

Lecturer User Study Instructions

Project Outline

This project deals with automatically generating exercises for algorithmics courses, while maintaining uniform difficulty in order to uphold academic integrity. Specifically, **exercises** and **solutions** can be generated for **Dijkstra's algorithm** (finding the shortest path in a weighted graph starting from a given vertex) and the Knuth–Morris–Pratt string-searching algorithm (or **KMP algorithm**) for finding a string/pattern in another string.

Program Information

The included JAR file launches the program, which can be used to generate a given number of Dijkstra and/or KMP exercises along with their solutions. These will appear as both **.tex** and **.pdf** files (pdf files include a watermark and only include up to 4 pages, due to missing API license). These files may take a couple of minutes to generate based on how many are required. The program gives options for generating pdfs or not (if not, only tex files will be written), generating simple solutions (answer key) and generating full step-by-step solutions. **Note** that the generation will create new folders in the JAR file's directory, in which the outputs can be found.

Algorithmic Choices

For Dijkstra, the user can give inputs for the **number of vertices** and **edge relaxations** each exercise is going to have, varying the difficulty. The exercise generated will require students to find the shortest paths from a given vertex to all other vertices in a weighted graph using Dijkstra's algorithm.

For KMP, the inputs consist of **string length**, **longest border length** and whether the longest border **overlaps** itself (allows for longer border lengths). The exercise generated will require students to build a border table from a given string.

These inputs are used by the algorithm to ensure **uniform difficulty** across all generations.

Further Attachments

Examples of generated exercises and solutions can also be found in the provided folder (5 vertices with 3 edge relaxations for Dijkstra, 13 length string with 4 length non-overlapping longest border for KMP).

Instructions

The steps for completing this user study are as follows:

1. **Launch** the JAR file (*java -jar AutomatedExerciseGenerator.jar*) and experiment with generating exercises and solutions (program will empty the destination directory with each execution). Alternatively, simply inspect the provided screenshots of the program.
2. **Review** a few examples of exercises and solutions (either self-generated or the ones attached).
3. **Complete** the [survey](#).

```
Would you like to generate solutions? (y/n)
y
Would you like to generate step-by-step solutions? (y/n)
y
Would you like to render to PDF? (y/n)
y
Which algorithm/s would you like to generate for? (Can choose multiple, enter to confirm)
Available algorithms: [(2) KMP, (1) Dijkstra]
1
2

How many Dijkstra graphs would you like to generate?
2
How many vertices?
5
How many edge-relaxations?
5
How many KMP strings would you like to generate?
2
What size string?
13
What size largest border?
4
Overlapping? (t/f)
f
Generating...
Generation complete.
|
```