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# EX:08 THRESHOLDING
# Name: ABISHEK PV
# Register Number: 212222230003

import cv2
import numpy as np
import matplotlib.pyplot as plt
from google.colab.patches import cv2_imshow  # Optional for Colab image display

# Upload image in Colab
from google.colab import files
uploaded = files.upload()  # Upload your image file here

# Get the uploaded file name
image_path = list(uploaded.keys())[0]

# Read the Image and convert to grayscale
image = cv2.imread(image_path)
gray_image = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

# Display Original Image
plt.subplot(2, 2, 1)
plt.imshow(cv2.cvtColor(image, cv2.COLOR_BGR2RGB))  # Convert from BGR to RGB for display
plt.title("Original Image")
plt.axis('off')

# Global Thresholding
_, global_thresholded = cv2.threshold(gray_image, 127, 255, cv2.THRESH_BINARY)
plt.subplot(2, 2, 2)
plt.imshow(global_thresholded, cmap='gray')
plt.title("Global Thresholding")
plt.axis('off')

# Adaptive Thresholding
adaptive_thresholded = cv2.adaptiveThreshold(
    gray_image, 255, cv2.ADAPTIVE_THRESH_GAUSSIAN_C, cv2.THRESH_BINARY, 11, 2
)
plt.subplot(2, 2, 3)
plt.imshow(adaptive_thresholded, cmap='gray')
plt.title("Adaptive Thresholding")
plt.axis('off')

# Otsu's Method
_, otsu_thresholded = cv2.threshold(gray_image, 0, 255, cv2.THRESH_BINARY + cv2.THRESH_OTSU)
plt.subplot(2, 2, 4)
plt.imshow(otsu_thresholded, cmap='gray')
plt.title("Otsu's Method")
plt.axis('off')

# Show the plot
plt.tight_layout()
plt.show()
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