Python Project
An Amazing Problem to Solve
— EPITA —

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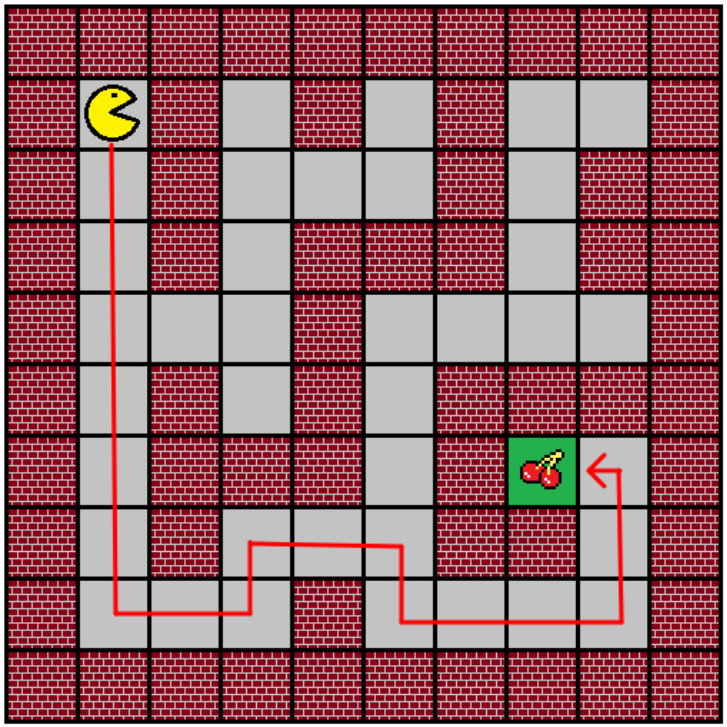
Your main goal :

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

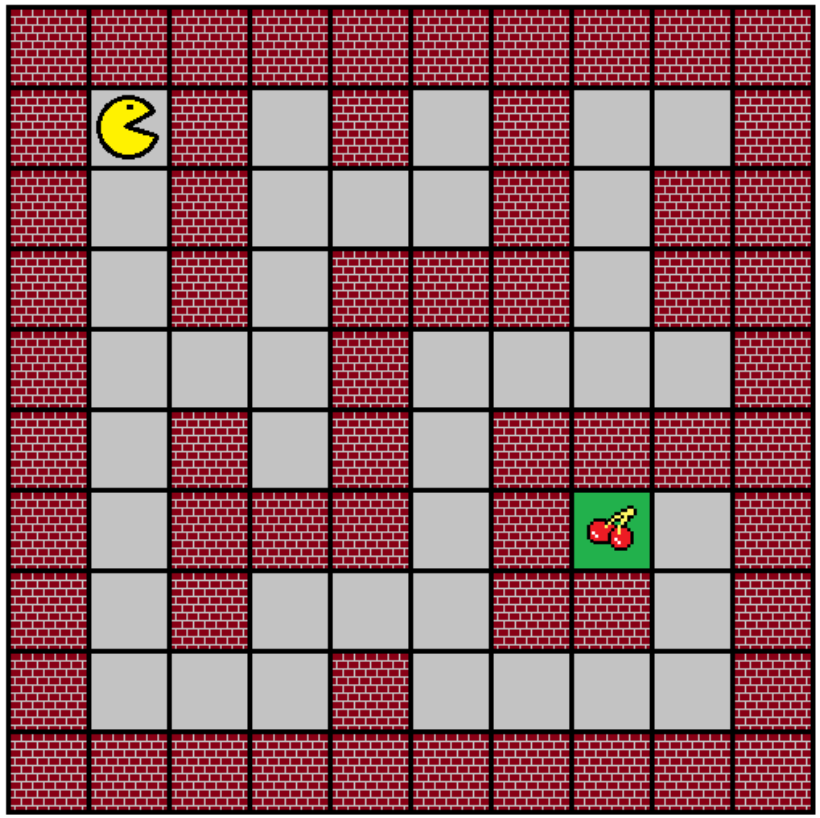
What do you have as input ?

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 :

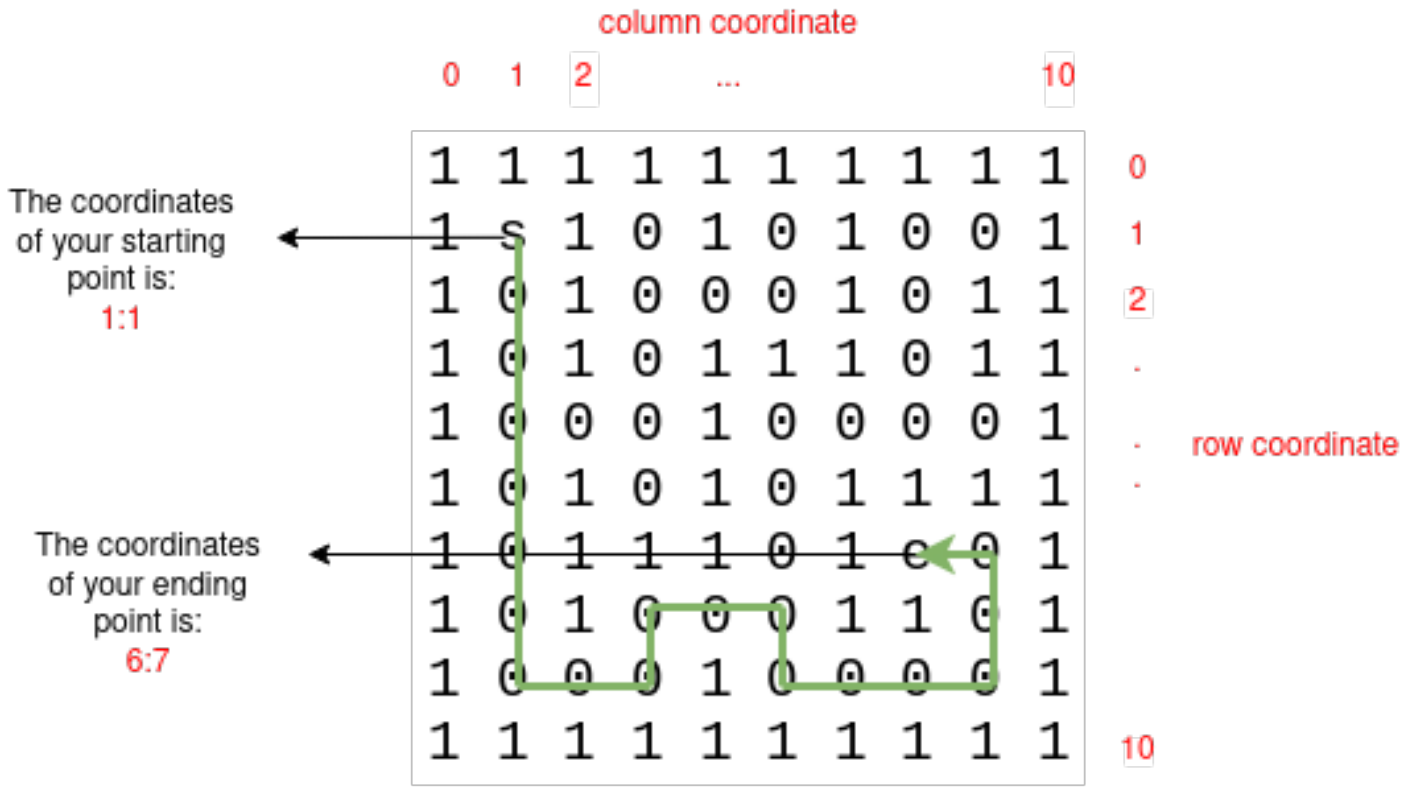
- **0 : path**
  you have to move this block
- **1 : wall**
  you cannot move to this block
- **s : start**
  your starting point
- **e : end**
  your ending point

```
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 ?

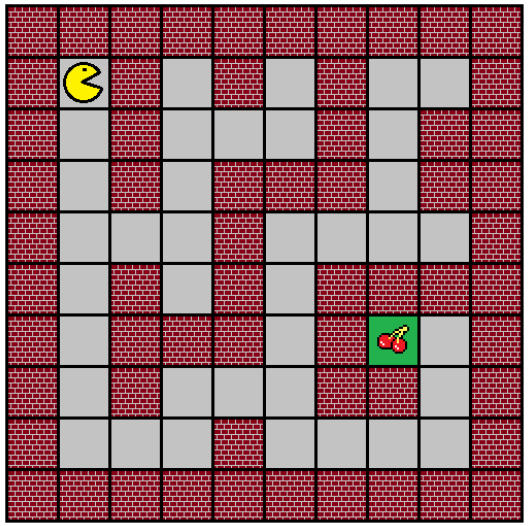
You need to provide a **list of tuples** which descibe :
the matrix coordinate point of the path from start to the end

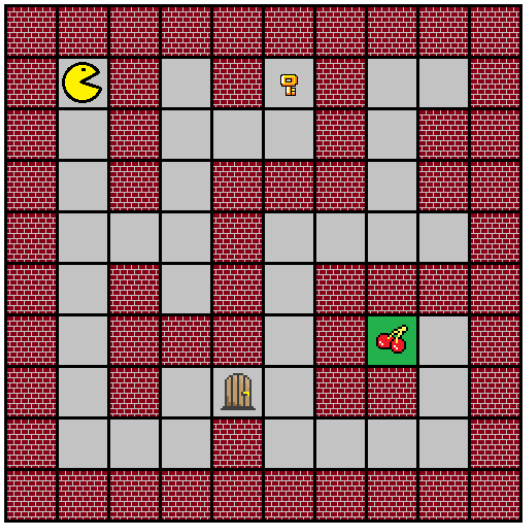


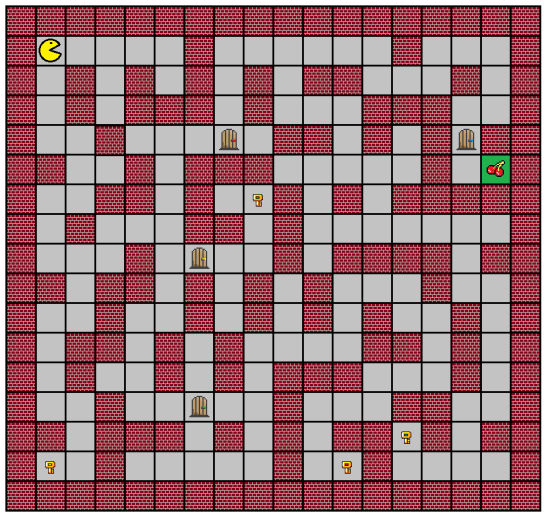
Your result:

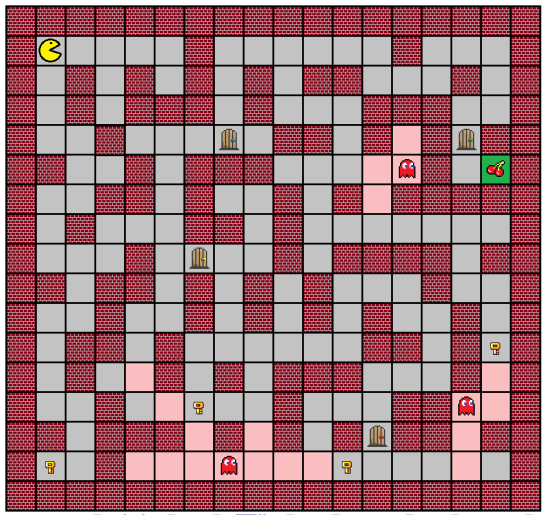
```
[(1, 1), (2, 1), (3, 1), (4, 1), (5, 1), (6, 1),
(7, 1), (8, 1), (8, 2), (8, 3), (7, 3),
 (7, 4), (7, 5), (8, 5), (8, 6), (8, 7),
```

4 types of maze to solve : from easiest to hardest









Different obstacles to overcome

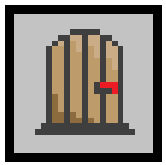
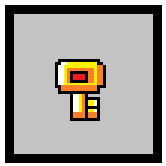
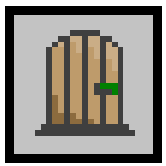
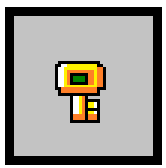
image	matrix notation	description
	g	A red door prevent to to move forward until you have the red key to open it.
	f	A red key which let you to open the red door
	c	A green door prevent to to move forward until you have the green key to open it.
	d	A green key which let you to open the green door

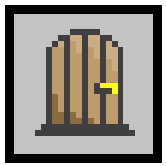
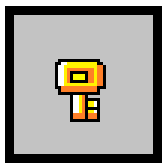
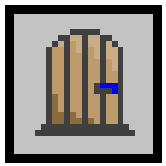
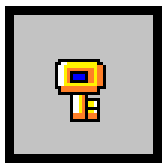
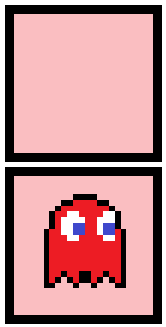
image	matrix notation	description
	b	A yellow door prevent to to move forward until you have the yellow key to open it.
	a	A yellow key which let you to open the yellow door
	i	A blue door prevent to to move forward until you have the blue key to open it.
	h	A blue key which let you to open the blue 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 -f 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 ! ! !
- We will test new 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 or other.
- You need to animate the moving of the pacman to the end.

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

Your third goal :

Your are free to create your challenge :

- You could allow the user to move the pacman with arrow keys
- You could create an AI to animate the ghost catching you
- You could create an menu with score, times, replay, save games..etc

Use a command line parser

Your cli parser must handle the input of file (ex : -f). You have to handle at least two options :

1. The solving problem of path and return the list of tuples
2. Start the IHM
3. Your challenge (Maybe)

Use argparse, click..etc

Where to sent your work : 1/2

Teams homework

Where to sent your work 2/2

With your code, you have to present your results in the template file.