

Chapter I

Introduction

This chapter discusses key points about this final project, i.e. motivation, problem formulation, limitation of study, objective of study, and systematic writing.

1.1 Motivation

Emergency is an abnormal event that has negative impact because it can threaten and disrupt a person's life. Emergency occurs suddenly with unexpected place and time. An emergency can be presented in many forms; from everyday incidents like traffic accident or assault, to major incidents like wild-fire, earthquake, or large-scale terrorist attacks.

Many fatal impact in emergency situations can be prevented or reduced by adequate first aid. Therefore, most countries have implemented some form of emergency services in order to do first aid in emergency. In Indonesia, emergency services divided into several hotline which are 118 for ambulance services, 110 for police services, and 113 for fire brigade services. On December 2016, KOMINFO implementing single hotline number 112 emergency services as an experiment project for some cities. One of those cities is Bandung.

The 112 emergency services aims to establish an easy recall number that can be accessed by anyone, anytime, anywhere. It provides services of ambulance, police, and fire brigade. This emergency service works as a bridge connecting user to each emergency units. On June 2017, 112 emergency services in Bandung received 637 emergency requests. It means over 21 emergency requests received per day by specially trained operators. The operator have to decide which nearest emergency unit to dispatch to emergency location every time emergency happens. The environment they operate is characterized by high degree of uncertainty. Its because they don't know the exact distance from each unit to emergency location which inconvenience them to determining nearest emergency unit.

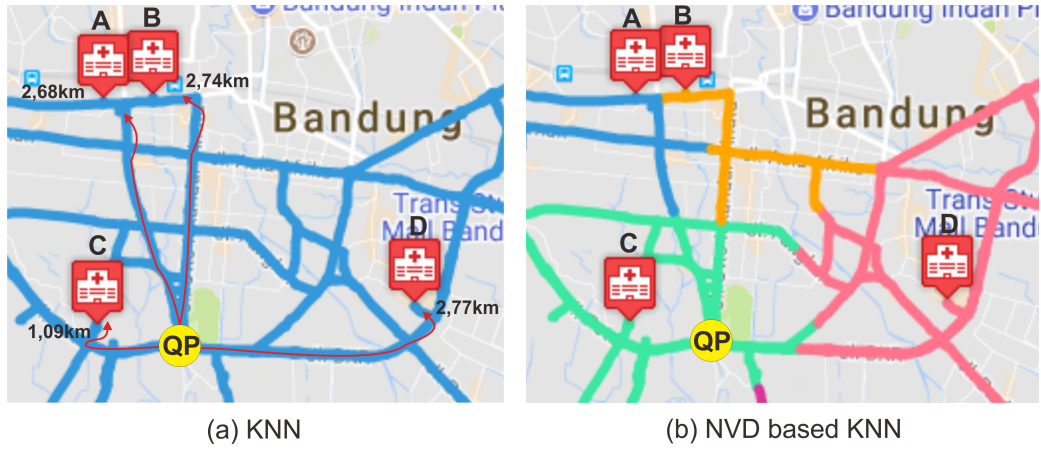


Figure 1.1: Emergency services illustration in Bandung

In computer science, finding nearest emergency unit can be determine by using K-Nearest Neighbor (KNN) algorithm. Consider road network in Bandung shown in Figure 1.1(a), where emergency happens in Query Point (QP). KNN needs to determine each emergency unit distance to QP before comparing it and pick up the emergency unit with minimum distance. So in Figure 1.1(a), the nearest ambulance is C-ambulance. Notice that if there are emergency requests from many different location, then these process will repeted for each request. More requests means more processes KNN will takes.

Each emergency unit basically has a coverage area which specifies that its closer to the emergency unit than others. It can be done by using Network Voronoi Diagram (NVD) algorithm. NVD works as shown in Figure 1.1(b), where every road network's color represented each emergency unit's territories. So when emergency happens, NVD just needs to determine which emergency unit's territory emergency exist. In Figure 1.1(b) QP exist in C-ambulance with green territory which is the nearest ambulance.

This final project presents Network Voronoi Diagram based Kth-Nearest Neighbor development for 3 emergency services (ambulance, police, and fire brigade) in Bandung. In general, when an emergency occurs, user contact 112 to make a report. System will determine user coordinate location and select nearest emergency unit. System also support finding next nearest emergency units if nearest unit is on duty. The selected unit will be dispatch after receiving shortest path to the emergency location.

1.2 Problem Formulation

Based on facts and problems mentioned in subsection motivation above, the main problems which will be discussed in this final project as follows :

1. How to designing first aid emergency system which can get nearest and next nearest emergency unit?
2. How to perform performance analysis on architecture and developed method on first aid demergency system?

1.3 Limitation of the Study

To scope this final project to be more specific in accordance with the title and purpose, this final project limited to be discussed as follows :

1. This final project only focused on emergency services in Bandung but only in west, south, east region.
2. The road network used is the road segments that have functions as primary arterial roads, primary collector roads, secondary arterial road, and secondary collector road.
3. Emergency units are divided into police, ambulance and fire brigade.
4. Emergency unit selected is based on kth-nearest from emergency location.
5. Route determination from selected units to emergency location using shortest path ignoring road conditions.

1.4 Objective of the Study

Based on the formulation of the above problems, this final project's objective are described as follows:

1. Designing first aid emergency system architecture that can determine nearest and next nearest emergency unit.
2. Analyzing the performance of architecture and developed method on first aid emergency system.

1.5 Systematic Writing

The writing of the results in this report follows the description given in each successive chapter to facilitate discussion. From the subject matter can be divided into six chapters as described below :

Chapter I : Introduction chapter contains an introduction that includes background, problem formulation, limitation of the study, objective of study, and systematic writing.

Chapter II : Review of Related Literature
This chapter contains the theoretical foundations that support and directly relate to research to be conducted from books, research journals, internet, and other literary sources.

Chapter III : Method of Investigation
This chapter contains a description of the steps of research conducted, but it is also a picture of author's mind frame in doing this final project from the beginning until it completed.

Chapter IV : Data Collection and Processing
This chapter contains data collection process used in tis final project and contains process of data processing as an effort to create solutions for existing problems.

Chapter V : Result Analysis
This chapter contains the analysis and data interpretation of the results in the previous section. The purpose of this section is to provide clear information about the results of this final project and able to provide solutions of the problems that arise.

Chapter VI : Conclusion
This chapter contains the conclusions derived from the system design and analysis that have been done and the recommendations given for improvement.