A* Algorithm for Easy Navigation of Mapa ni Ramon: An Augmented Reality
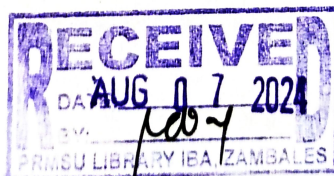
Labrador, Drix T.

Manila, Renzo Andre D.

Robilo III, Emerson A.

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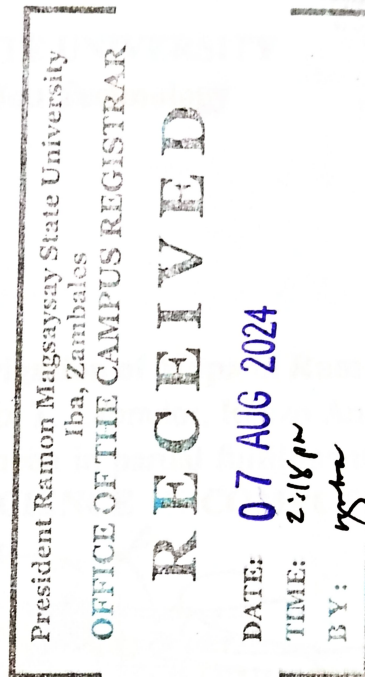
A Thesis

In partial Fulfillment of the Requirements

for the degree of Bachelor of Science in Computer Science

College of Communication and Information Technology

President Ramon Magsaysay State University
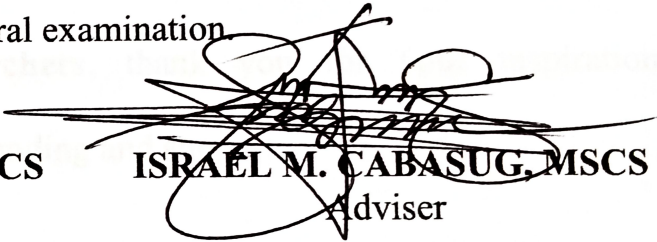
Iba, Zambales

July 2024

Republic of the Philippines
PRESIDENT RAMON MAGSAYSAY STATE UNIVERSITY
College of Communication and Information Technology
Iba, Zambales

APPROVAL SHEET

This, study entitled **"A* Algorithm for Easy Navigation of Mapa ni Ramon: An Augmented Reality"** prepared and submitted by Drix T. Labrador, Renzo Andre D. Manila, Emerson A. Robilo III, and Rovic H. Romanban in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN COMPUTER SCIENCE** are hereby recommended for oral examination.

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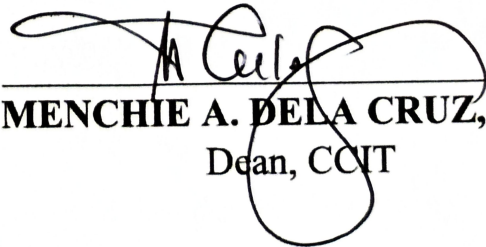
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Accepted and approved in partial fulfillment of the requirements for the degree of
BACHELOR OF SCIENCE IN COMPUTER SCIENCE.

07 AUG 2024
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EXECUTIVE SUMMARY

The study evaluated the effectiveness of A* pathfinding algorithm and Dijkstra algorithm in navigating complex location like PRMSU Iba Campus. Researchers developed a navigation prototype called "Mapa ni Ramon" using A* algorithm for accurate and efficient route assistance. The prototype included turn-by-turn navigation, a 2D map display, and augmented reality functionalities to enhance user experience.

Researchers also conducted a study comparing the Dijkstra algorithm and A* algorithm's time and space complexity. Researchers created a two-dimensional map of PRMSU campus using color-coded nodes to identify best routes and distinguish open spaces. The prototype's performance was assessed through measurements of memory use, route length, node expansion, and execution time. The study aimed to demonstrate the A* algorithm's practicality on college campuses, providing a reliable and user-friendly alternative for tourists and students.

The comparative analysis between Dijkstra and A* algorithm shows significant differences in time taken but not in the length of the path it covered to analyze the possible path in finding the end route. In terms of memory used, the Dijkstra algorithm used less RAM compare to the A* algorithm. The A* algorithm exhibits $O(1)$ time and space complexity in its best case, while its average and worst cases show $O(V\log V)$ time and $O(V)$ space complexity, making it a reliable pathfinding algorithm suitable for various applications. The following recommendations in the study includes enhancing the A* algorithm and applications that includes the A* algorithm.