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from google.colab.patches import cv2_imshow
import cv2
import numpy as np
import time

def gaussian_blur(image, kernel_size):
    start_time = time.time()
    blurred_image = cv2.GaussianBlur(image, (kernel_size, kernel_size), 0)
    end_time = time.time()
    print(f"Gaussian Blur took {(end_time - start_time) * 1000} milliseconds.")
    return blurred_image


def dilation(image, kernel_size):
    kernel = np.ones((kernel_size, kernel_size), np.uint8)
    start_time = time.time()
    dilated_image = cv2.dilate(image, kernel, iterations=1)
    end_time = time.time()
    print(f"Dilation took {(end_time - start_time) * 1000} milliseconds.")
    return dilated_image


def mean_filtering(image, kernel_size):
    start_time = time.time()
    filtered_image = cv2.blur(image, (kernel_size, kernel_size))
    end_time = time.time()
    print(f"Mean Filtering took {(end_time - start_time) * 1000} milliseconds.")
    return filtered_image


def process_image(image_path, kernel_size):
    image = cv2.imread(image_path, cv2.IMREAD_GRAYSCALE)

    total_start_time = time.time()

    blurred_image = gaussian_blur(image, kernel_size)

    dilated_image = dilation(image, kernel_size)

    filtered_image = mean_filtering(image, kernel_size)

    total_end_time = time.time()
    print(f"Total processing took {(total_end_time - total_start_time) * 1000} milliseconds.")

    return blurred_image, dilated_image, filtered_image
```