Python 3 Days Challenge (P3DC)

An Amazing Problem to Solve

— EPITA —

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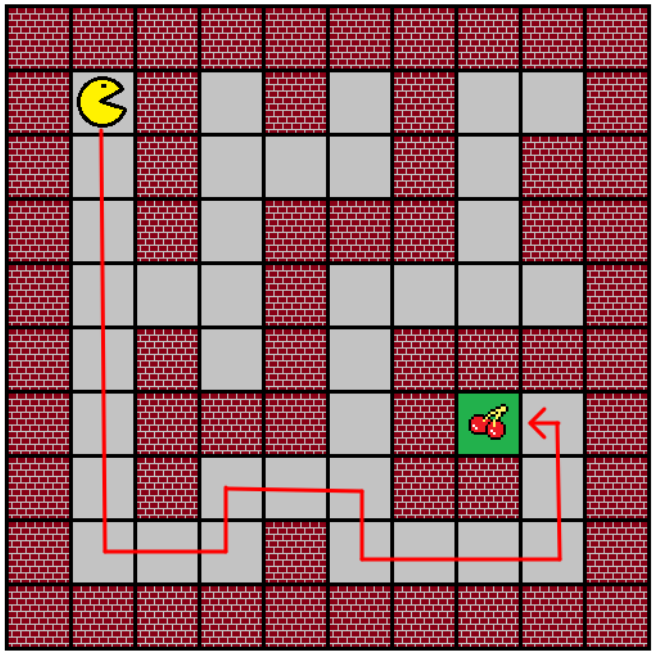
Your main goal :

You have to solve a maze.

- You start from a fixed position in the maze.
- You need to find the fastest way to reach the fixed end point.



Example of a maze solved

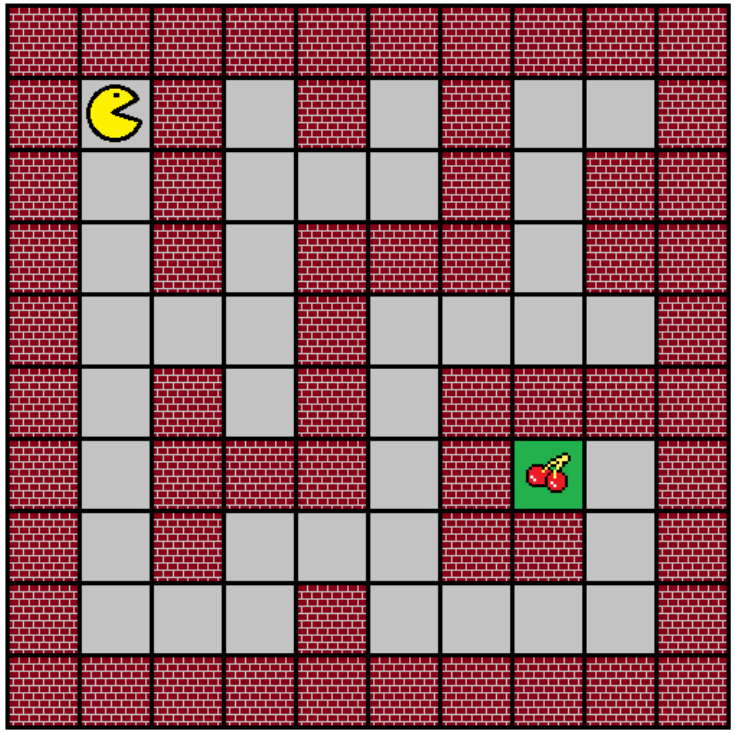
What do you have as input ?

You have a matrix which describe every element of the maze

```
1 1 1 1 1 1 1 1 1 1
1 s 1 0 1 0 1 0 0 1
1 0 1 0 0 0 1 0 1 1
1 0 1 0 1 1 1 0 1 1
1 0 0 0 1 0 0 0 0 1
1 0 1 0 1 0 1 1 1 1
1 0 1 1 1 0 1 e 0 1
1 0 1 0 0 0 1 1 0 1
1 0 0 0 1 0 0 0 0 1
1 1 1 1 1 1 1 1 1 1
```

Matrix format of the maze

=



Picture of the respective maze

Matrix description

Main element of the matrix has a rule in maze

Rules :

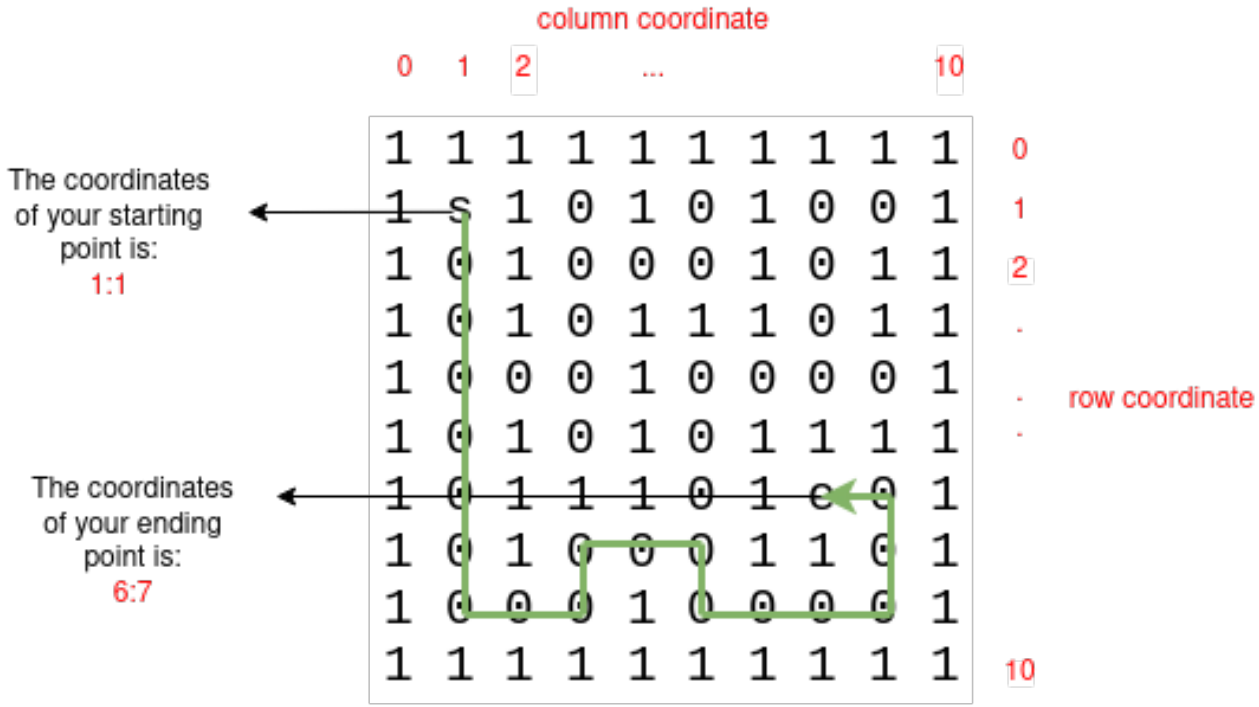
- **0 : path**
  you have to move this block
- **1 : wall**
  you cannot move to this block
- **s : start**
  your starting point
- **e : end**
  your ending point

```
1 1 1 1 1 1 1 1 1 1
1 s 1 0 1 0 1 0 0 1
1 0 1 0 0 0 1 0 1 1
1 0 1 0 1 1 1 0 1 1
1 0 0 0 1 0 0 0 0 1
1 0 1 0 1 0 1 1 1 1
1 0 1 1 1 0 1 e 0 1
1 0 1 0 0 0 1 1 0 1
1 0 0 0 1 0 0 0 0 1
1 1 1 1 1 1 1 1 1 1
```

Example

What do we expect as a result ?

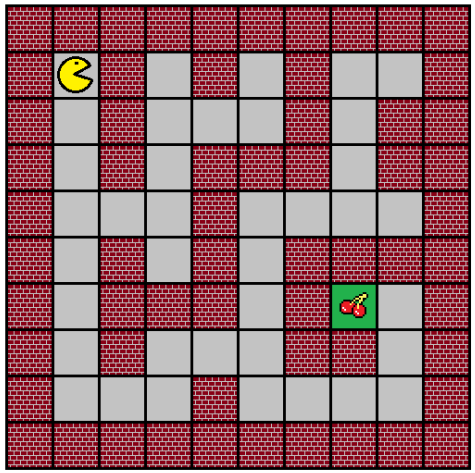
You need to provide a **list of tuples** which descibe :
the matrix coordinate point of the path from start to the end

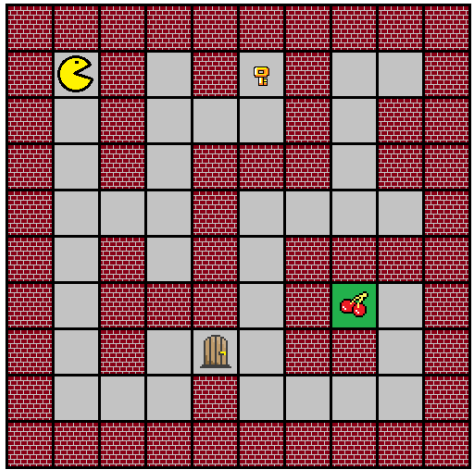


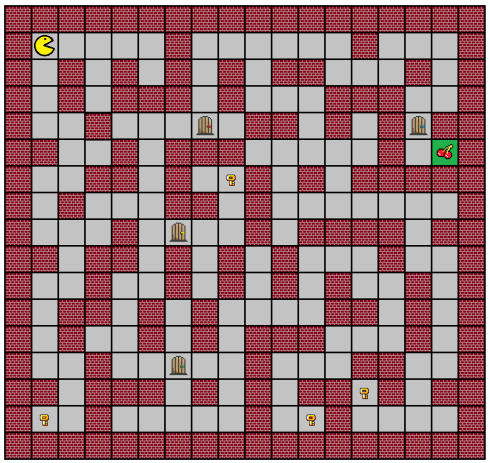
Your result:

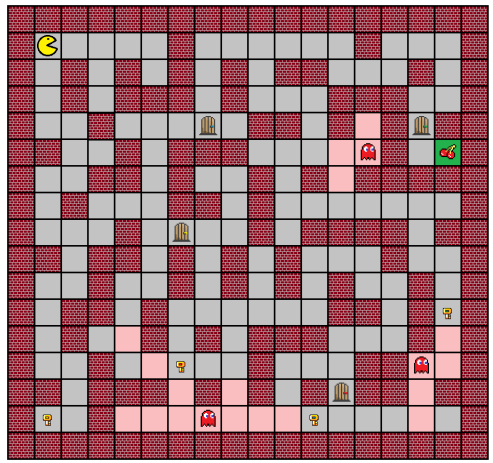
```
[(1, 1), (2, 1), (3, 1), (4, 1), (5, 1), (6, 1),
(7, 1), (8, 1), (8, 2), (8, 3), (7, 3),
 (7, 4), (7, 5), (8, 5), (8, 6), (8, 7),
 (8, 8), (7, 8), (6, 8), (6, 7)]
```

4 types of maze to solve : from easiest to hardest









Different obstacles to overcome

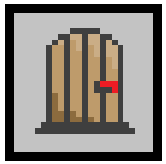
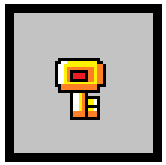
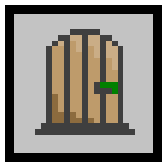
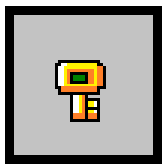
image	matrix notation	description
	g	A red door prevent to to move forward until you have the red key to open it.
	f	A red key which let you to open the red door
	c	A green door prevent to to move forward until you have the green key to open it.
	d	A green key which let you to open the green door

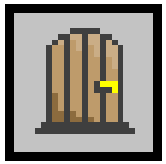
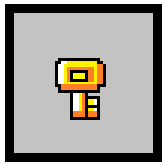
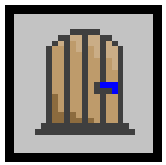
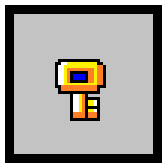
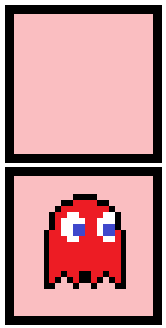
image	matrix notation	description
	b	A yellow door prevent to to move forward until you have the yellow key to open it.
	a	A yellow key which let you to open the yellow door
	i	A blue door prevent to to move forward until you have the blue key to open it.
	h	A blue key which let you to open the blue door

image	matrix notation	description
	2 or more	The ghost has a range of 2 cells or more (pink in the pictures exemples) which kill you in all direction if you move on it. Avoid it ! ! !

Your final result

Program a solver to compute the fastest path from start to the end by :

- Finding the right color key for right color door
- Avoiding the ghost's line of sight.

If you find different paths, return the shortest. Don't forget : you always must return a **unique** path, i.e. a unique list of tuples.

Expected usage and result example

python solvemaze.py maze1.txt will give us :
[(1, 1), (2, 1), (3, 1), (4, 1), (5, 1), (6, 1), (7, 1), (8, 1), (8, 2), (8, 3), (7, 3), (7, 4), (7, 5), (8, 5), (8, 6), (8, 7), (8, 8), (7, 8), (6, 8), (6, 7)]

Warning

- DO NOT HARD CODE THE PATH!!!
- You will have new much bigger matrix matching completley new maze. Your program will have to find each path for each matrix.

Your secondary goal :

You have to program the game interface.

- You could use Pygame or Pygame zero.
- You need to animate the moving of the pacman to the end.

We will provide you the images matching the element of the maze.

Where to sent your work

Sent [a] to p3dcmsc@protonmail.com

1. Your python code
2. **and** your Jupyter Notebook if you have one.
3. and (mandatory) : add **all** your Family and First names both in your python code and in your Jupyter Notebook if you have one.
4. and (mandatory) : add YOUR TEAM NUMBER in your python file and in your Jupyter Notebook if you have one.
5. and (mandatory) : add in your email (object) : <Python Week 3 Days Challenge : <Team number > >
6. A unique email please !

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a. Don't use podcmsc@protonmail.com !

Get the best score you can !

. . . **Congratulations and** *bon courage* **to all of you.**