Experiment: 6

Shashwat Shah
60004220126
BE comps C22

Aim: Histogram stretching on an Image.

Theory: Histogram stretching also known as contrast stretching is a technique used in image processing to improve the contrast of an image by stretching the range of intensity value.

→ Image Histogram

It represents the distribution of pixel intensity values. For grey scale images, it shows how often each pixel intensity (0 - 255) occur.

→ Histogram stretching.

The main goal of histogram stretching is to enhance the contrast by expanding the narrow intensity range to cover the full range to cover the possible values. (0 - 255). The process can be defined as,

$$S = \frac{(r - r_{min})}{(r_{max} - r_{min})} \cdot (S_{max} - S_{min}) - S_{min}$$

where r is the input pixel intensity, r_{min} and r_{max} are the minimum and maximum intensities of the original image and S_{min} and S_{max} are the desired new minimum and maximum intensity value.

Conclusion - Overal, this experiment highlighted how histogram manipulation can improve image quality making features that were initially obscure more distinguishable and thus making it a valuable tool for image enhancement applications

NAME: Shashwat Shah SAP ID: 60004220126 DIV/BATCH:

DIGITAL SIGNAL PROCESSING (DSP)
EXPERIMENT 06

AIM: To perform Histogram Stretching on an Image.

CODE:

```
# Function to plot histogram from scratch
def plot_histogram2(image, title):
    # Calculate the histogram
    hist = np.zeros(256, dtype=int)
    for pixel in image.ravel():
        hist[pixel] += 1

    # Plot the histogram
    plt.plot(hist, color='gray')
    plt.title(title)
    plt.xlabel('Pixel Intensity')
    plt.ylabel('Frequency')
    plt.xlim([0, 256])
    plt.grid(True)

# Plot histograms for the original and stretched images
plt.figure(figsize=(12, 6))
plt.subplot(1, 2, 1)
plot_histogram2(image, 'Original Image Histogram')
plt.subplot(1, 2, 2)
plot_histogram2(stretched_image, 'Stretched Image Histogram')
plt.tight_layout()
plt.show()
```

OUTPUT: