

**A COMPARATIVE ANALYSIS OF PRIM, KRUSKAL, AND
REVERSE-DELETE ALGORITHMS IN OPTIMIZING ROUTES
WITHIN TERENGGANU'S AND PAHANG'S ATTRACTION
ROAD NETWORK**

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ABSTRACT

This paper presents a detailed comparison of three greedy algorithms—Prim, Kruskal, and Reverse-Delete—in optimizing the routes within Terengganu’s and Pahang’s attraction road network. The goal is to determine the most effective algorithm for constructing the minimum spanning tree (MST) that minimizes total travel distance. Prim’s algorithm builds the MST by starting from an arbitrary node and continually adding the smallest edge that connects a vertex in the tree to a vertex outside the tree. Kruskal’s algorithm, on the other hand, constructs the MST by sorting all the edges and adding the smallest edge to the tree, as long as it doesn’t form a cycle. The Reverse-Delete algorithm works in reverse; it starts with the full graph and iteratively removes the largest edges, ensuring that the graph remains connected. This study meticulously evaluates each algorithm’s computational efficiency, implementation complexity, and performance in generating optimal routes.

Upon analysis, it was found that all three algorithms—Prim, Kruskal, and Reverse-Delete—produced the same MST, indicating they are all effective in minimizing the total travel distance. To identify the best method for this specific road network problem, the time complexity of each algorithm was calculated. The results showed that Kruskal’s algorithm has the lowest time complexity compared to Prim and Reverse-Delete. Consequently, for optimizing routes in Terengganu’s and Pahang’s Road network, Kruskal’s algorithm offers an optimal balance of simplicity and efficiency. This makes it the most suitable algorithm for transportation planning and infrastructure development in this context.

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TABLE OF CONTENTS

	Page
DECLARATION BY THE SUPERVISOR-----	i
DECLARATION BY THE CANDIDATE-----	ii
ABSTRACT-----	iii
ACKNOWLEDGEMENT-----	iv
TABLE OF CONTENTS-----	v
LISTS OF TABLES-----	viii
LIST OF FIGURES-----	ix
CHAPTER 1 INTRODUCTION OF PROJECT-----	1
1.1 Introduction-----	1
1.2 Background of Study-----	1
1.3 Problem Statement-----	2
1.4 Objectives-----	4
1.5 Significance of the Project-----	4
1.6 Scope of the Project-----	7
1.7 Project Benefits-----	8
1.8 Definitions of Terms and Concept-----	9
1.9 Organization of Report-----	11
CHAPTER 2 LITERATURE REVIEW-----	14
2.1 Introduction-----	14
2.2 Literature Review of Greedy Algorithm-----	14

2.3	Literature Review of Prim Algorithm-----	16
2.4	Literature Review of Kruskal Algorithm-----	17
2.5	Literature Review of Reverse-Delete Algorithm-----	20
CHAPTER 3 METHODOLOGY-----		21
3.1	Prim Algorithm-----	21
3.2	Kruskal Algorithm-----	22
3.3	Reverse-Delete Algorithm-----	23
3.4	Time Complexity-----	24
3.5	Research Step-----	25
CHAPTER 4 Implementation-----		27
4.1	Introduction-----	27
4.2	Data Research-----	27
4.3	Manual Calculations of Prim Algorithm-----	39
4.4	Manual Calculations of Kruskal Algorithm-----	57
4.5	Manual Calculations of Reverse-Delete Algorithm-----	65
4.6	Pretesting Algorithm-----	70
4.7	Manual Calculation of Time Complexity-----	71
CHAPTER 5 RESULTS AND DISCUSSION-----		73
5.1	Introduction-----	73
5.2	The Graphical Representation for Eleven Data Points-----	74
5.3	The List Representation for Eleven Data Points-----	75