

AAE1001 - Introduction to Artificial Intelligence and Data Analytics in Aerospace and Aviation Engineering

Week 9 – Software Installation and Setup (Windows)

Dr. Guohao Zhang, Assisted by
Miss Hongmin ZHANG, Mr Feng HUANG (Darren),
Mr Penghui XU and Mr Zekun ZHANG

Software Installation and setup Guide

Install VS code in Windows 10/11

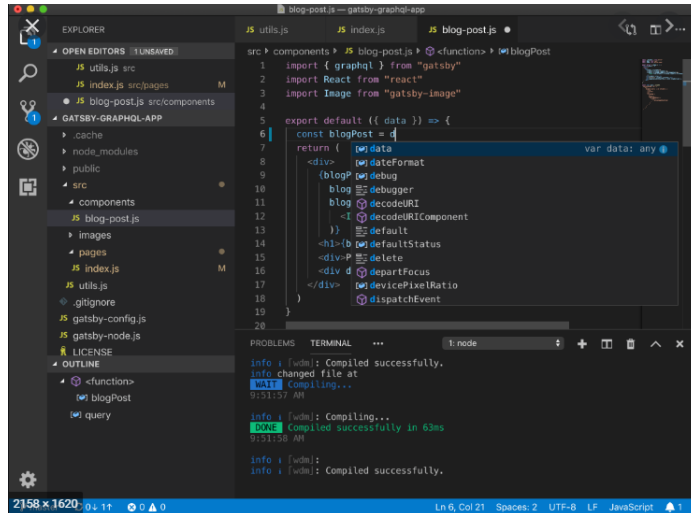
Step 1: Download the latest VS code

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

Tutorial Video:

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

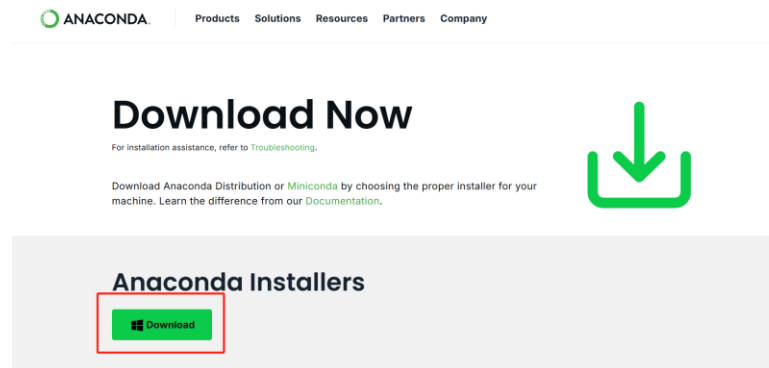
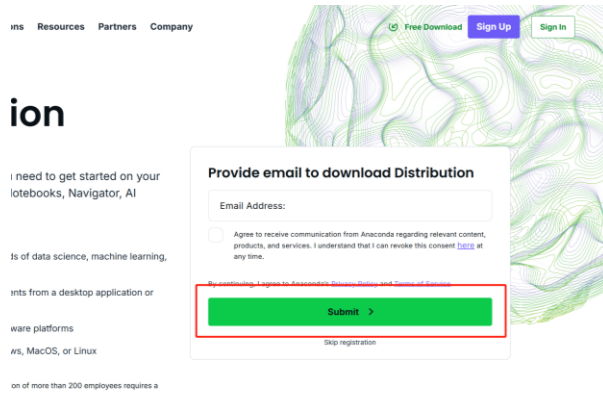
Step 2: Install latest VS code in Windows 10/11



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.

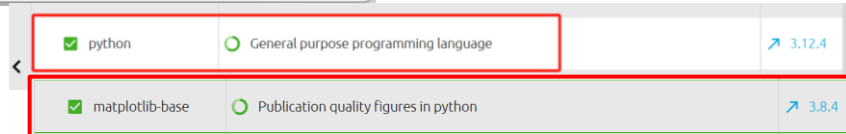
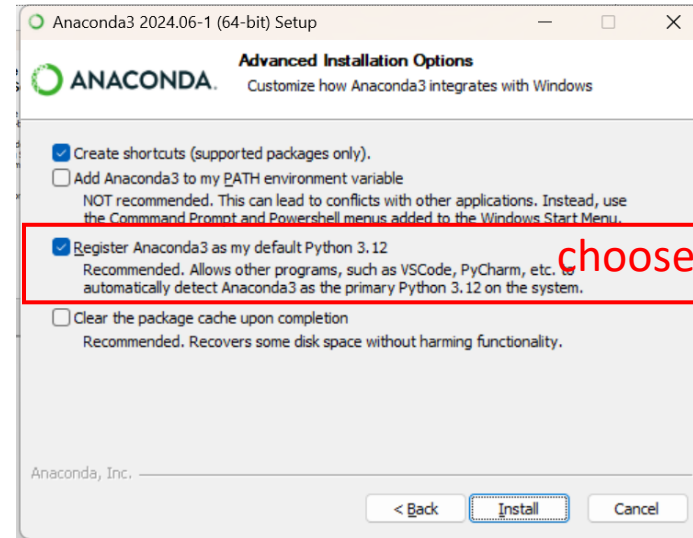
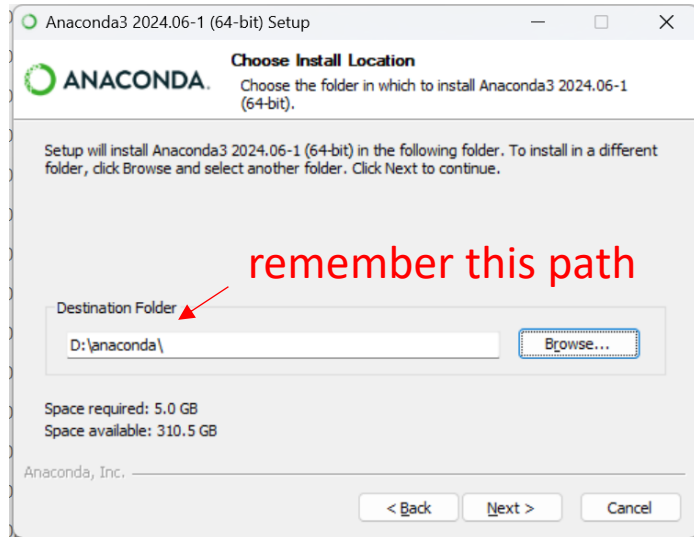
Install Anaconda for Python management

- <https://www.anaconda.com/download>
- **Anaconda** is an open source Python and R distribution designed for scientific computing, data science, machine learning, and big data analysis. It provides a complete set of tools and libraries to facilitate data processing and scientific computing. **It can manage different Python versions.**

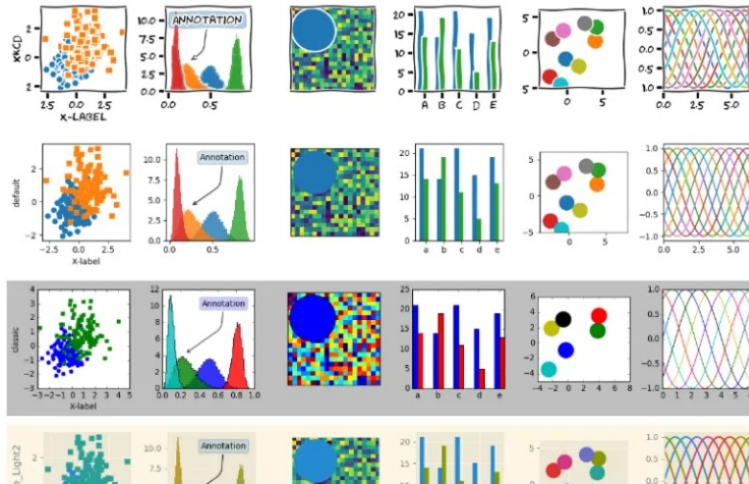


Install Anaconda for Python management

- The process of **Anaconda** installation can automatically install the newest **Python** and **Matplotlib**

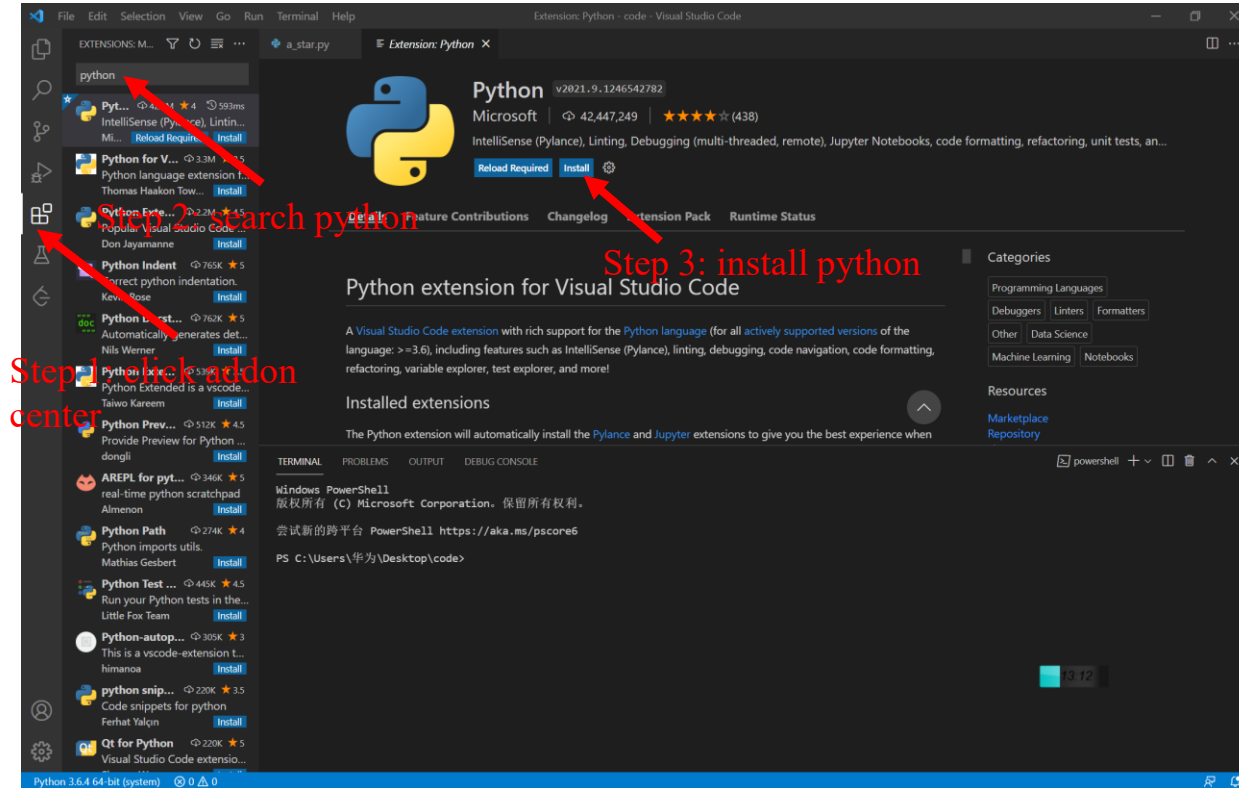


Matplotlib introduction



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 Python **addon** in VS code in Windows 10/11



VS code setting

The image shows a composite of three screenshots from the Visual Studio Code interface, illustrating the steps to select a Python interpreter.

Left Screenshot: The 'EXTENSIONS' view is active, showing installed extensions: Pylance, Python, and Python Debugger. A red arrow points from the 'Python' extension to the command palette.

Middle Screenshot: The command palette is open, showing the command '>Python: Select Interpreter' selected. A red box highlights this command, and a red arrow points from the 'Python' extension in the left panel to it.

Right Screenshot: The 'Select Interpreter' dialog is open, showing the 'Selected Interpreter' as 'D:\anaconda\python.exe'. A red box highlights the 'Python 3.12.4 (base)' option, and a red arrow points from the 'Python' extension in the left panel to it.

Bottom Panel: A large 'X' watermark is overlaid on the bottom right of the screenshots.

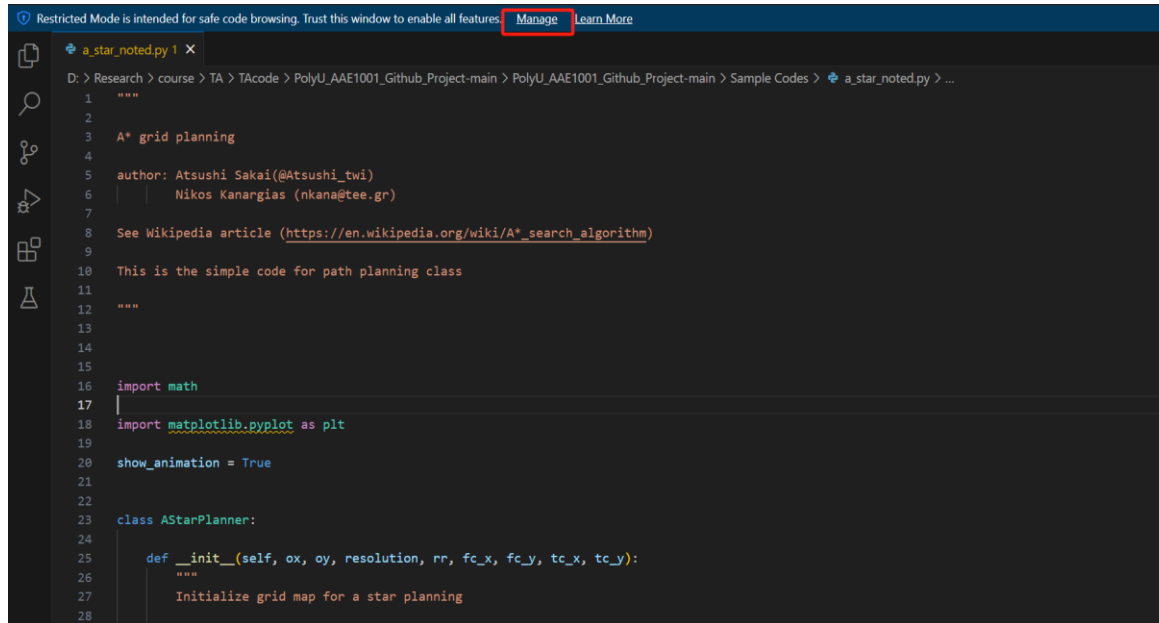
1. Type: ">Python: Select Interpreter"

2. Select "Python 3.12.4" installed by anaconda

Run A Star in VS code

a_star_noted.py

➤ step 1: Open the code sample by VS code



```
1  """
2
3  A* grid planning
4
5  author: Atsushi Sakai (@Atsushi_twi)
6         Nikos Kanargias (nkana@tee.gr)
7
8  See Wikipedia article (https://en.wikipedia.org/wiki/A\*\_search\_algorithm)
9
10 This is the simple code for path planning class
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
```

In a Trusted Window

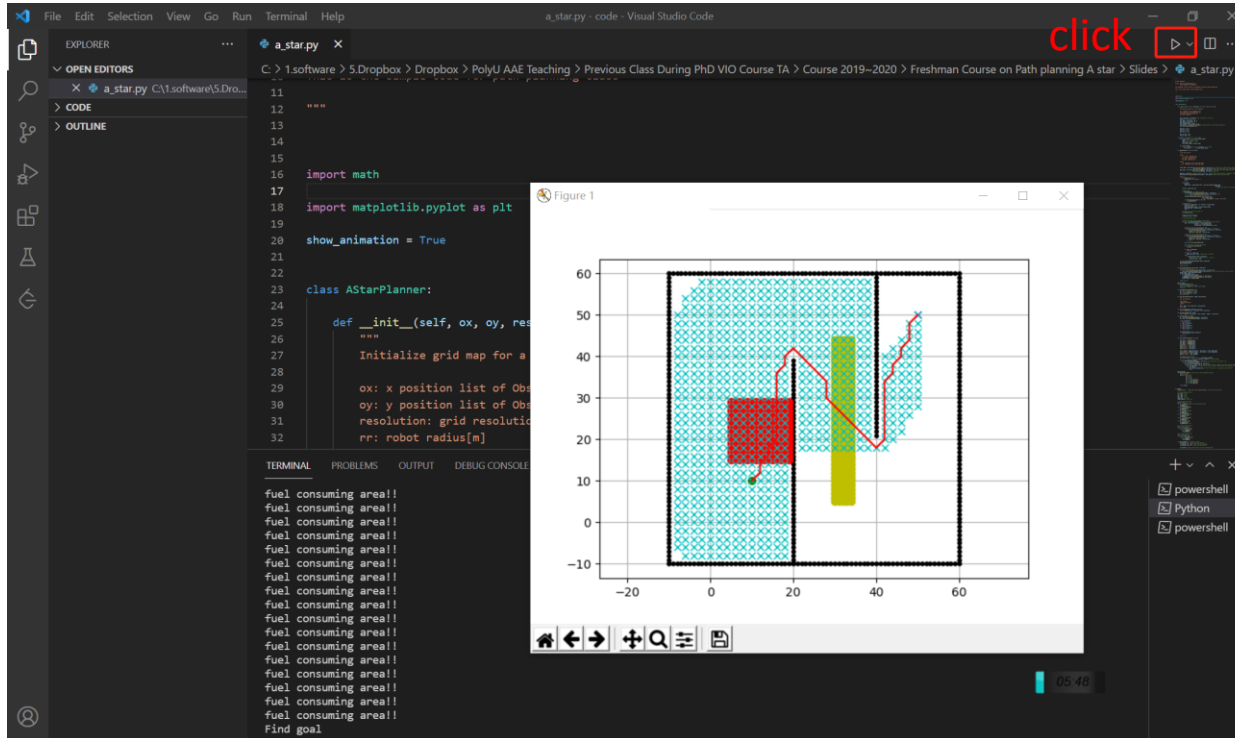
You trust the authors of the files in the current window. All features are enabled:

- ✓ Tasks are allowed to run
- ✓ Debugging is enabled
- ✓ All enabled extensions are activated

Trust

Ctrl+Enter

➤ step 2: Run the demo



Run A Star in VS code

Run the code

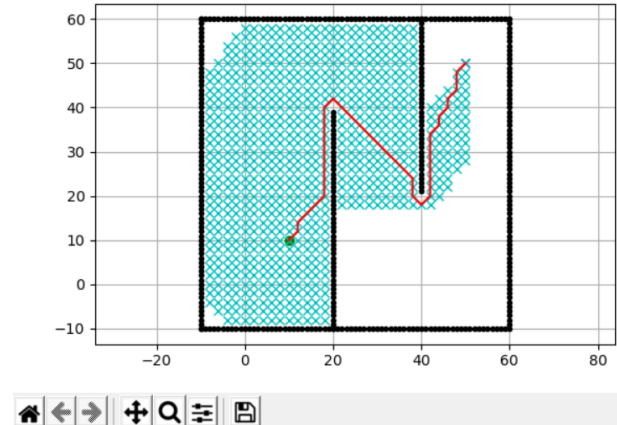
```

a_star.py - PythonRobotics-master - Visual Studio Code
a_star.py x
PathPlanning ? AStar > a_star.py > AStarRunner > planning
self.calc_obstacle_map(ox, oy)
18
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     sx: start x position [m]
38     sy: start y position [m]
39     gx: goal x position [m]
40     gy: goal y position [m]
41
42     output:
43     rx: x position list of the final path
44     ry: y position list of the final path
45     """
46
47     start_node = self.Node(self.calc_xy_index(sx, self.min_x),
48                             self.calc_xy_index(sy, self.min_y), 0.0, -1)
49     goal_node = self.Node(self.calc_xy_index(gx, self.min_x),
50                             self.calc_xy_index(gy, self.min_y), 0.0, -1)
51
52     open_set, closed_set = dict(), dict()
53     open_set[self.calc_xy_index(start_node.x, start_node.y)] = 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.

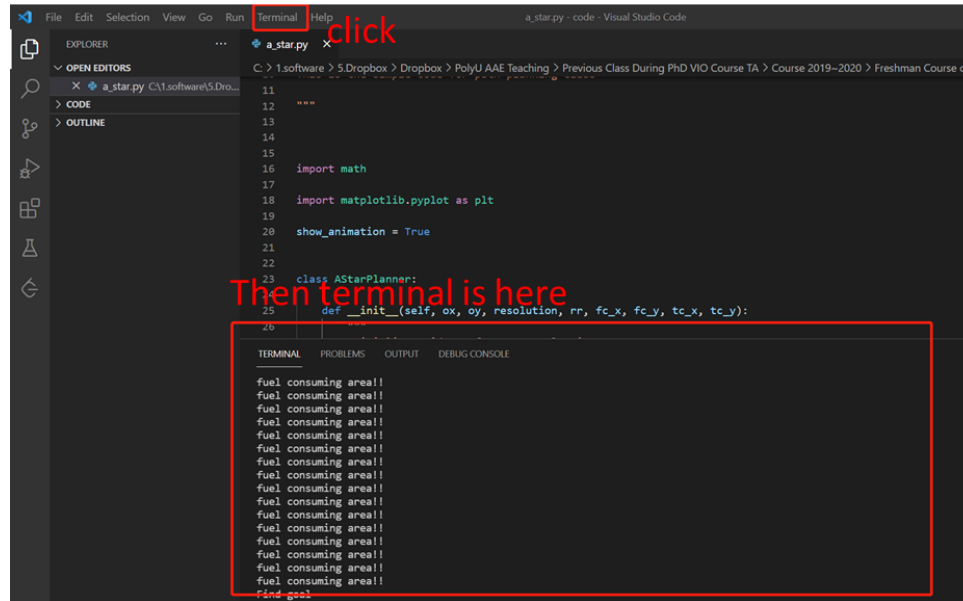
Figure 1



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**



The screenshot shows the Visual Studio Code interface. The Explorer panel on the left shows the file 'a_star.py' in the directory 'C:\1.software\5.Dro...'. The Code panel shows the content of 'a_star.py', which includes imports for 'math' and 'matplotlib.pyplot as plt', a variable 'show_animation = True', and a class 'AStarPlanner' with an '__init__' method. The Terminal panel at the bottom is highlighted with a red box and the text 'Then terminal is here' is written in red. The terminal output shows a repeating message 'fuel consuming area!!'.