**Aim:** Apply non-linear filters on images and investigate its application in noise-removal.

**Theory:-**

* Non-linear filters are image processing techniques used for noise removal by considering the  
  local neighborhood of each pixel. Unlike linear filters, non-linear filters modify pixel values  
  based on their relationship with neighboring pixels, allowing them to effectively suppress  
  different types of noise.

**Programm:-**

import cv2

import numpy as np

*# Load the noisy image*

noisy\_image = cv2.imread("./Images.jpg", 0)  *# Load as grayscale*

if noisy\_image is None:

    raise FileNotFoundError(

        "The image './Images.jpg' could not be loaded. Check the file path."

    )

*# Apply a median filter to remove noise*

filtered\_image = cv2.medianBlur(noisy\_image, 5)  *# 5x5 neighborhood window size*

*# Save the filtered image*

cv2.imwrite("filtered\_image.jpg", filtered\_image)

*# Wait for a key press and then close the windows*

cv2.waitKey(0)

cv2.destroyAllWindows()

print("Filtered image saved as 'filtered\_image.jpg'")

**Output:-**

|  |  |
| --- | --- |
| **Original Image** | **Non Linear Image** |
|  |  |