# Step 1: Install OpenCV (if needed)

!pip install opencv-python-headless

# Step 2: Import necessary libraries

import cv2

import numpy as np

from matplotlib import pyplot as plt

from google.colab import files

# Step 3: Upload an image

print("Upload a binary or grayscale image:")

uploaded = files.upload()

image\_path = next(iter(uploaded))

# Step 4: Read the image in grayscale

img = cv2.imread(image\_path, cv2.IMREAD\_GRAYSCALE)

# Step 5: Convert to binary image using thresholding

\_, binary = cv2.threshold(img, 127, 255, cv2.THRESH\_BINARY)

# Step 6: Define the structuring element (kernel)

kernel = np.ones((5, 5), np.uint8) # You can adjust the size

# Step 7: Apply Opening (Erosion followed by Dilation)

opened = cv2.morphologyEx(binary, cv2.MORPH\_OPEN, kernel)

# Step 8: Display the original and opened images

plt.figure(figsize=(10, 5))

plt.subplot(1, 2, 1)

plt.imshow(binary, cmap='gray')

plt.title('Original Binary Image')

plt.axis('off')

plt.subplot(1, 2, 2)

plt.imshow(opened, cmap='gray')

plt.title('After Opening')

plt.axis('off')

plt.show()

# Step 9: Save the opened image

cv2.imwrite("opened\_output.jpg", opened)

print("Saved as opened\_output.jpg")

