DEAD END DETECTORS

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Introduction

Problem Statement

while locations and streets information are provided, placing dead end signs at dead end streets and removing the redundant dead end signs

Approach

- The method used in this code is to create a matrix using locations and initializing the matrix with zeros.
- Zeroes are replaced with ones where ever street is present.
- We then traverse the matrix to check each street if it is leading to dead end and append to a list
- Redundant dead ends are then removed and output is displayed.

Packages

- No packages are used

Challenges

- Our biggest challenge was formatting the code.
- Breaking the approach into different parts such that each function does its designated task required more work
- TEAM WORK and communication is most challenging part

Statistics

- Number of line of code:86
- Functions:
  - input_command_line()
  - connections()
  - detect_dead_ends()
  - is_dead_end()
  - remove_unwanted_dead_ends()

Demo of the project:

- Dead end detector project takes input about the locations and streets through command line. input_command_line() function takes input into list of lists and calls respective functions for further tasks.
- List of streets is sent to connections() function which establishes connections between different locations by 0 or 1 in matrix at respective positions
- connections_matrix is traversed in detect_dead_ends_() functions . If it finds 1 in any position that street is sent to is_dead_end() function to check whether it leads to dead end. If that function returns true,that street is added to dead_ends list.
- is_dead_end function checks whether it leads to dead end through continuous recursions.
- Finally redundant dead ends are removed from list of dead ends through remove_unwanted_dead_ends() function and display the output.

Screenshots:

WISE_PROJECT (1).py

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```python
import sys

total_dead_ends = 0
dead_ends_list = []
locations = 0
streets = 0
streetsList = []
connections_matrix = []


def connections(l, s):
    global connections_matrix
    connections_matrix = [[0 for i in range(l + 1)] for j in range(l + 1)]
    for street in s:
        v = street[0]
        w = street[1]
        connections_matrix[v][w] = connections_matrix[w][v] = 1


def detect_dead_ends(c):
    for i in range(1, locations + 1):
        for j in range(1, locations + 1):
            if connections_matrix[i][j] == 1:
                if is_dead_end(i, [], [i, j]):
                    global total_dead_ends
                    total_dead_ends += 1
```

WISE_PROJECT (1).py

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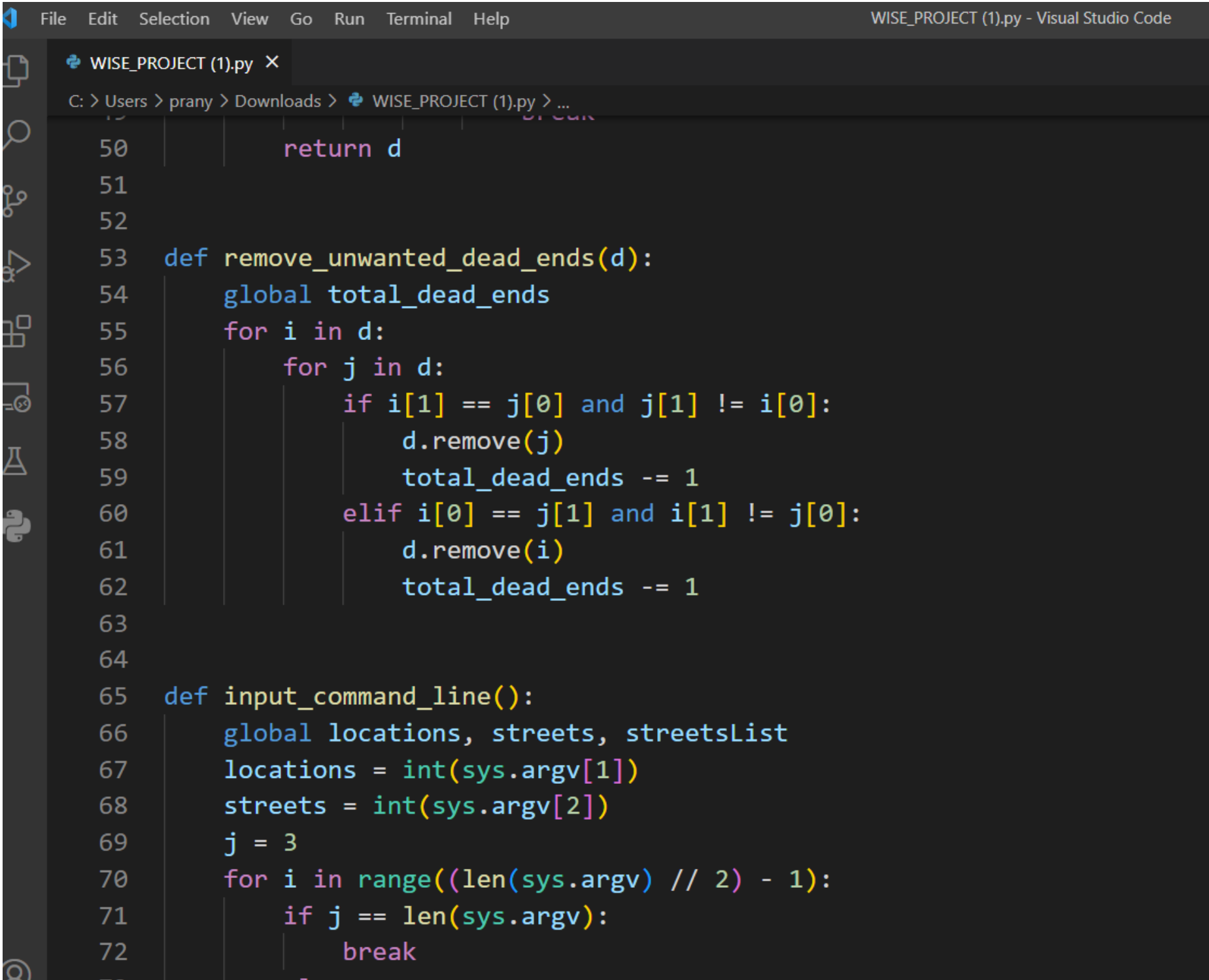
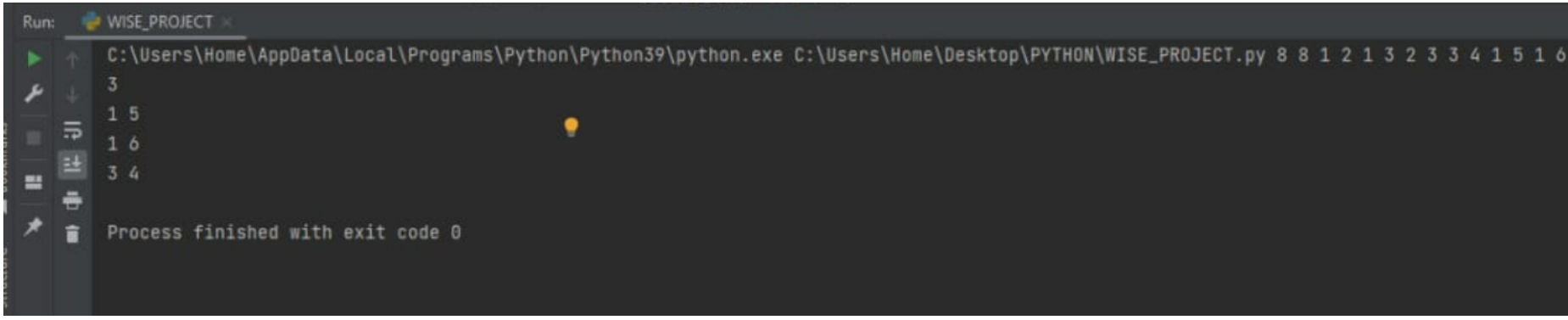
```
                    total_dead_ends += 1
                    dead_ends_list.append([i, j])


def is_dead_end(v, traversed, l):
    x = l[0]
    y = l[1]
    s = 0
    for i in range(1, locations + 1):
        s = s + connections_matrix[y][i]
    if s == 1:
        return True
    else:
        d = True
        for i in range(1, locations + 1):
            if connections_matrix[y][i] == 1 and i != x:
                if i == v:
                    d = False
                    break
                elif [y, i] not in traversed:
                    traversed.append([y, i])
                    d = is_dead_end(v, traversed, [y, i])
                    if not d:
                        break
        return d
```


File Edit Selection View Go Run Terminal Help
WISE_PROJECT (1).py - Visual Studio Code
WISE_PROJECT (1).py
C: > Users > prany > Downloads > WISE_PROJECT (1).py > ...
50 return d
51
52
53 def remove_unwanted_dead_ends(d):
54 global total_dead_ends
55 for i in d:
56 for j in d:
57 if i[1] == j[0] and j[1] != i[0]:
58 d.remove(j)
59 total_dead_ends -= 1
60 elif i[0] == j[1] and i[1] != j[0]:
61 d.remove(i)
62 total_dead_ends -= 1
63
64
65 def input_command_line():
66 global locations, streets, streetsList
67 locations = int(sys.argv[1])
68 streets = int(sys.argv[2])
69 j = 3
70 for i in range((len(sys.argv) // 2) - 1):
71 if j == len(sys.argv):
72 break

WISE_PROJECT (1).py

C: > Users > prany > Downloads > WISE_PROJECT (1).py > is_dead_end

```
72                  break
73              else:
74                  streetsList.append([int(sys.argv[j]), int(sys.argv[j + 1])])
75                  j += 2
76
77      connections(locations, streetsList)
78      detect_dead_ends(connections_matrix)
79      remove_unwanted_dead_ends(dead_ends_list)
80      print(total_dead_ends)
81      for i in dead_ends_list:
82          print(i[0], end=' ')
83          print(i[1])
84
85
86  input_command_line()
87
```


Run:
WISE_PROJECT
C:\Users\Home\AppData\Local\Programs\Python\Python39\python.exe C:\Users\Home\Desktop\PYTHON\WISE_PROJECT.py 8 8 1 2 1 3 2 3 3 4 1 5 1 6
3
1 5
1 6
3 4
Process finished with exit code 0

Thank you!!