King Saud University
College of Computer and Information Sciences
Department of Computer Science

CSC 361: Artificial Intelligence
Second Semester 1442-1443 H (Winter 2021)
Instructor: Bander Alsulami

Assignment # 2

Due Date: 10 March 2021

1 Introduction

Students can work in groups of 2-3 students.

The assignment is composed of two consecutive parts. The first part is to development a program. Whereas in the second part an oral presentation will be prepared and presented.

2 Problem description:

A group of K persons (K > 1) want to cross a bridge from East to West during the night. The persons that are crossing the bridge must use a flashlight. There is only one flashlight. The bridge is very narrow and allows two persons to cross it at the same time at most. Two persons go from east to west and one person returns with the flashlight from west to east. If the two persons are crossing the bridge together, they are crossing it at the speed of the slower one. These people are trying to cross the bridge as quickly as possible.
Use 3 search strategies (UCS, IDS and A*) to find the best order for these persons to cross the bridge.

Input file:

1) C, number of test cases
2) For each test case:
    a. K, number of people
    b. A list of K numbers, showing the time required by each person to pass to the other side.

Output:

Your program should printout the following information for each search strategy:

1) Sequence of trips taken by the group along with direction of each trip for each strategy (solution)
2) Total time required to have all K people crossing using each strategy (solution cost).
3) Total number of generated nodes (Search time) for each strategy
4) Maximum number of nodes concurrently stored in the system (Space requirement) for each strategy.

3 What to submit

A report containing problem description, problem formulation and experimental results (minimum of 5 samples).

4 Example:

Input:

1
3
3, 2, 5

Description:

There is one test case, C=1

There are three people, K=3.

The first person (a) needs 3 (time units) to pass to from one side to the other

The second person (b) needs 2 time units

The third person (c) needs 5 time units

Output:

Test case #1:

	UCS
Solution	1. (a,b) move to the west side 2. (b) returns with the flashlight 3. (b,c) move to the west side
Solution Cost	10
Search Cost	14
Space Requirement	9

5 Important notes

1- Oral presentation will be scheduled right after the due date.
2- You may consult books and/or the web for ideas only and it must be acknowledged.
3- In case you change your group, provide me with your groups members' names before **28 FEB 2021**.
4- All group members must participate in the report and presentation of all parts of the homework.

6 Collaboration policy:

You are free to form groups to study and discuss tasks, assignments, and projects. However, you must write up your own assignments and code from scratch independently, and you must acknowledge in your submission all the resources. Prepare your tasks by taking into consideration the following points:

- It is not allowed to share your own work with others.
- It is not allowed to look at the works of other students.
- It is not allowed to upload your write-up or code to a public repository (e.g. github) before the end of the semester.