

**Mean filter = equal importance**

**Gaussian filter = distance-based importance**

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## 15. What Should You Learn Next?

Best progression:

1. Gaussian filter
2. Sharpening filters
3. Laplacian filter
4. Edge detection (Sobel → Canny)

If you want, next I can:

- Show **numerical Gaussian filtering example**
- Explain  $\sigma$  vs kernel size
- Write lab record theory
- Compare **Gaussian vs Median**

Just tell me what you want next.



in table, write difference between, neighbourhood operations and point operation, correlation and convolution

Below is a **clean, exam-ready comparison**, written **strictly in table form**, concise and easy to memorize.

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### 1. Difference between Point Operation and Neighbourhood Operation

Aspect	Point Operation	Neighbourhood Operation
Definition	Output pixel depends only on the corresponding input pixel	Output pixel depends on the pixel and its neighboring pixels
Pixel dependency	Single pixel	Group of pixels (window/kernel)

Aspect	Point Operation	Neighbourhood Operation
Use of kernel	Not required	Required
Computation	Simple and fast	More complex
Effect on image	Changes intensity values	Changes local structure
Noise reduction	Not effective	Effective
Edge detection	Not possible	Possible
Example operations	Thresholding, contrast stretching, image negative	Mean, median, Gaussian, Sobel filters
Mathematical form	$g(x, y) = f(x, y)$	$g(x, y) = f(\text{neighbourhood})$

## 2. Difference between Correlation and Convolution

Aspect	Correlation	Convolution
Kernel flipping	No flipping	Kernel is flipped horizontally and vertically
Mathematical operation	Direct sliding and multiplication	Sliding after kernel rotation
Symmetry requirement	Kernel need not be symmetric	Kernel may be symmetric or asymmetric
Usage in CV	Template matching, feature detection	Filtering, smoothing, edge detection
Result difference	Different for asymmetric kernels	Different due to flipping
Implementation complexity	Simpler	Slightly complex
Frequency domain meaning	No strict physical interpretation	Corresponds to multiplication in frequency domain

Aspect	Correlation	Convolution
Common usage in theory	Less emphasized	Heavily emphasized
Gaussian kernel output	Same as convolution	Same as correlation (because symmetric kernel)

## Key Exam Notes (Very Important)

- Neighbourhood operations use kernels; point operations do not
- Convolution = flipped kernel
- Correlation = no flipping
- For symmetric kernels (Gaussian, mean) → correlation = convolution
- For asymmetric kernels (Sobel, Prewitt) → results differ

If you want next:

- Numerical example of correlation vs convolution
- Short 2-mark answers
- Diagram-based explanation
- Lab-record formatted content

Just tell me.

