Vinh Long University of Technology Education
Faculty of Information Technology

Module: Artificial Intelligence Academic year: 2023 -2024
Semester: 2nd
Module Code: TH1333
Exam Code: 01 The exam has 02 pages
Duration: 90 minutes
Use of material is not permitted.

Student ID: Full Name: Computer No.:

EXAM CONTENT

Requirements:

- *Create a folder with the name <StudentID>_<Full name> in the SinhVien disk.*
- *Create a notebook file in Google Colab with the name <StudentID >_<Full name>.ipynb*
- *Create a word file in Microsoft Word with the name <StudentID>_<Full name>.docx to save the result and code screenshot in this file.*

Question 1 (2.0 points): Use Google Colab to perform convolution operations to meet the following tasks:

a) Implement an image sharpening filter using a 3 × 3 matrix with a central value of 9.
b) Implement an emboss filter for the image from part (a).

-1	-1	-1
-1	9	-1
-1	-1	-1

Sharpen Filter

-1	-1	0
-1	0	1
0	1	1

Emboss Filter

Result of question (a):

Result of question (b)

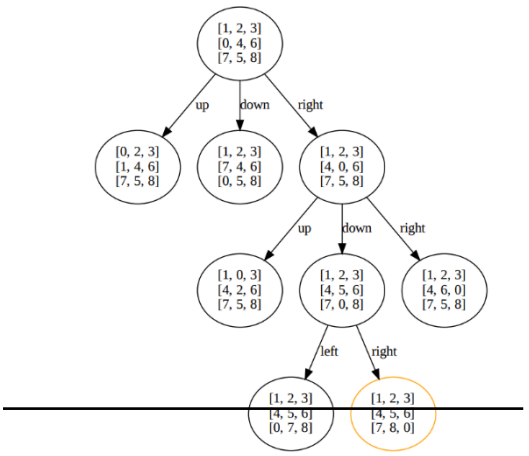
Question 2 (2.5 points): Implement the A* algorithm for the 8-puzzle game with the initial state provided in the figure below. Display the result with the goal state highlighted in orange, as shown in the image, and save it as <StudentID>_Astar.pdf.

1	2	3
	4	6
7	5	8

Initial State:

1	2	3
4	5	6
7	8	

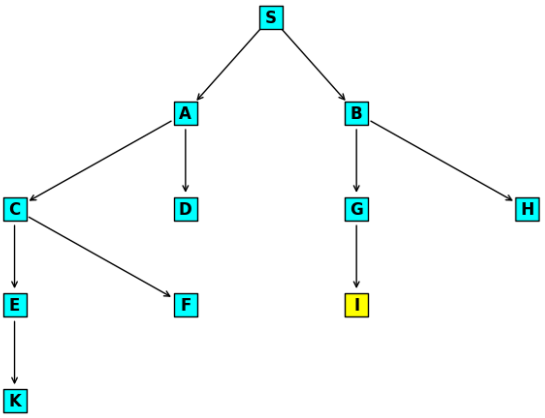
Goal State:



Question 3 (2.5 points): Implement the Breadth-First Search (BFS) algorithm for the binary tree below and complete the following tasks:

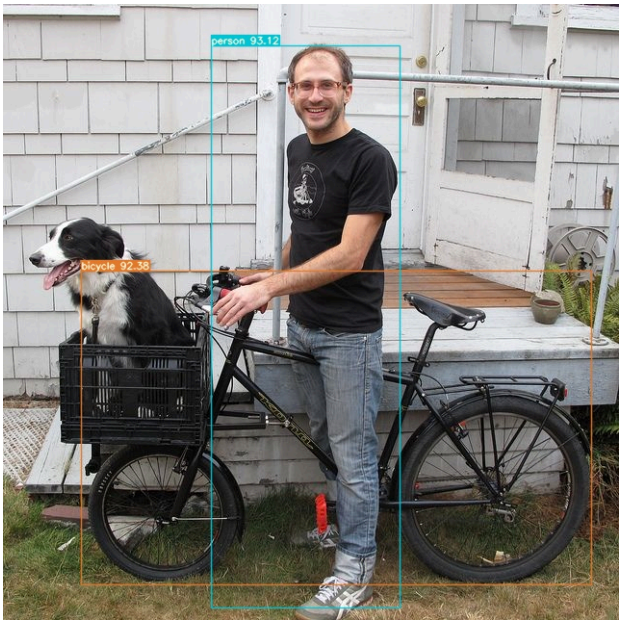
a) Build and implement a function to search for any node. For example, search from node S to node I.

b) Draw a graph representing the tree for part (a), with the following settings: edge colors are black, node shape is "s", and node size is 300.



Question 4 (2.0 points): Implement an object detection task using YOLOv7 to detect objects with an accuracy of over 90% and produce results as shown in the image below.

Original Image



Result: Include labels and accuracy for each detected object.

Question 5 (1.0 point): Implement a genetic algorithm for the problem below. Consider characters A-Z, a-z, and certain special characters like -;:_!" as genes. The target string is "I am a student of FIT-VLUTE" with a population density of 70 and a probability range between 0.45 and 0.95.

---------- End ----------

DEAN