Chapter 13

Location-Based Data Visualisation Tool for Tuberculosis and Dengue: A Case Study in Malaysia

Kim Nee Goh
Universiti Teknologi PETRONAS, Malaysia

Yoke Yie Chen
Universiti Teknologi PETRONAS, Malaysia

Cheah Hui Chow
Universiti Teknologi PETRONAS, Malaysia

ABSTRACT

Malaysians suffer from both communicable and non-communicable diseases. Tuberculosis (communicable disease) is common in rural places and dengue (non-communicable disease) is a popular vector-borne disease in Malaysia. Health centres record information of the victims, but merely recording the address in a Microsoft Excel file does not provide much insight to viewers. Currently, an easy to use tool is not available for doctors, officers from the Ministry of Health, and also the public to analyse and visualise the data. It is difficult and time consuming to analyse and interpret raw data tabulated through Microsoft Excel. This research aims to develop a prototype tool that visualises disease data on a Google map. An interpretation is then generated along with the visualisation to give an impartial description about the data. This prototype obtained favourable feedback from a health officer as it can help them in analysing data and assist in the decision making process. The benefit of such application is helpful in tracking diseases’ spreading patterns, how to isolate diseases, as well as mobilising personnel and equipment to the affected areas.

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INTRODUCTION

With the immense power of computing these days, data can now be given ‘treatment’ in order to transform it into usable information. Health centres have a lot of data that are not fully utilized. In our research work, we developed a prototype system to visualise data, as it is easier to interpret an image rather than text (Jin & Liu, 2009). Visualization reduces the extra cognitive effort needed to understand raw data and data mining results besides allowing comparisons and testing to be done on the results. It will also make data mining algorithms more understandable to users and thus enable them to be involved in their decision analysis (Kantardzic, 2002). Our location of study is situated in Kinta District, within the Perak state of Malaysia. Two diseases were chosen: 1. tuberculosis, as it is contagious and common in rural parts of Kinta District and 2. dengue, as it is a very common vector borne disease in Malaysia. From interviews conducted with the health officer of Kinta District, data were obtained, requirements were gathered and a prototype was developed. It is envisaged that this prototype will assist health officers in managing new disease cases, monitoring the spread of diseases and to make more informed decisions in terms of mobilizing resources such as health personnels and equipment that may be needed in a particular area. In the long run, it is hoped that it will be able to assist health centres in discovering spreading patterns, isolating diseases and mobilizing personnel and equipment to such areas.

BACKGROUND

As people become more mobile with travelling due to various accessible transportation modes and affordability, the risk of influenza or other communicable diseases increases (Merler et. al., 2006). In Malaysia, both inbound and outbound tourism has been rapidly increasing as the global economy in Asia strengthens. In 2007, the top five diseases in Malaysia were dengue fever, tuberculosis, food poisoning, hand food and mouth disease (HFMD) and HIV/AIDS. As stated by the World Health Organisation (WHO) (2010), the incidence rates for Malaysia were 80.6 per 100,000 population for dengue fever, 61.9 per 100,000 for tuberculosis, 52.6 per 100,000 for food poisoning, 46.1 per 100,000 for HFMD, and 16.0 per 100,000 for HIV/AIDS. Dengue fever, which is a vector borne disease, topped the rank. All of the top five diseases are communicable diseases which indicate that transmission could happen between humans through direct or indirect contact (Hawker et. al., 2000). One of the strategies that will guide the health sector development is by enhancing research and development to support evidence-based decision-making and strengthening health information and management systems (Ali, 2010).

Communicable diseases are diseases that can be passed from one person to the other. If we are able to inform and educate the public to help contain and prevent the spread of communicable diseases by taking some precautionary steps, the number of death and also the money spent on curing such diseases can be reduced tremendously. Pandemic influenza is also threatening the health of not only Malaysians but also many people around the world. Pandemic influenza arrives with little warning and can cause huge damage in a short period of time. The risk of influenza had also increased as the mobility of the population becomes greater. The outbreak of a new disease is reminded by the Spanish flu pandemic, which happened between 1918 and 1919 and was estimated to have killed 40 million people worldwide. This perception had caused panic and weakened the world economy. The areas that were adversely affected by this situation were air travel, tourism and meat imports and exports, although WHO relaxed the travel restrictions that were recommended earlier and meat was proven not as a medium where the virus could spread. The circumstance above showed that...