EXPT 1	Basic Image processing operations (Point Operations)

AIM:-

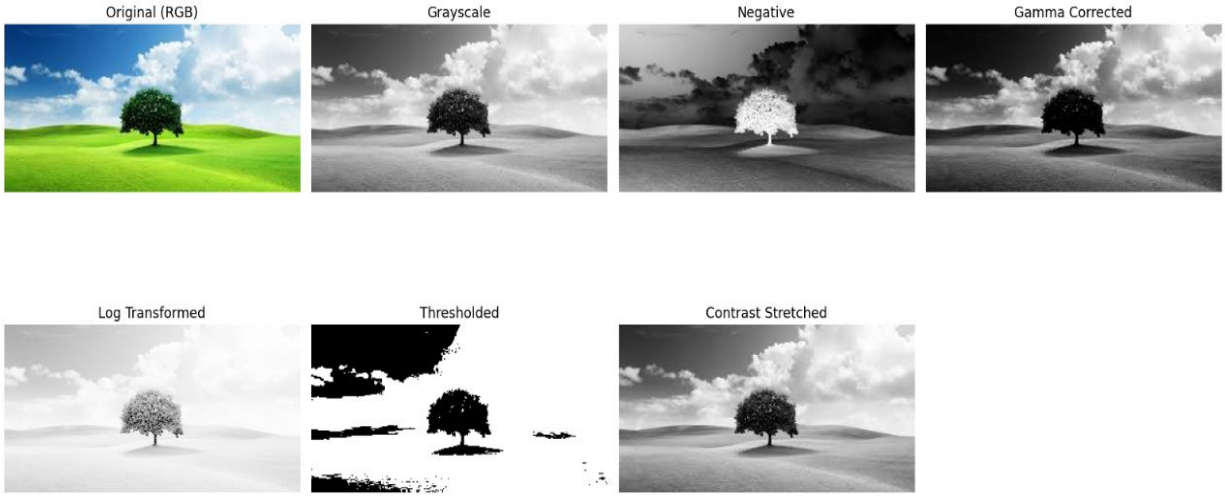
To implement fundamental point-wise transformations on digital images including negative, gamma, logarithmic, threshold transformations, and contrast adjustment techniques to enhance image quality and understand pixel-level manipulations.

CODE:-

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

# Helper function to display images
def show_image(img, title="Image", cmap_type="gray"):
    plt.imshow(img, cmap=cmap_type)
    plt.title(title)
    plt.axis("off")
    plt.show()

# Load the image
img = cv2.imread("input.jpg")

# A. Reading, writing, and converting images
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
img_rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)

show_image(img_rgb, "Original (RGB)", cmap_type=None)
show_image(gray, "Grayscale")

# B. Negative Transformation
img_gray = cv2.imread("input.jpg", 0) # Load as grayscale for simplicity
```

```
negative = 255 - img_gray
show_image(negative, "Negative")

# C. Gamma Transformation
gamma = 2.2
gamma_corrected = np.array(255*(img_gray/255.0)**gamma, dtype='uint8')
show_image(gamma_corrected, "Gamma Corrected")

# D. Log Transformation
img_float = cv2.imread("input.jpg", 0).astype(np.float32)
c = 255 / np.log(1 + np.max(img_float))
log_transformed = c * np.log(1 + img_float)
log_transformed = np.array(log_transformed, dtype='uint8')
show_image(log_transformed, "Log Transformed")

# E. Threshold Transformation
_, thresh = cv2.threshold(img_gray, 127, 255, cv2.THRESH_BINARY)
show_image(thresh, "Thresholded")

# F. Contrast Stretching /Adjustment
min_val = np.min(img_gray)
max_val = np.max(img_gray)
stretched = ((img_gray - min_val) / (max_val - min_val)) * 255
stretched = stretched.astype('uint8')
show_image(stretched, "Contrast Stretched")
```

OUTPUT:-



RESULT:-

Successfully applied various point operations on images, demonstrating how pixel intensity transformations affect image appearance. Each transformation technique proved effective for specific image enhancement requirements based on the input image characteristics.