

# PROJECT PROGRESS REPORTS

This is mid-term project progress report. This report includes four parts. They are project goal, Method that are using in the project, work that have accomplished and work that have not done yet.

## 1. Project Goal

The topic of this project is the visualization of Divide-and-Conquer algorithms. The project aims to develop a web application that supports students in interacting with two classic Divide-and-Conquer algorithms: merge sort and closest pair of points in 2D dimensions. Unlike most traditional visualizations, this application provides a high-level control that helps users understand the algorithm better. The project's goal is to investigate the usefulness of algorithm visualization with high-level control in the study of computer science algorithms, particularly those related to Divide-and-Conquer. The high-level control focuses on the main phases of the algorithm rather than the detailed steps. The key high-level controls for the Divide-and-Conquer algorithm are Divide, Conquer, and Merge.

## 2. Method

This part discusses the methods used to conduct this project, including the type of research, the approach to data collection and analysis, and the underlying reasons for employing them.

### 2.1 Approach

This project aims to investigate the usefulness of high-level control in algorithm visualization, specifically in the context of divide-and-conquer algorithms. We aim to determine whether the inclusion of high-level control, which is lacking in traditional visualization methods, enhances students' understanding of the divide-and-conquer algorithm. To accomplish this, we conducted a study employing a combination of qualitative and quantitative analysis to address our research question and find a conclusive answer.

### 2.2 Data Collection

We utilized a Google Form questionnaire survey to collect both qualitative and quantitative data for this project. Users were prompted to complete the questionnaire after experiencing the visualization tool we provided. The survey encompassed two quantitative questions, aiming to gather information about the users' educational background and their level of understanding regarding the merge sort and closest pair of point problem algorithms. Additionally, the survey included four qualitative questions, designed to capture users' experiences with the application and their comprehension of the algorithms following their experience.

### 2.3 Data Analysis

We employed quantitative data to categorize the users into two distinct groups: skilled students and beginning students. Subsequently, we utilized content analysis on the qualitative data to evaluate the effectiveness of our application incorporating high-level control.

## 3. Completed work

In the past month, we successfully developed a prototype of two scheduled divide-and-conquer algorithms, focusing on functionality rather than UI design. The prototype includes essential functions such as divide,

conquer, merge, and a detailed step-by-step progression feature.

#### 4. Next Steps

Moving forward, our next step involves incorporating UI design into the application. We will enhance the user interface to improve the overall user experience. Additionally, we will design the questionnaire questions strategically to gather feedback from the users, specifically targeting the evaluation of the usefulness of high-level control in algorithm visualization. This feedback will play a crucial role in our evaluation process. Finally, we will commence writing the final dissertation, incorporating our research findings, analysis, and conclusions.