

```

import cv2
import numpy as np
import matplotlib.pyplot as plt

# Load Image (Grayscale)
image_path = 'download.jpeg'
img = cv2.imread(image_path, cv2.IMREAD_GRAYSCALE)

if img is None:
    raise FileNotFoundError(f"Error: Unable to load image. Check the
file path: {image_path}")

# Apply Smoothing Filters
mean_blur = cv2.blur(img, (5, 5)) # Mean Filter
gaussian_blur = cv2.GaussianBlur(img, (5, 5), 0) # Gaussian Filter
median_blur = cv2.medianBlur(img, 5) # Median Filter

# Apply Sharpening Filters
laplacian = cv2.Laplacian(img, cv2.CV_64F) # Laplacian Filter
laplacian = np.uint8(np.absolute(laplacian))

# Unsharp Masking
gaussian = cv2.GaussianBlur(img, (9, 9), 10.0)
unsharp_mask = cv2.addWeighted(img, 1.5, gaussian, -0.5, 0)

# Display Results
plt.figure(figsize=(12, 8))

plt.subplot(2, 3, 1)
plt.imshow(img, cmap='gray')
plt.title("Original Image")
plt.axis("off")

plt.subplot(2, 3, 2)
plt.imshow(mean_blur, cmap='gray')
plt.title("Mean Filter")
plt.axis("off")

plt.subplot(2, 3, 3)
plt.imshow(gaussian_blur, cmap='gray')
plt.title("Gaussian Filter")
plt.axis("off")

plt.subplot(2, 3, 4)
plt.imshow(median_blur, cmap='gray')
plt.title("Median Filter")
plt.axis("off")

plt.subplot(2, 3, 5)
plt.imshow(laplacian, cmap='gray')
plt.title("Laplacian Filter")
plt.axis("off")

plt.subplot(2, 3, 6)

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```
plt.imshow(unsharp_mask, cmap='gray')  
plt.title("Unsharp Masking")  
plt.axis("off")
```

```
plt.tight_layout()  
plt.show()
```

Matplotlib is building the font cache; this may take a moment.

Original Image



Mean Filter



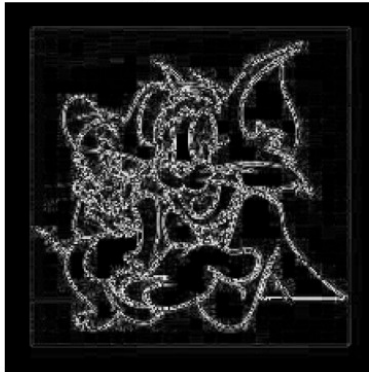
Gaussian Filter



Median Filter



Laplacian Filter



Unsharp Masking

