

Image Processing Software Setup and Use Guide

*Monitoring Logan Pass Parking: Developing
an Ethical Proof-of-Concept Image Capturing
and Processing System for Glacier National
Park*

Worcester Polytechnic Institute

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<https://www.wpi.edu/project-based-learning/project-based-education/global-project-program>

About

This manual is designed to guide a user through installing the necessary programs to run the image analysis program created by the 2023 Worcester Polytechnic Institute Visitor Use Management team. It also details the steps needed to run this program with images from an SD card. Though not intended to be a permanent solution, understanding how to utilize this software can provide a basis for further development of the monitoring system.

This work was produced by undergraduate students in the Worcester Polytechnic Institute (WPI) Global Projects Program. For more information:
<http://www.wpi.edu/academics/ugradstudies/projectlearning.html>

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Glossary

Directory	A digital location that contains computer files and/or folders. Folders are an example of directories.
SD Card Root Directory	The location in an SD card outside of all folders
File Path	The location of a file in your computer's file system
Terminal	An interface for direct communication with your computer or program

Setup

The following steps need to be taken before “LPCarCounter.py” program can be run and modified on your computer.

1

Install Python and Visual Studio Code

Follow this Python installation guide:

<https://www.digitalocean.com/community/tutorials/install-python-windows-10>

NOTE: On step 2.5 make sure the “pip” box is checked.

Follow this Visual Studio Code installation guide:

<https://www.geeksforgeeks.org/how-to-install-visual-studio-code-on-windows/>

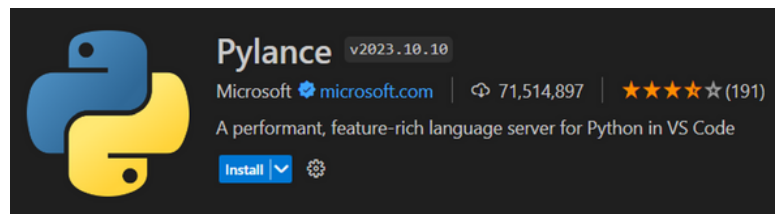
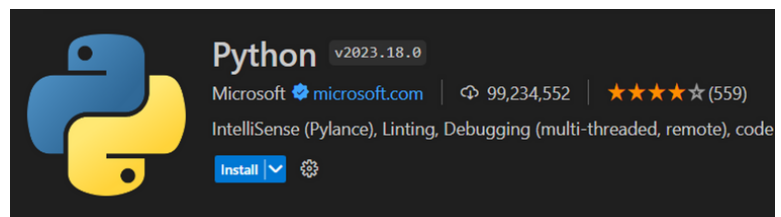
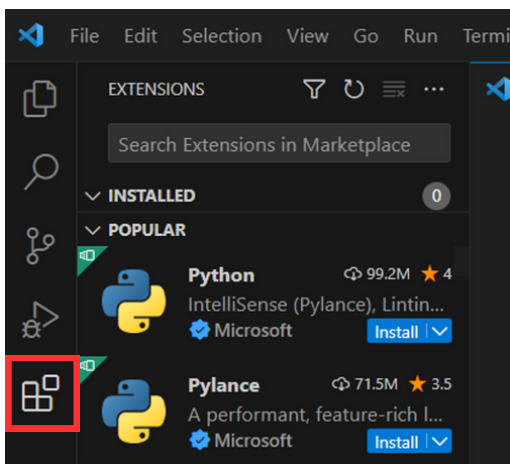
Setup

2

Download Libraries and Extensions

Visual Studio Code Extensions

In VSCode go to “Extensions” and install the “Python” extension as well as the “Pylance” Extension.



Pip Library Installations

In a VSCode terminal or Command Prompt enter the following commands. After each press ‘Enter.’

```
pip install numpy
```

```
python -m pip install --upgrade pillow
```

```
pip install opencv-python
```

Software Use

NOTE: If the 'cars.xml' file is located anywhere other than the root directory of the SD card, modifications will need to be made to the code. See "Code Modification" on page 6 for instructions.

1

Insert SD card into computer

Quick Tip

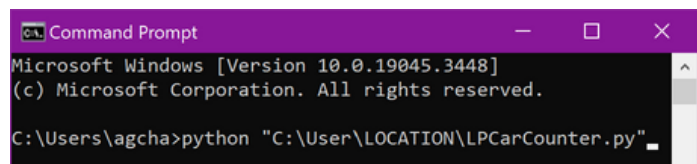
A file path can quickly be copied by selecting the file in the File Explorer and shift-right-clicking on it. An option will appear to "Copy as path"

2

Run "LPCarCounter.py" through one of these locations:

Command Prompt

1. Copy the file path of "LPCarCounter.py."
2. In the terminal, type "**python**" followed by the copied file path.
3. Press enter.

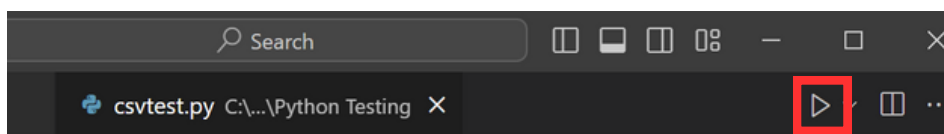


```
Command Prompt
Microsoft Windows [Version 10.0.19045.3448]
(c) Microsoft Corporation. All rights reserved.
C:\Users\agcha>python "C:\User\LOCATION\LPCarCounter.py"
```

OR

Visual Studio Code

1. Open "LPCarCounter.py" in VSCode by navigating to the "File" tab and clicking "Open File" or by pressing **Ctrl+O**.
2. Click the "Run" button in the top right corner.
3. A terminal will appear on the bottom of the VSCode window that will display prompts.



4

Software Use

3

Input directory holding images

When prompted to input the directory for files that you want to be read, copy the path and paste (**Ctrl+V** or **Ctrl+Shift+V**) into the terminal.

4

Input .csv location

When prompted to input the .csv file for data output location, copy the path and paste it into the terminal. For the first run of the program, the .csv file must be empty.

What is a .csv file?

A .csv (comma separated values) is a file type allows data to be saved in a format readable by most programming languages.

5

Declare entrance or exit

When asked if the data is from an entrance, type 'Y' or 'y' for yes, or 'N' or 'n' for no.

“LPCarCounter” will notify the user it has completed image processing when a total number of cars is displayed

Add data

To add more data to the current set, run the program again with the same .csv file.

Code Modification

'cars.xml' path modification

NOTE: This process is only necessary if the 'cars.xml' file is not located in the root directory of an SD card

1

Copy 'cars.xml' file path

Quick Tip

A file path can quickly be copied by selecting the file in the File Explorer and shift-right-clicking on it. An option will appear to "Copy as path"

2

Open "LPCarCounter.py"

Open "LPCarCounter.py" file in Visual Studio Code.

What is

'cars.xml'?

'cars.xml' is the file that contains the training model that "LPCarCounter.py" uses to identify cars in images.

3

Got to line 56

It will look like this:

```
56 cascadeSource = "D:cars.xml"
```


Code Modification

'cars.xml' path modification

4

Copy 'cars.xml' file path

If there are any backslashes (\) in the file path, they need to be replaced with double backslashes (\\).

Example: If the path was "C:Users\TEST\cars.xml" it needs to be modified to "C:Users\\TEST\\cars.xml".

```
cascadeSource = "C:Users\\TEST\\cars.xml"
```

5

Save changes

Save the changes by pressing **Ctrl+S** or by going to "File" and clicking "Save."

Code Modification

Display images while running program

1

Open "LPCarCounter.py"

Open "LPCarCounter.py" file in Visual Studio Code.

2

Go to lines 83 to 85

There will be three lines of code with # symbols at the beginning.

```
82     total += cnt
83     #     cv2.imshow('image', image_arr)
84     #     cv2.waitKey(0) & 0xFF
85     #     cv2.destroyAllWindows()
86     return cnt, precenter
```

3

Remove # symbols

The three lines must have the same indentation level as lines 82 and 86.

```
82     total += cnt
83     cv2.imshow('image', image_arr)
84     cv2.waitKey(0) & 0xFF
85     cv2.destroyAllWindows()
86     return cnt, precenter
```

Code Modification

Display images while running program

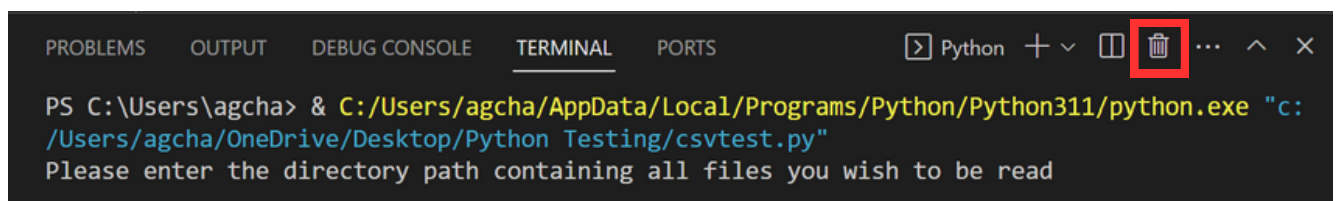
4

Save changes

Save the changes by pressing **Ctrl+S** or by going to “File” and clicking “Save.”

Notes

- To advance to the next image press any key. There is no way to skip images or go back to a previous image.
- Pressing the ‘X’ to close the image window will not stop the program.
- To stop “LPCarCounter.py” early:
 - In VSCode: Press the “Kill Terminal” button. It is a small trashcan icon on the top right of the terminal.



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS Python + - [Kill Terminal] ... ^ X
PS C:\Users\agcha> & C:/Users/agcha/AppData/Local/Programs/Python/Python311/python.exe "c:
/Users/agcha/OneDrive/Desktop/Python Testing/csvtest.py"
Please enter the directory path containing all files you wish to be read
```

- From Command Prompt: Press **Ctrl+C**