DSA0210 Computer Vision with Open CV LAB Experiments

Experiment- 11: Perform transformation using Direct Linear Transformation.

PROGRAM:

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

# Read the input image
img = cv2.imread(r"D:\New Folder\input.jpeg")

# Check if image is loaded
if img is None:
    raise FileNotFoundError("Image not found. Check the file path.")

# Get image dimensions
h, w = img.shape[:2]

# Source points (from original image)
src_pts = np.array([
    [100, 100],
    [w - 100, 100],
    [w - 100, h - 100],
    [100, h - 100]
], dtype=np.float32)

# Destination points
dst_pts = np.array([
    [0, 0],
```

```
    [w, 0],
    [w, h],
    [0, h]
], dtype=np.float32)

# --- Direct Linear Transformation (DLT) ---
A = []
for i in range(4):
    x, y = src_pts[i]
    u, v = dst_pts[i]
    A.append([-x, -y, -1, 0, 0, 0, x*u, y*u, u])
    A.append([0, 0, 0, -x, -y, -1, x*v, y*v, v])

A = np.array(A)

# Solve using SVD
U, S, Vt = np.linalg.svd(A)
H = Vt[-1].reshape(3, 3)

# Normalize homography matrix
H = H / H[2, 2]

# Apply transformation
dlt_image = cv2.warpPerspective(img, H, (w, h))

# Display images
plt.figure(figsize=(8, 4))

plt.subplot(1, 2, 1)
```

```
plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
plt.title("Original Image")
plt.axis("off")

plt.subplot(1, 2, 2)
plt.imshow(cv2.cvtColor(dlt_image, cv2.COLOR_BGR2RGB))
plt.title("DLT Transformed Image")
plt.axis("off")

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

OUTPUT: