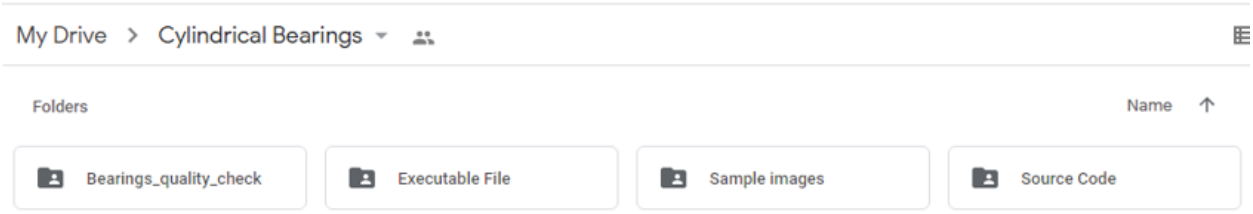
Problem:1 Solution
Cylindrical Bearings Classification

Solution folder overview:

1. The solution can be found from the following link in google drive.

https://drive.google.com/drive/u/0/folders/1u7escWsKvI_Pp66e5tcPkcjFLZNmd-Ny

2. The link contains following folders



a. Bearing_quality_check: This contains all the files needed to build the exe, and windows application.

b. Executable File: This contains the **Bearings_classifier.exe** file that was built from source code using **Pyinstaller library**

c. Sample images: This contains sample images delivered during the assignment(Contains two folders corresponding to Good and Bad bearings images)

d. Source code: The folder contains following files

1. Bearings_classifier.py: Contains the python code for building interactive GUI for Bearing classification based on input image queried in the form of a folder, which contains the images.

2. Bearings.py: Contains the python class which contains the functionality for Bearing detection in images, and needle counts in the bearings, and which in turn helps to classify the bearings(If needle count=16 Good elsse Bad bearing)

Dependencies and Libraries:

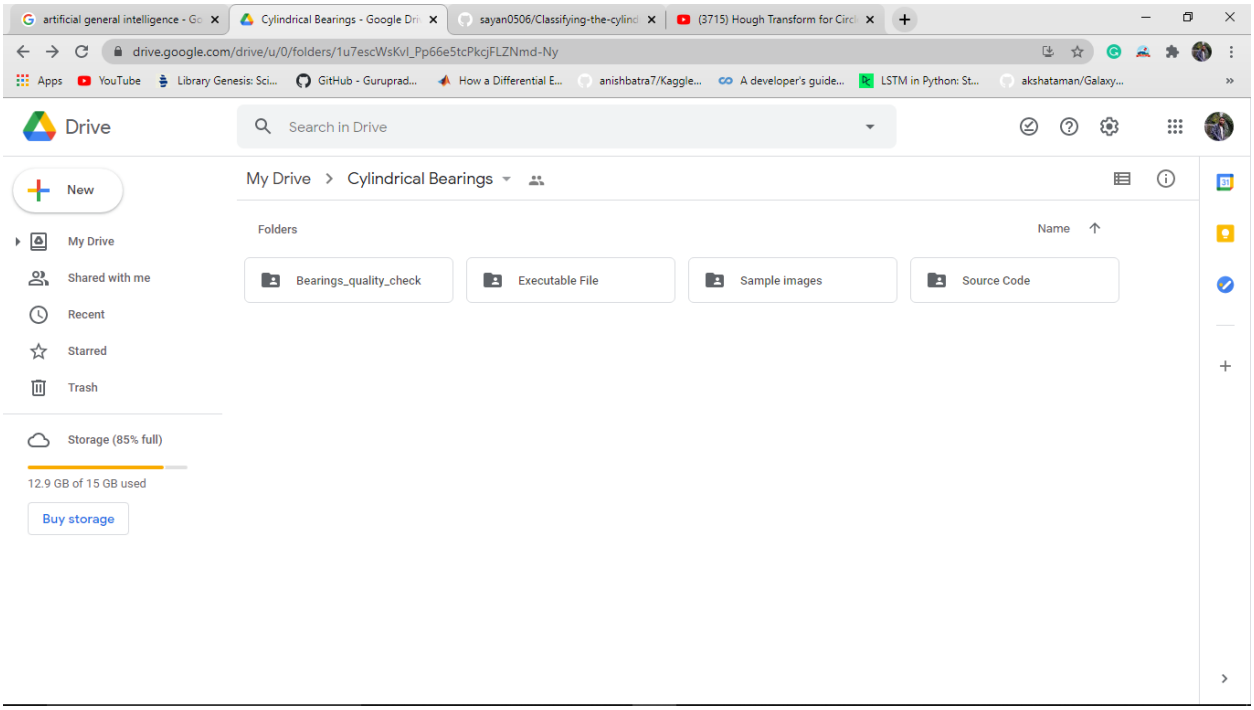
- **matplotlib.pyplot:** Used to handle images and visualization.
- **OS:** Used to handles files from directories and folder operations
- **Cv2:** Opencv library used to handle images, implementing circle detection algorithm named **HoughCircles**
- **Numpy:** Used to perform numerical operations
- **PySimpleGUI:** Used to build interactive GUI for testing of bearings quality.

Execution:

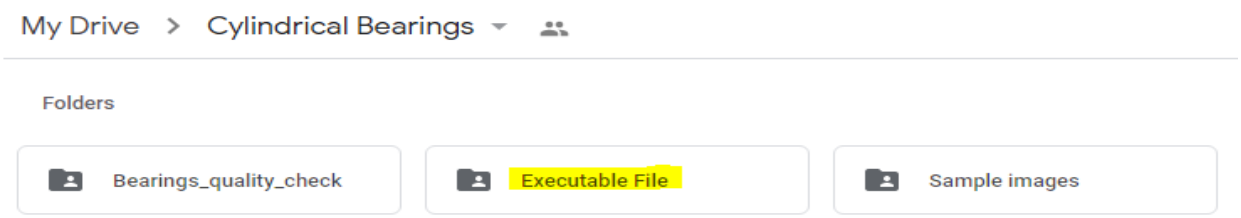
To execute the solution don't need to install any dependencies or no further setup needed to run, simply click the executable file(Bearings_classifier.exe), and follow the steps mentions in next page. The file is executable in windows, if want I can also build windows app to install it for further testing.

Steps for execution:

1. Go to the following drive link(Edit permission is given)
https://drive.google.com/drive/u/0/folders/1u7escWsKvI_Pp66e5tcPkcjFLZNmd-Ny

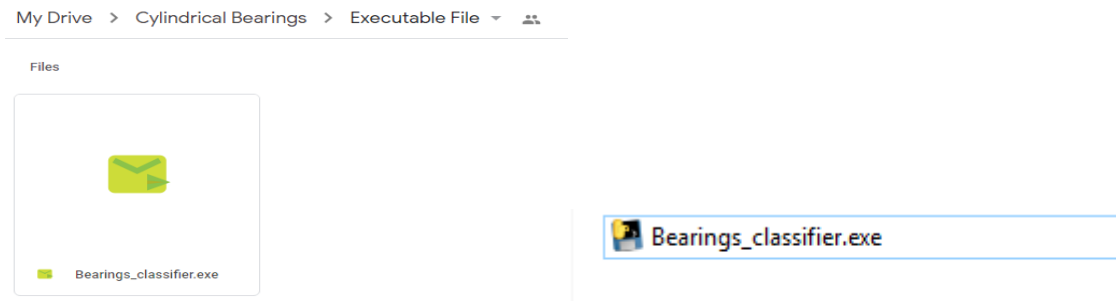


2. Go to the folder named **Executable File**(Marked below) to get the .exe file.



3. Download the following **Executable File(.exe)** named **Bearings_classifier.exe**

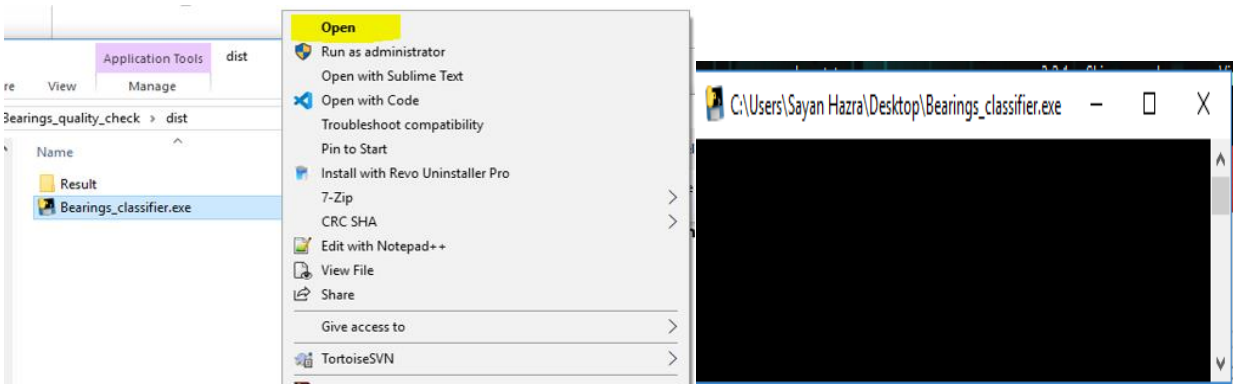
Note: It is better to disable antivirus, else it may delete the file while downloading



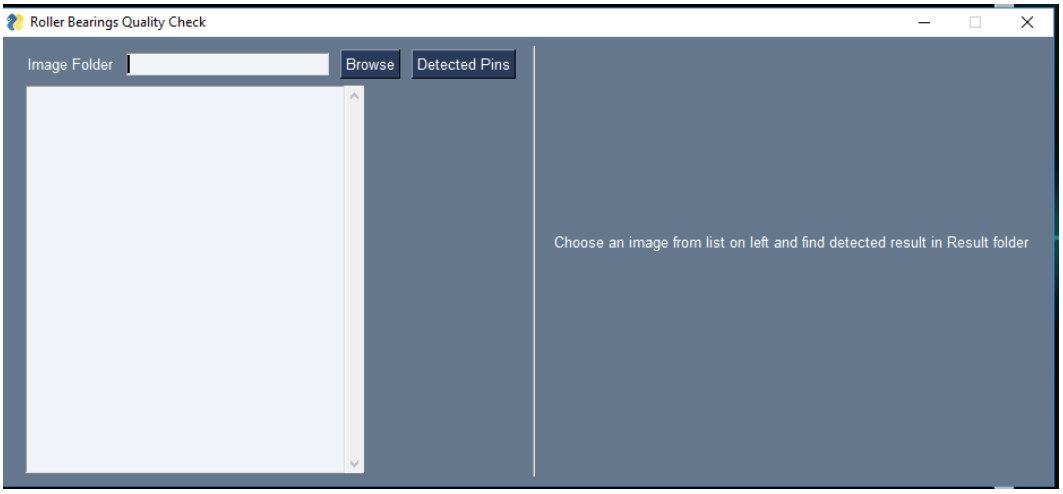
4. Then to execute right click on **.exe →Open**

Note:

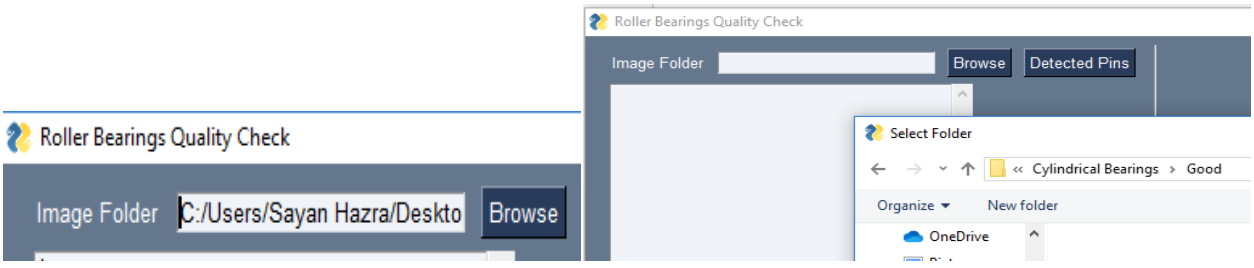
- **The file is a bit slow to open, and it may take few minutes to open from step 4 to 5, and after opening the GUI it will work smoothly.**
- **The file may be deleted during the execution so allow the file to execute from the antivirus before execution.**



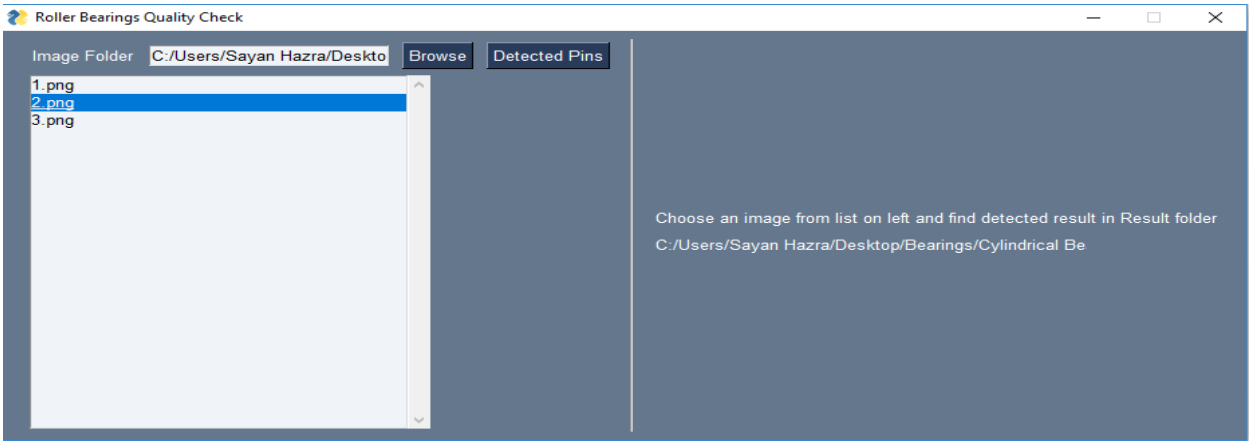
5. After few time the GUI will opened automatically named **Roller Bearings Quality Check.**



6. Enter or browse the image folder, and select it.

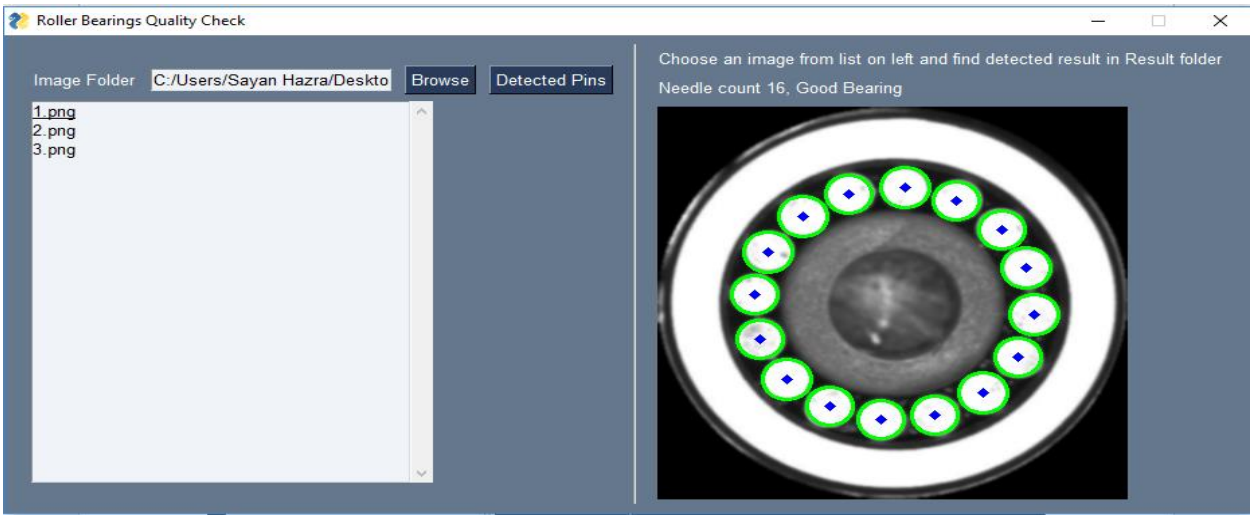


7. Select the image from the list, which corresponds to the folder.



8. Click on **Detected Pins** button to find the pin count in the bearings and visualize pins with overlay. **The detected results will be stored in 'Result' folder created automatically on 1st selection.**

Example 1: A Good bearing is detected with 16 needles count and needles are visible here.



Example 2: A Bad bearing is detected with 15 needles count and needles are visible here.