. The techniques to visualize the data are depending on type of information. Many law enforcement and intelligence experts are interested in these visualization techniques for their practical use. There are list of techniques for visualize crime data [5]:

- Spatiotemporal crime visualization and analysis
- Geospatial crime hotspot visualization and analysis
- GIS visualization techniques for crime mapping
- Interactive investigation visualization/visual analytics tools for spatiotemporal crime analysis
• Collaborative and distributed visualization for multiple crime analysts
• Detecting crime patterns and predictions using visual analytics on big crime data
• Interactive information dashboards for crime analysts
• 3D visualization/animation/simulation for crime data exploration and analysis
• Virtual reality and augmented reality techniques for crime data visualization

In addition, there is an example of proceeding that proposes a STT (spatio-temporal-textual) search engine for extracting, indexing, querying and visualizing crime information. They had developed a crime search engine for Washington DC metropolitan area that includes geo-temporal-tagger, STT indexer, heuristic query and ranker and dynamical ST visualization. It assists crime detection for investigators, identification of crime trends and patterns for decision makers and researchers, and security of city life for residents and journalists [6].

Card et al. [7] defines the two forms of visualization as

• Scientific Visualization: the use of interactive visual representations of scientific data, typically physically based, to amplify cognition.
• Information Visualization: the use of interactive visual representations of abstract non-physically based data to amplify cognition.

Examples of scientific visualization are

• Regular mesh

This is probably the most commonly seen representation of the model domain because it is conceptually simple and clear, it corresponds naturally to array types provided by programming languages, and there is a large body of traditional mathematics organized around uniform samplings. All “grid lines” are parallel to coordinate axes, and the spacing between cells is uniform within each direction. There is an implicit “topology” of the underlying