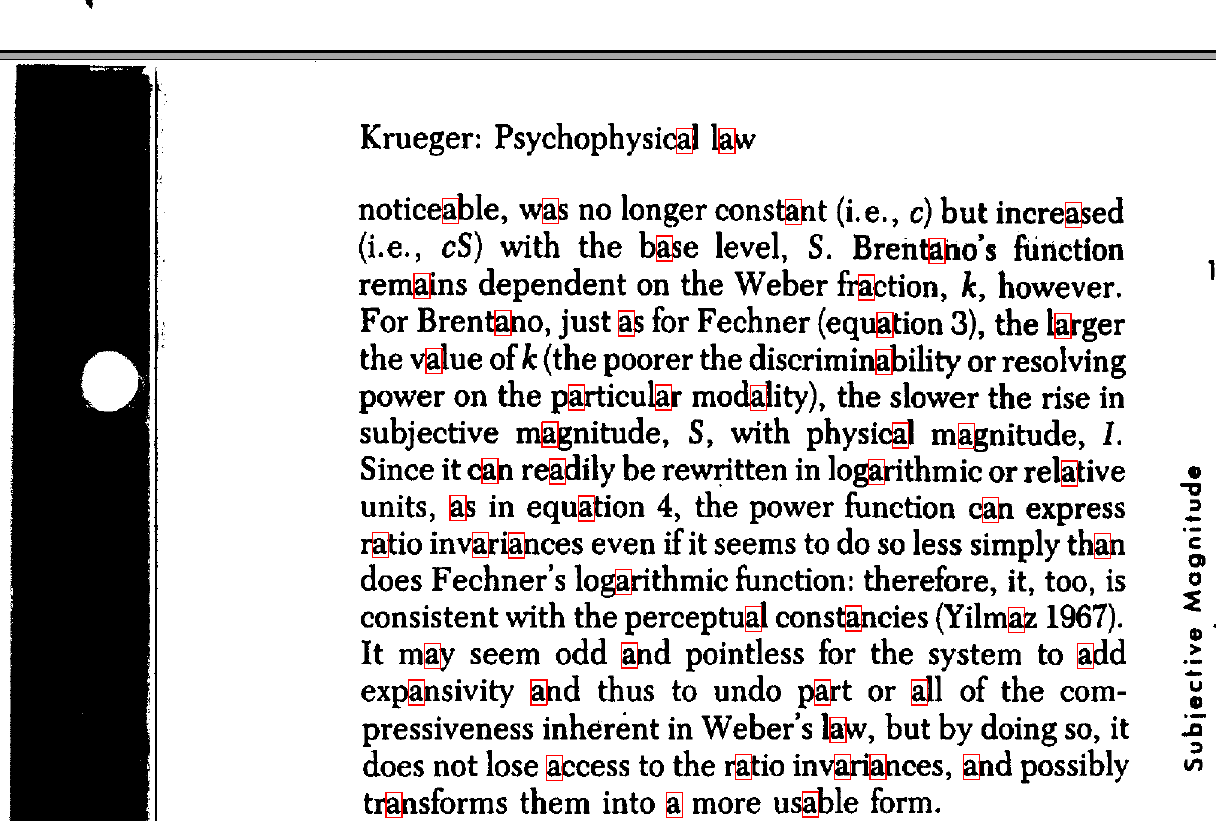
N1

A grey rectangular object with text

Description automatically generatedA close-up of a newspaper

Description automatically generated



Number of detected "a"s: **53**

Code:

# -\*- coding: utf-8 -\*-

"""

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"""

import cv2

import numpy as np

import matplotlib.pyplot as plt

# Load the image

image\_path = "C:\\Users\\Zakaria\\Desktop\\CSCI-507HW#5\\textsample.tif"

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

# Extract the template subimage of 'a' (manually selected region)

x, y, w, h = 442, 198, 16, 25  # Example coordinates for the letter 'a'

template = image[y:y+h, x:x+w]

# Show the template image

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

plt.title('Template Image')

plt.axis('off')

plt.show()

# Match the template

result = cv2.matchTemplate(image, template, cv2.TM\_CCOEFF\_NORMED)

# Threshold peaks

threshold = 0.8  # Adjust this threshold as necessary

loc = np.where(result >= threshold)

# Create a binary image of the peaks

binary\_peaks = np.zeros\_like(result)

binary\_peaks[loc] = 1

# Use connectedComponentsWithStats to extract the centroids of the peaks

num\_labels, labels, stats, centroids = cv2.connectedComponentsWithStats(binary\_peaks.astype(np.uint8), connectivity=8)

# Draw rectangles on the original image at the detected locations

output\_image = cv2.cvtColor(image, cv2.COLOR\_GRAY2BGR)

count\_a = num\_labels - 1  # Subtract 1 because background is also labeled

for pt in zip(\*loc[::-1]):

    top\_left = (pt[0], pt[1])

    bottom\_right = (pt[0] + w, pt[1] + h)

    cv2.rectangle(output\_image, top\_left, bottom\_right, (0, 0, 255), 1)

# Show the template image, the scores image, and the result

plt.figure(figsize=(15, 5))

plt.subplot(1, 3, 1)

plt.title('Template Image')

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

plt.axis('off')

plt.subplot(1, 3, 2)

plt.title('Scores Image')

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

plt.colorbar()

plt.axis('off')

plt.subplot(1, 3, 3)

plt.title('Detected "a"s in Image')

plt.imshow(output\_image)

plt.axis('off')

plt.show()

# Save the result image

output\_image\_path = "C:\\Users\\Zakaria\\Desktop\\CSCI-507HW#5\\output\_image\_with\_a\_markers.png"

cv2.imwrite(output\_image\_path, output\_image)

# Save the scores image

scores\_image\_path = "C:\\Users\\Zakaria\\Desktop\\CSCI-507HW#5\\scores\_image.png"

cv2.imwrite(scores\_image\_path, (result \* 255).astype(np.uint8))

# Print the number of detected 'a's

print(f'Number of detected "a"s: {count\_a}')

N2

