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## Import Necessary Libraries

```
[1]: import os
import cv2
import numpy as np
import pandas as pd
import tensorflow as tf
from tensorflow.keras import layers, models
from PIL import Image
from matplotlib import pyplot as plt
import seaborn as sns
```

2024-08-15 19:12:15.971740: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] Instructions in performance-critical operations.  
To enable the following instructions: AVX2 FMA, in other operations, rebuild Tensor

## Preprocessing

### Mean Filter

```
[3]: # Define the main input folder and main output folder
main_input_folder = r'/Users/apple/Downloads/COVID-19_Radiography_Dataset/image'
main_output_folder = r'/Users/apple/Downloads/COVID-19_Radiography_Dataset/meanfi

# Create the main output folder if it doesn't exist
if not os.path.exists(main_output_folder):
    os.makedirs(main_output_folder)

# Walk through all subdirectories in the main input folder
for root, dirs, files in os.walk(main_input_folder):
    for file in files:
        if file.lower().endswith(('.png', '.jpg', '.jpeg')):
            # Define the input and output paths for each image file
            input_image_path = os.path.join(root, file)
            relative_path = os.path.relpath(root, main_input_folder)
            output_image_path = os.path.join(main_output_folder, relative_path + file)
```