Daniel Nofulla

ICSI 435

Homework 1 Documentation

9/21/2021

DFS, BFS and UCS

```
# Daniel Nofulla ICSI 435 Homework 1

- Graphs_and_Helpers.py holds all the Graphs (Hard Coded because nothing says it
is not allowed), 3 helper functions and the map of vertices

- DFS_G1.py holds all the DFS Functions for Graph 1 (4 Functions - Matrix and Ver
tex by Stack and Recursion)
- DFS_G2.py holds all the DFS Functions for Graph 2 (4 Functions - Matrix and Ver
tex by Stack and Recursion)

- BFS_G1.py holds all the BFS Functions for Graph 1 (4 Functions - Matrix and Ver
tex by Stack and Recursion)
- BFS_G2.py holds all the BFS Functions for Graph 2 (4 Functions - Matrix and Ver
tex by Stack and Recursion)

- UCS_G3.py holds all the DFS Functions for Graph 2 (2 Functions - Matrix and Ver
tex by Priority Queue)
- UCS_G4.py holds all the DFS Functions for Graph 2 (2 Functions - Matrix and Ver
tex by Priority Queue)

- run.py runs the program

# Wrong Functions but still implemented (to an extent)

- On BFS_G1.py, Recursive Implementations have a few issues with both the path an
d the expanded steps
- On BFS_G2.py, Recursive Implmenetaions have a few issues with the expanded step
s on the vertex implementation and both the path and expanded steps on the matrix
 implementation

# Functions with no attempt at implementation

- None

# Libraries and Python Default Data Structure Implementations Used

- numpy==1.21.2
```

```
- PriorityQueue from queue
- Stack
- Dictionaries
- Arrays

# Documentation

Documentation and Program Output is in the Documentation Folder

# How to install dependencies

```
pip install -r requirements.txt
```
```

Program Output:

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Fall 2021

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Homework 1

DFS, BFS and UCS

PRINTING DFS FOR G1 - All Correct

DFS Expanded Steps Vertex w/ Stack G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Path Vertex w/ Stack G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Expanded Steps Vertex w/ Recursion G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Path Vertex w/ Recursion G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Expanded Steps Matrix w/ Stack G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Path Matrix w/ Stack G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Expanded Steps Matrix w/ Recursion G1:

[S -> D -> B -> A -> C -> F -> G]

DFS Path Matrix w/ Recursion G1:

[S -> D -> B -> A -> C -> F -> G]

PRINTING BFS FOR G1 - All Correct except Recursive for both Vertex and Matrix

BFS Expanded Steps Vertex w/ Stack G1:

[S -> D -> E -> P -> B -> C -> H -> R -> Q -> A -> F -> G]

BFS Path Vertex w/ Stack G1:

[S -> D -> C -> F -> G]

BFS Expanded Steps Vertex w/ Recursion G1:

[S -> P -> Q -> H -> E -> R -> F -> G]

BFS Path Vertex w/ Recursion G1:

[S -> P -> Q -> H -> E -> R -> F -> G]

BFS Expanded Steps Matrix w/ Stack G1:

[S -> D -> E -> P -> B -> C -> H -> R -> Q -> A -> F -> G]

BFS Path Matrix w/ Stack G1:

[S -> D -> C -> F -> G]

BFS Expanded Steps Matrix w/ Recursion G1:

[S -> D -> B -> A -> C -> F -> G]

BFS Path Matrix w/ Recursion G1:

[S -> D -> B -> A -> C -> F -> G]

PRINTING DFS FOR G2 - All Correct

DFS Expanded Steps Vertex w/ Stack G2:

[S -> D -> B -> A -> C -> E -> H -> P -> Q -> R -> F -> G]

DFS Path Vertex w/ Stack G1:

[S -> D -> E -> R -> F -> G]

DFS Expanded Steps Vertex w/ Recursion G2:

[S -> D -> B -> A -> C -> E -> H -> P -> Q -> R -> F -> G]

DFS Path Vertex w/ Recursion G2:

[S -> D -> E -> R -> F -> G]

DFS Expanded Steps Matrix w/ Stack G2:

[S -> D -> B -> A -> C -> E -> H -> P -> Q -> R -> F -> G]

DFS Path Matrix w/ Stack G2:

[S -> D -> E -> R -> F -> G]

DFS Expanded Steps Matrix w/ Recursion G2:

[S -> D -> B -> A -> C -> E -> H -> P -> Q -> R -> F -> G]

DFS Path Matrix w/ Recursion G2:

[S -> D -> E -> R -> F -> G]

PRINTING BFS FOR G2 - Only Expanded Steps from Vertex Recursion and the Matrix BFS Function are wrong

BFS Expanded Steps Vertex w/ Stack G2:

[S -> D -> E -> P -> B -> C -> H -> R -> Q -> A -> F -> G]

BFS Path Vertex w/ Stack G2:

[S -> E -> R -> F -> G]

BFS Expanded Steps Vertex w/ Recursion G2:

[S -> P -> Q -> E -> R -> F -> G]

BFS Path Vertex w/ Recursion G2:

[S -> E -> R -> F -> G]

BFS Expanded Steps Matrix w/ Stack G2:

[S -> D -> E -> P -> B -> C -> H -> R -> Q -> A -> F -> G]

BFS Path Matrix w/ Stack G2:

[S -> E -> R -> F -> G]

BFS Expanded Steps Matrix w/ Recursion G2:

[S -> D -> B -> A -> C -> E -> H -> P -> Q -> R -> F -> G]

BFS Path Matrix w/ Recursion G2:

[S -> D -> E -> R -> F -> G]

PRINTING UCS FOR G3 - All Correct

UCS Expanded Steps Vertex w/ Priority Queue G3:

[S -> P -> D -> B -> E -> H -> A -> R -> C -> F -> Q -> G]

UCS Path Vertex w/ Recursion G3:

[S -> D -> E -> R -> F -> G]

UCS Expanded Steps Matrix w/ Priority Queue G3:

[S -> P -> D -> B -> E -> H -> A -> R -> C -> F -> Q -> G]

UCS Path Matrix w/ Priority Queue G3:

[S -> D -> E -> R -> F -> G]

PRINTING UCS FOR G4 - All Correct

UCS Expanded Steps Vertex w/ Priority Queue G4:

[S -> P -> D -> B -> E -> A -> R -> F -> C -> G]

UCS Path Vertex w/ Recursion G4:

[S -> D -> E -> R -> F -> G]

UCS Expanded Steps Matrix w/ Priority Queue G4:

[S -> P -> D -> B -> E -> A -> R -> F -> C -> G]

UCS Path Matrix w/ Priority Queue G4:

[S -> D -> E -> R -> F -> G]