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BSCS-IS-4B

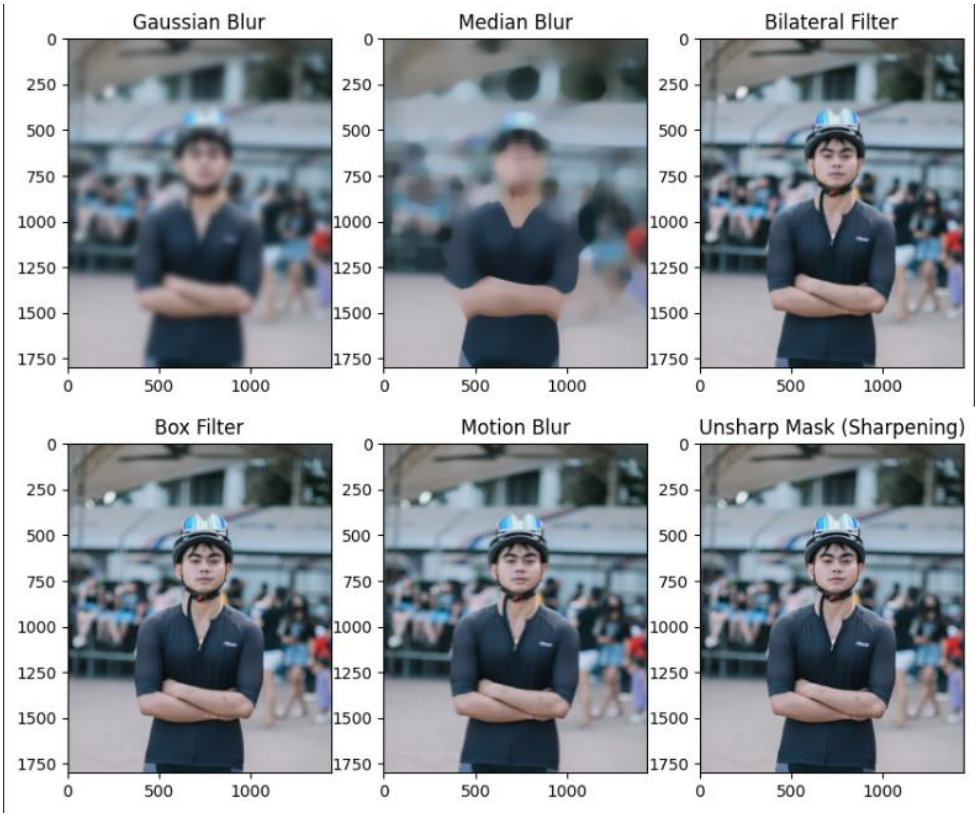
Image Manipulation

Original Image

Scaled Image

Rotated Image

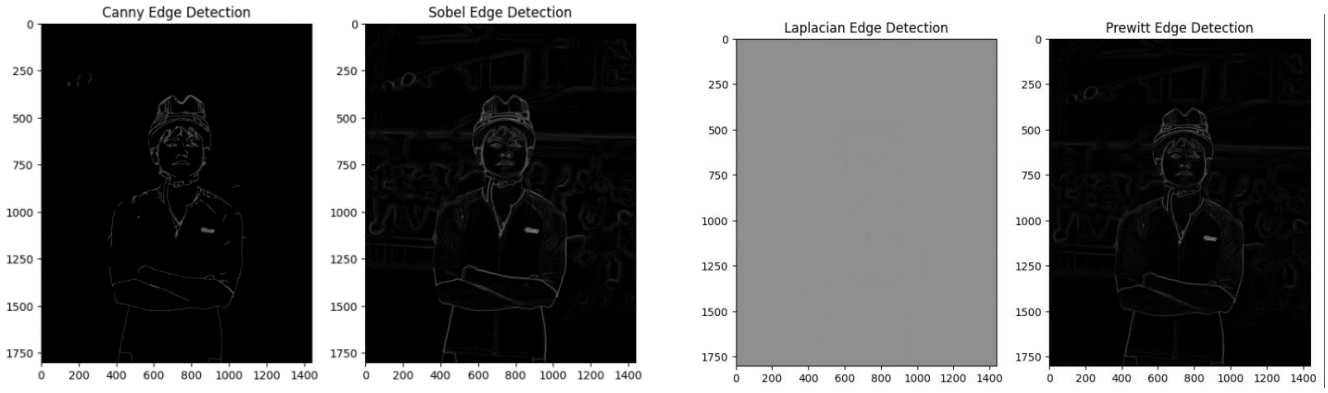
Comparison of Blurring Techniques



Techniques	Blurring	Noise Reduction	Edge Preservation	Artistic Effects	Sharpening
Gaussian Blur	80%	80%	50%	50%	20%
Median blur	90%	85%	70%	90%	30%
Bilateral Filter	35%	80%	85%	50%	30%
Box Filter	60%	70%	85%	80%	20%
Motion Blur	50%	50%	40%	30%	30%
Unsharp mask	30%	90%	75%	20%	85%

Blurring and filtering techniques vary in their effects and uses. **Gaussian blur** provides general smoothing by averaging pixel values, reducing noise but softening edges. **Median blur** is effective for removing salt-and-pepper noise while preserving edges. **Bilateral filter** smooths images while retaining sharp edges, making it ideal for noise reduction without losing detail, though it's computationally heavy. **Box filter** offers simple, fast blurring but may introduce artifacts. **Motion blur** simulates directional movement, often used for creating motion effects. Lastly, **Unsharp mask** enhances edge sharpness and detail, commonly used in photography to increase image clarity.

Comparison of Edge Detection



Techniques	Sensitivity to Noise	Edge Thinness	Edge Continuity	Computational Efficiency
Canny Edge Detection	50%	90%	90%	60%
Sobel Edge Detection	80%	60%	60%	80%
Laplacian Edge Detection	90%	40%	40%	90%
Prewitt Edge Detection	80%	60%	60%	80%

Edge detection techniques differ in precision and complexity. **Canny edge detection** is highly accurate, providing sharp, well-defined edges with minimal noise but is computationally intensive. **Sobel** and **Prewitt** methods detect horizontal and vertical edges, producing thicker, less precise edges with moderate noise resistance. **Laplacian edge detection** highlights intensity changes without edge direction but is prone to noise, resulting in thicker, noisier edges. Overall, **Canny** is best for detailed tasks, while **Sobel**, **Prewitt**, and **Laplacian** are simpler and better suited for basic edge detection.