

AAE2004 Introduction to Aviation Systems

AAE

Design of Path Planning Algorithm for Aircraft Operation

Week 8 (First Week) – Software Installation and Setup (Windows)

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Assisted by

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Software Installation and setup Guide

Install Python in Windows 10

Tutorial Video:

https://www.youtube.com/watch?v=wJEZ08M2j4Q&ab_channel=POLYUIPNL

Step 1: Download Python 3.6.4

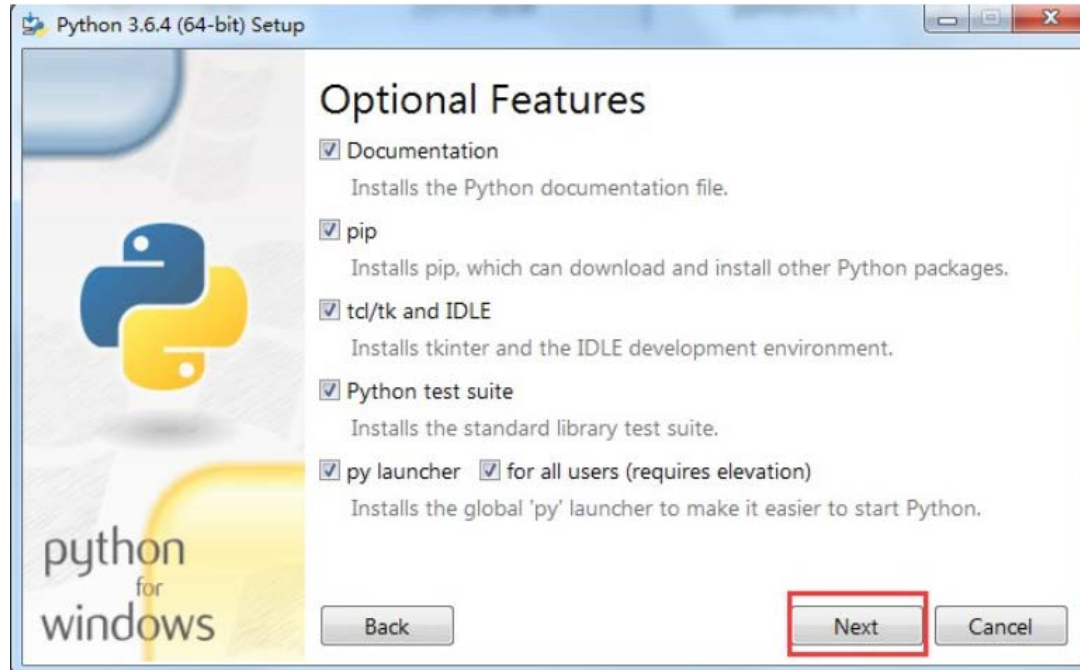
<https://www.python.org/ftp/python/3.6.4/python-3.6.4-amd64.exe>

Step 2: Install Python 3.6.4 in Windows 10



Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace.

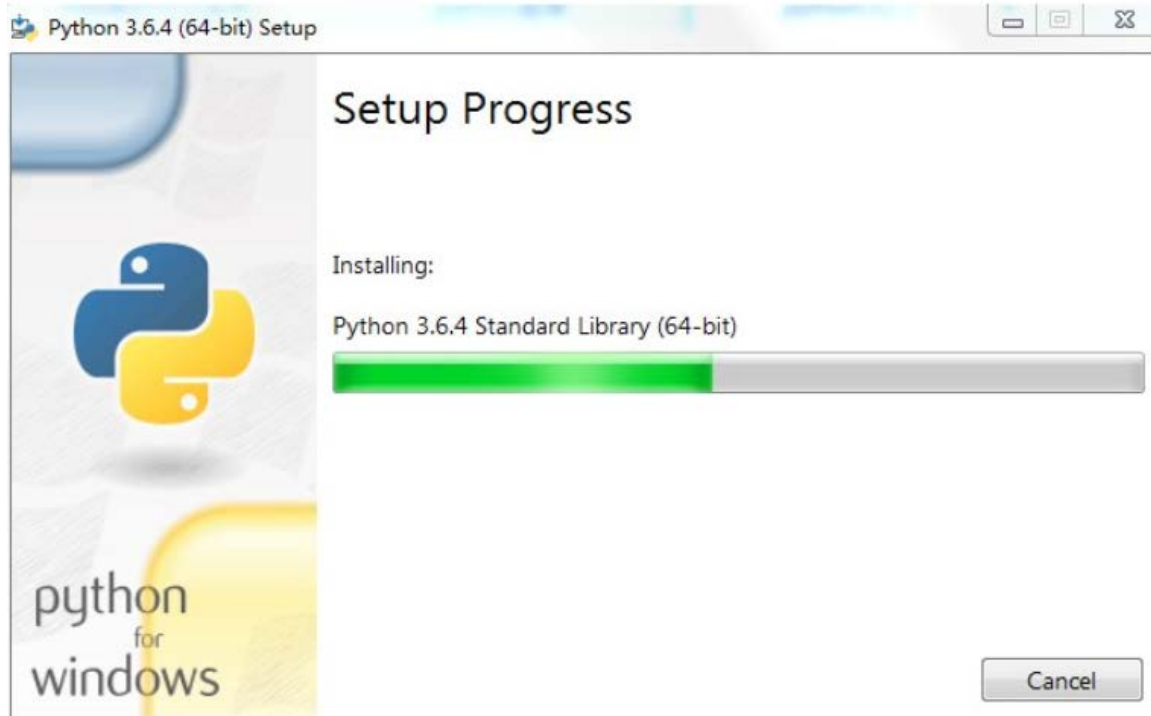
Install Python in Windows 10



Install Python in Windows 10



Install Python in Windows 10



Install Python in Windows 10



Install VS code in Windows 10

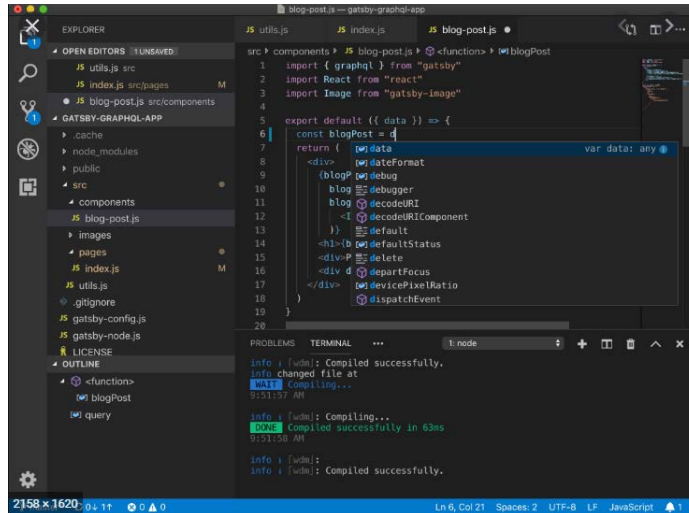
Step 1: Download the latest VS code

<https://code.visualstudio.com/download>

Tutorial Video:

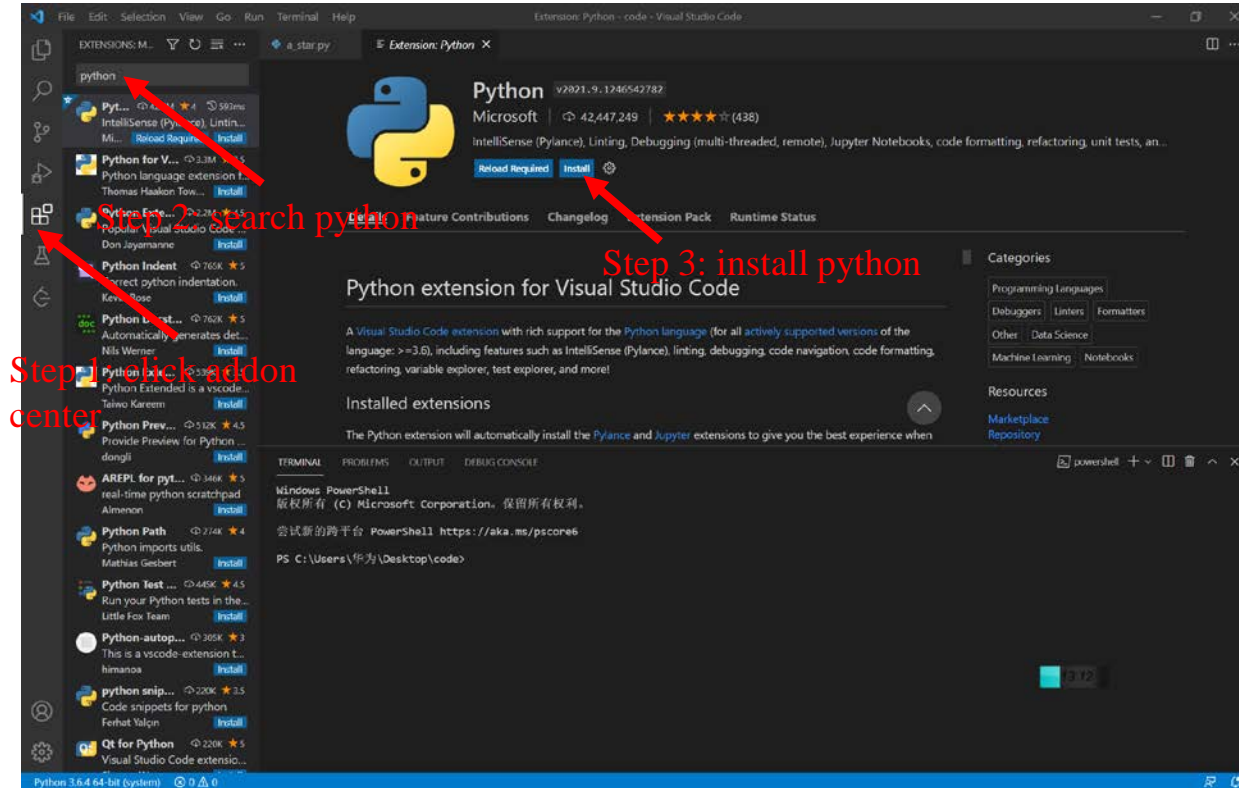
https://www.youtube.com/watch?v=MZ2w7VU9T4c&ab_channel=POLYUIPNL

Step 2: Install latest VS code in Windows 10

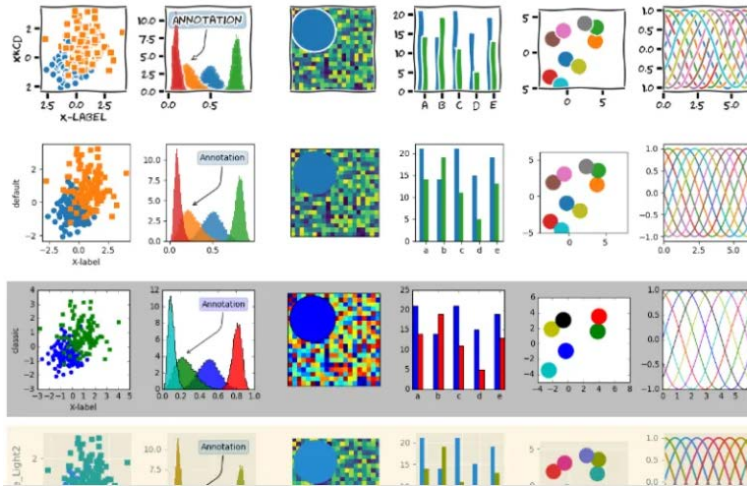


Visual Studio Code is a free source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git.

Install Python **addon** in VS code in Windows 10



Install matplotlib



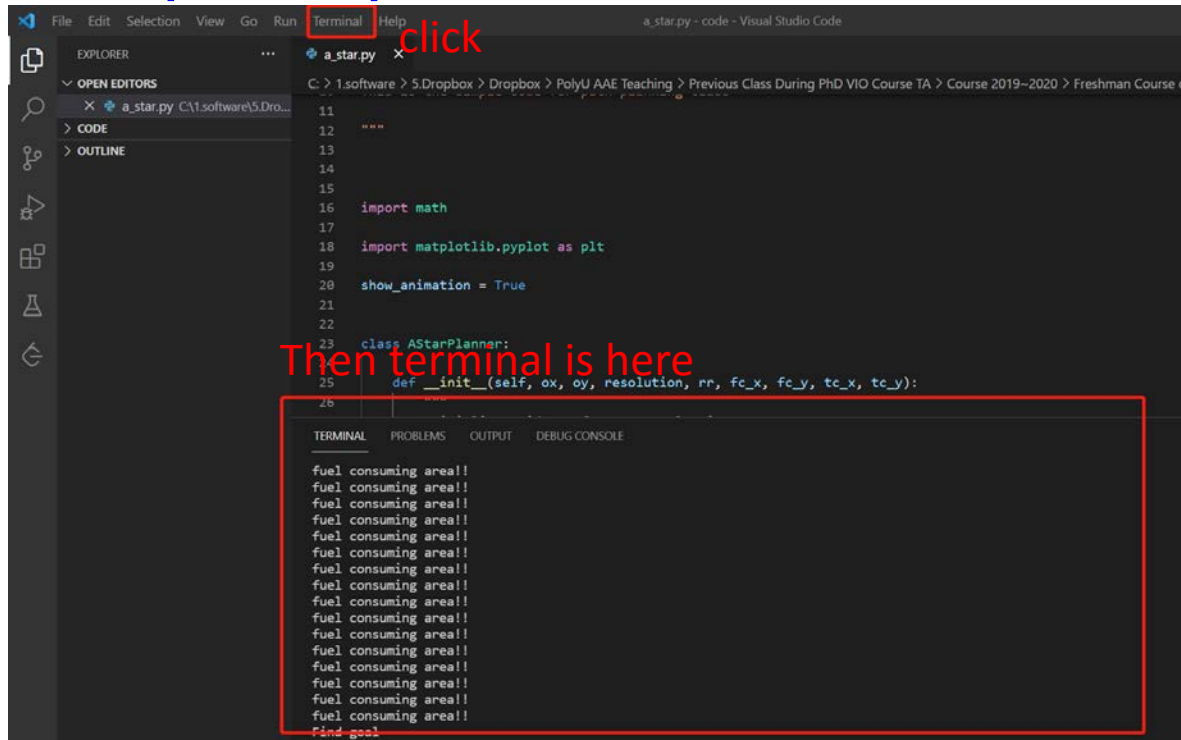
Source:

<https://www.gnuband.org/2017/12/29/gallery-of-xkcd-and-other-python-matplotlib-styles/>

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits like Tkinter, wxPython, Qt, or GTK+.

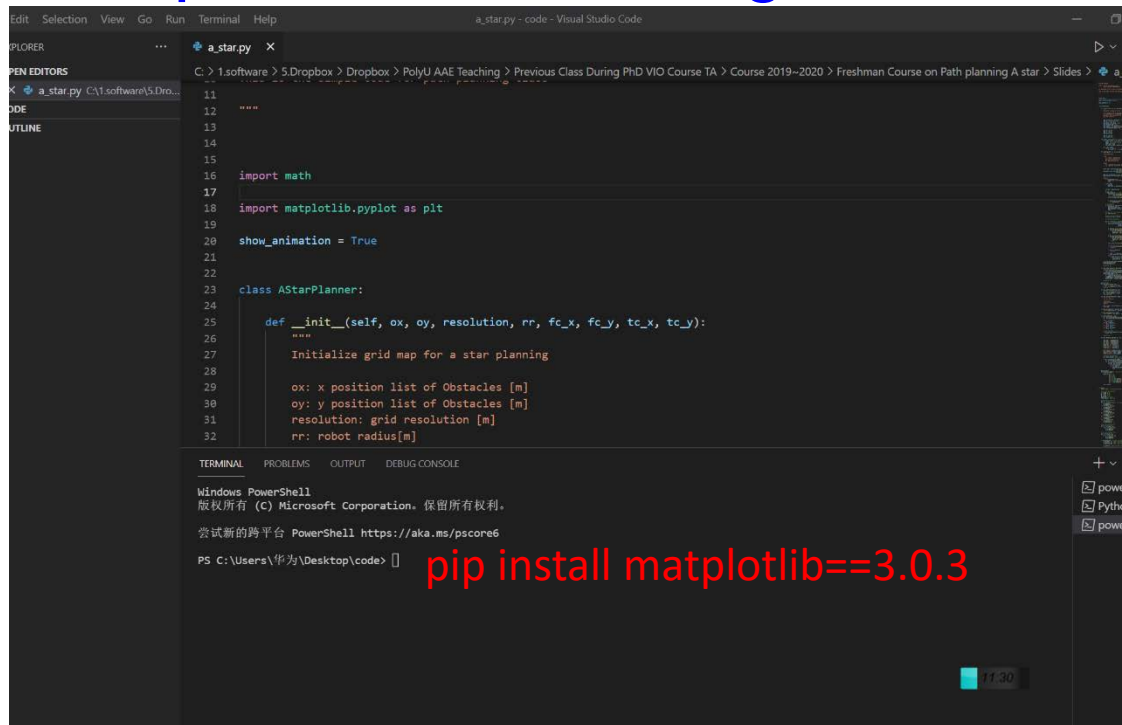
Install matplotlib

➤ step 1: Open VS code, and then click Terminal



Install matplotlib

➤ step 2: Print following command into terminal➤



```
11  
12  
13  
14  
15  
16 import math  
17  
18 import matplotlib.pyplot as plt  
19  
20 show_animation = True  
21  
22  
23 class AStarPlanner:  
24  
25     def __init__(self, ox, oy, resolution, rr, fc_x, fc_y, tc_x, tc_y):  
26         """  
27         Initialize grid map for a star planning  
28  
29         ox: x position list of Obstacles [m]  
30         oy: y position list of Obstacles [m]  
31         resolution: grid resolution [m]  
32         rr: robot radius[m]
```

TERMINAL PROBLEMS OUTPUT DEBUG CONSOLE

Windows PowerShell
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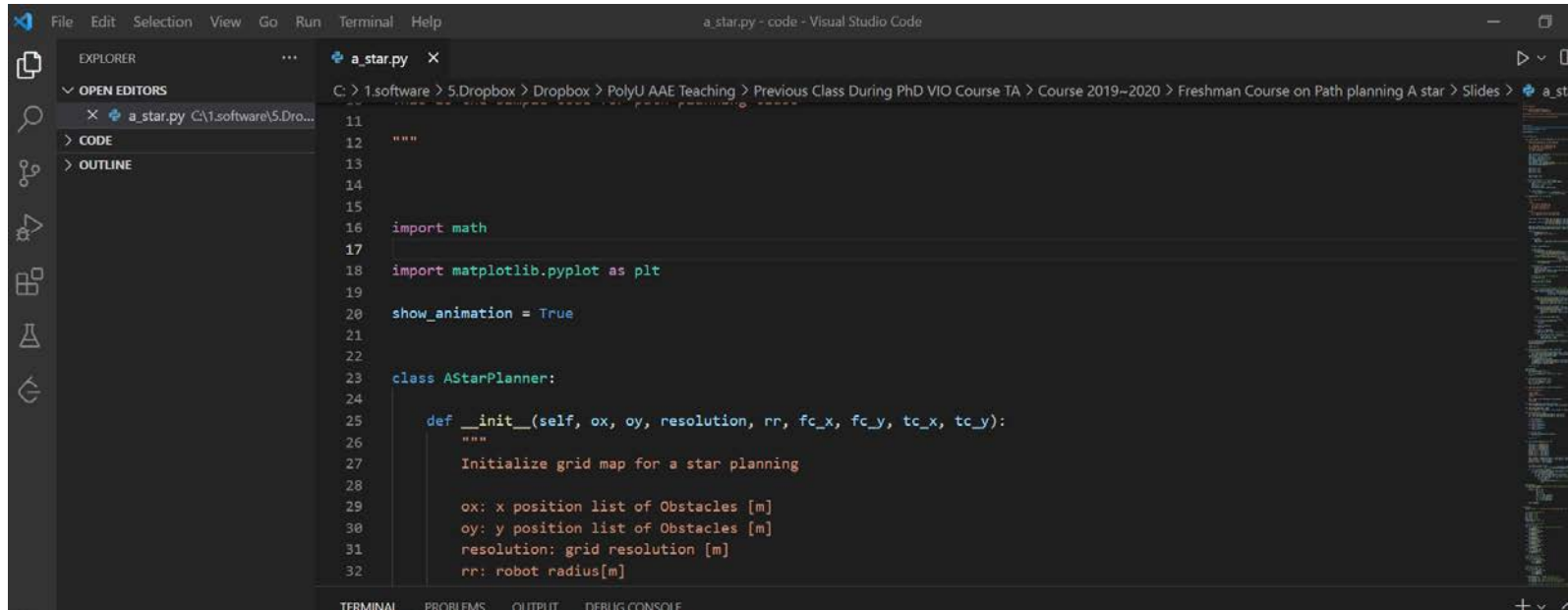
尝试新的跨平台 PowerShell <https://aka.ms/pscore6>

PS C:\Users\华为\Desktop\code> **pip install matplotlib==3.0.3**

11:30

Test matplotlib

➤ step 3: Open the code sample by VS code



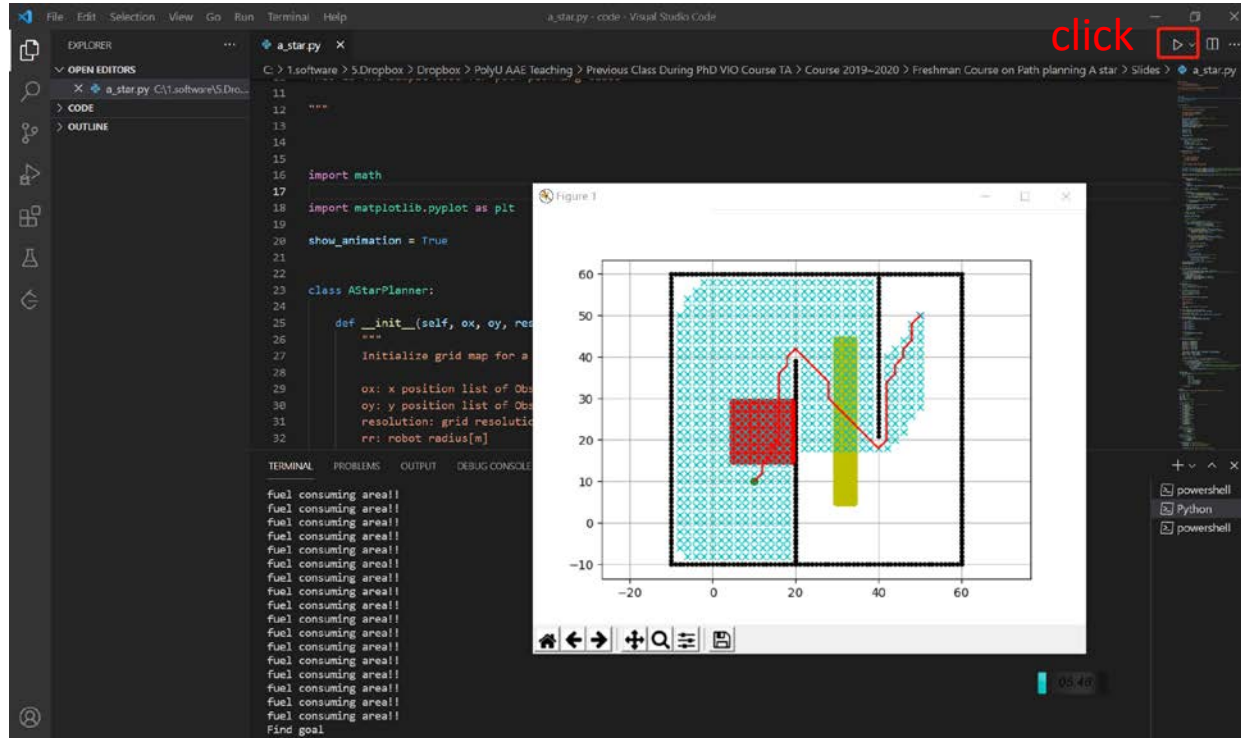
```
File Edit Selection View Go Run Terminal Help
a_star.py - code - Visual Studio Code

EXPLORER
OPEN EDITORS
  a_star.py C:\software\5.Dro...
CODE
OUTLINE

11
12 """
13
14
15
16 import math
17
18 import matplotlib.pyplot as plt
19
20 show_animation = True
21
22
23 class AStarPlanner:
24
25     def __init__(self, ox, oy, resolution, rr, fc_x, fc_y, tc_x, tc_y):
26         """
27         Initialize grid map for a star planning
28
29         ox: x position list of Obstacles [m]
30         oy: y position list of Obstacles [m]
31         resolution: grid resolution [m]
32         rr: robot radius[m]
```

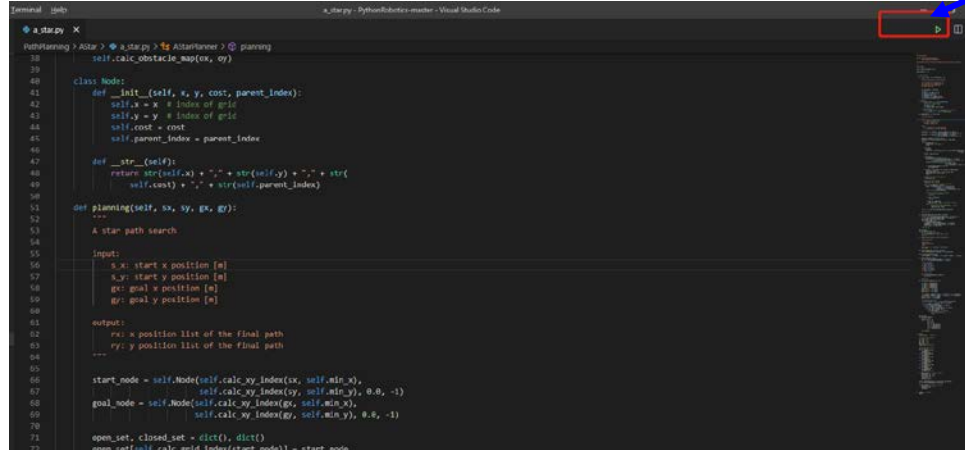
Test matplotlib

➤ step 4: Run the demo



Run A Star in VS code

Run the code

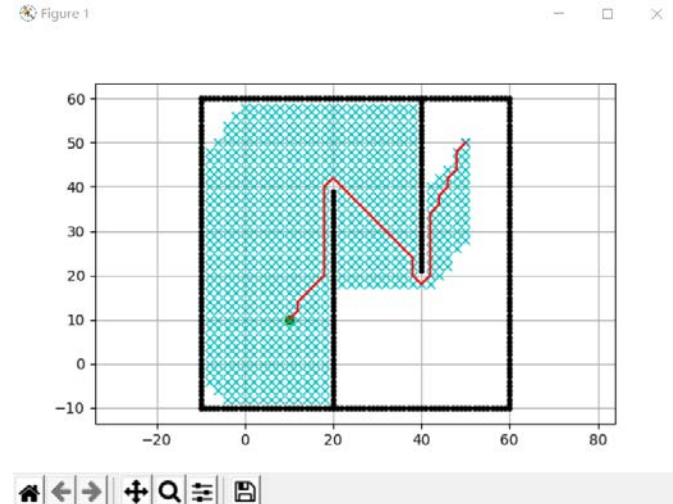


```

18 self.calc_obstacle_map(mx, my)
19
20
21 class Node:
22     def __init__(self, x, y, cost, parent_index):
23         self.x = x # index of grid
24         self.y = y # index of grid
25         self.cost = cost
26         self.parent_index = parent_index
27
28     def __str__(self):
29         return str(self.x) + "," + str(self.y) + "," + str(
30             self.cost) + "," + str(self.parent_index)
31
32 def planning(self, sx, sy, gx, gy):
33     """
34     A star path search
35
36     input:
37     s.x: start x position [s]
38     s.y: start y position [s]
39     gx: goal x position [g]
40     gy: goal y position [g]
41
42     output:
43     rx: x position list of the final path
44     ry: y position list of the final path
45
46     """
47
48     start_node = self.Node(self.calc_xy_index(sx, self.min_x),
49                             self.calc_xy_index(sy, self.min_y), 0.0, -1)
50     goal_node = self.Node(self.calc_xy_index(gx, self.min_x),
51                             self.calc_xy_index(gy, self.min_y), 0.0, -1)
52
53     open_set, closed_set = dict(), dict()
54     run self.calc_grid_index(start_node) + start_node

```

A* is a graph traversal and path search algorithm, which is often used in many fields of computer science due to its completeness, optimality, and optimal efficiency. One major practical drawback is its space complexity, as it stores all generated nodes in memory.



Troubleshoot: Connect Github page via command in VS Code

➤ Input the command below to the terminal (change the blue to your info)

- *git config --global user.name* **weisongwen**
- *git config --global user.email* **wenwsrobo@gmail.com**

