Assignment 2

In image filtering, the two basic filters are Low Pass Filter (LPF) and High Pass Filter (HPF). LPF is used to remove noise, blur, smoothen an image. HPF is used to detect edges in an image. Both use kernel which is an odd size matrix contains weights to filter an image. In case of LPF, all values in kernel sum up to 1. If the kernel contains both negative and positive weights, it’s probably used to sharpen or smoothen an image.

Import the needed library named as OpenCV for image processing and NumPy for array. Reading the image and changing it into the gray image. Creating 3x3 kernel in range -9,9:

Text

Description automatically generated

Using filter2D function to make a mask with kernel:

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Description automatically generated

The original image and the results are:

A cat wearing a hat

Description automatically generatedA black and white image of a cat's face

Description automatically generated with low confidenceA picture containing sky, flock, flying, outdoor

Description automatically generated

The Laplacian edge detector uses only one kernel. It calculates second order derivatives in a single pass. Using Laplacian function with the k size is 7

A screenshot of a computer

Description automatically generated

Results:

A picture containing building, outdoor, city, white

Description automatically generatedA picture containing text, electronics, circuit

Description automatically generated

Two filter to smooth the image: Gaussian Blur and median filter

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Description automatically generated

Result Gaussian Blur:

A picture containing building, outdoor, city, white

Description automatically generatedA picture containing building, outdoor, house, white

Description automatically generated

Result Median Filter:

A cat wearing a hat

Description automatically generatedA cat wearing a hat

Description automatically generated