

Correlation

Correlation measures how similar two signals or images are. In image processing, correlation helps **detect patterns** by sliding a filter (mask) over an image and comparing pixel values. It's often used in **template matching**, where a small template is compared to different areas of an image.

Convolution

Convolution is a mathematical operation that transforms an input signal or image by applying a filter. It is commonly used in **edge detection, blurring, and sharpening**. The convolution process involves: 1. Flipping the kernel (filter). 2. Sliding the kernel over the image. 3. Computing weighted sums at each position.

Difference Between Correlation & Convolution:

- Correlation does **not** flip the kernel. - Convolution **flips** the kernel before applying it to the image.

Shearing

Shearing is a geometric transformation that **distorts** an image by shifting pixels in one direction while keeping others unchanged. It is used in: - **2D transformations** to create a skewed effect. - **Affine transformations**, which modify images while preserving parallel lines.