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#IMAGEAND VIDEOANALYTICS
#LAB TASK
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#Course: CSE4076

#Load Video:
#Load the provided video file.
import cv2

# Open the video file
video_path = r"C:\Users\user\Downloads\1507868-
uhd_3840_2160_25fps.mp4"
cap = cv2.VideoCapture(video_path)

# Check if video opened successfully
if not cap.isOpened():
    print("Error: Could not open video file")
else:
    while cap.isOpened():
        ret, frame = cap.read()
        if ret:
            # Display the frame
            cv2.imshow('Frame', frame)

            # Press 'q' to exit
            if cv2.waitKey(25) & 0xFF == ord('q'):
                break
        else:
            break

# Release the video capture object and close display window
cap.release()
cv2.destroyAllWindows()

#Frame Extraction:
import cv2
import os

# Path to the video file
video_path = r"C:\Users\user\Downloads\1507868-
uhd_3840_2160_25fps.mp4"

# Directory where frames will be saved
output_dir = "extracted_frames"

# Create directory if it doesn't exist
if not os.path.exists(output_dir):

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    os.makedirs(output_dir)

# Open the video file
cap = cv2.VideoCapture(video_path)

# Check if the video opened successfully
if not cap.isOpened():
    print("Error: Could not open video file")
    exit()

frame_count = 0

# Read until the video is completed
while cap.isOpened():
    ret, frame = cap.read()

    if ret:
        # Every frame will be saved with its frame number
        frame_filename = os.path.join(output_dir,
f"frame_{frame_count:04d}.jpg")

        # Save the frame as a .jpg image
        cv2.imwrite(frame_filename, frame)

        print(f"Saved {frame_filename}")

        frame_count += 1

        # To limit extraction (optional, e.g., extract every 30
frames)
        # if frame_count % 30 == 0:
        #     cv2.imwrite(frame_filename, frame)

    else:
        break

# Release the video capture object
cap.release()
print(f"Extracted {frame_count} frames and saved in {output_dir}.")

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Saved extracted_frames\frame_0538.jpg
Saved extracted_frames\frame_0539.jpg
Saved extracted_frames\frame_0540.jpg
Saved extracted_frames\frame_0541.jpg
Saved extracted_frames\frame_0542.jpg
Saved extracted_frames\frame_0543.jpg
Saved extracted_frames\frame_0544.jpg
Saved extracted_frames\frame_0545.jpg
Saved extracted_frames\frame_0546.jpg
Saved extracted_frames\frame_0547.jpg
Saved extracted_frames\frame_0548.jpg
Saved extracted_frames\frame_0549.jpg

```
Saved extracted_frames\frame_0550.jpg
Saved extracted_frames\frame_0551.jpg
Saved extracted_frames\frame_0552.jpg
Saved extracted_frames\frame_0553.jpg
Saved extracted_frames\frame_0554.jpg
Saved extracted_frames\frame_0555.jpg
Saved extracted_frames\frame_0556.jpg
Saved extracted_frames\frame_0557.jpg
Saved extracted_frames\frame_0558.jpg
Saved extracted_frames\frame_0559.jpg
Saved extracted_frames\frame_0560.jpg
Saved extracted_frames\frame_0561.jpg
Saved extracted_frames\frame_0562.jpg
Saved extracted_frames\frame_0563.jpg
Extracted 564 frames and saved in extracted_frames.
```

#Spatio-Temporal Segmentation:

#Perform segmentation on each frame using a technique like color thresholding or edge detection.

```
import cv2
import os
import numpy as np
```

Path to the video file

```
video_path = r"C:\Users\user\Downloads\1507868-
uhd_3840_2160_25fps.mp4"
```

Directories for saving extracted and segmented frames

```
output_dir_extracted = "extracted_frames"
output_dir_segmented = "segmented_frames"
```

Create directories if they don't exist

```
if not os.path.exists(output_dir_extracted):
    os.makedirs(output_dir_extracted)
if not os.path.exists(output_dir_segmented):
    os.makedirs(output_dir_segmented)
```

Open the video file

```
cap = cv2.VideoCapture(video_path)
```

Check if the video opened successfully

```
if not cap.isOpened():
    print("Error: Could not open video file")
    exit()
```

Define the color range for segmentation (HSV format)

```
lower_color = np.array([40, 40, 40]) # Lower bound (example: green)
upper_color = np.array([70, 255, 255]) # Upper bound (example: green)
```

```
frame_count = 0
```

```

# Process each frame
while cap.isOpened():
    ret, frame = cap.read()

    if ret:
        # Save the extracted frame
        frame_filename = os.path.join(output_dir_extracted,
f"frame_{frame_count:04d}.jpg")
        cv2.imwrite(frame_filename, frame)
        print(f"Saved extracted frame: {frame_filename}")

        # Convert the frame to HSV for color thresholding
        hsv_frame = cv2.cvtColor(frame, cv2.COLOR_BGR2HSV)

        # Apply color thresholding
        mask = cv2.inRange(hsv_frame, lower_color, upper_color)
        segmented_frame = cv2.bitwise_and(frame, frame, mask=mask)

        # Convert to grayscale for edge detection
        gray_frame = cv2.cvtColor(segmented_frame, cv2.COLOR_BGR2GRAY)

        # Apply Canny edge detection
        edges = cv2.Canny(gray_frame, 100, 200)

        # Save the segmented frame (edges and color segmentation)
        segmented_filename = os.path.join(output_dir_segmented,
f"segmented_{frame_count:04d}.jpg")
        cv2.imwrite(segmented_filename, edges)
        print(f"Saved segmented frame with edge detection:
{segmented_filename}")

        frame_count += 1
    else:
        break

```

```

# Release the video capture object
cap.release()
print(f"Processed {frame_count} frames. Extracted frames saved in
'{output_dir_extracted}', segmented frames saved in
'{output_dir_segmented}'.")

```

```

Saved extracted frame: extracted_frames\frame_0000.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0000.jpg
Saved extracted frame: extracted_frames\frame_0001.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0001.jpg
Saved extracted frame: extracted_frames\frame_0002.jpg

```

[illegible]

segmented_0018.jpg
Saved extracted frame: extracted_frames\frame_0019.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0019.jpg
Saved extracted frame: extracted_frames\frame_0020.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0020.jpg
Saved extracted frame: extracted_frames\frame_0021.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0021.jpg
Saved extracted frame: extracted_frames\frame_0022.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0022.jpg
Saved extracted frame: extracted_frames\frame_0023.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0023.jpg
Saved extracted frame: extracted_frames\frame_0024.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0024.jpg
Saved extracted frame: extracted_frames\frame_0025.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0025.jpg
Saved extracted frame: extracted_frames\frame_0026.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0026.jpg
Saved extracted frame: extracted_frames\frame_0027.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0027.jpg
Saved extracted frame: extracted_frames\frame_0028.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0028.jpg
Saved extracted frame: extracted_frames\frame_0029.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0029.jpg
Saved extracted frame: extracted_frames\frame_0030.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0030.jpg
Saved extracted frame: extracted_frames\frame_0031.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0031.jpg
Saved extracted frame: extracted_frames\frame_0032.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0032.jpg
Saved extracted frame: extracted_frames\frame_0033.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0033.jpg
Saved extracted frame: extracted_frames\frame_0034.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0034.jpg

Saved extracted frame: extracted_frames\frame_0035.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0035.jpg
Saved extracted frame: extracted_frames\frame_0036.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0036.jpg
Saved extracted frame: extracted_frames\frame_0037.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0037.jpg
Saved extracted frame: extracted_frames\frame_0038.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0038.jpg
Saved extracted frame: extracted_frames\frame_0039.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0039.jpg
Saved extracted frame: extracted_frames\frame_0040.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0040.jpg
Saved extracted frame: extracted_frames\frame_0041.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0041.jpg
Saved extracted frame: extracted_frames\frame_0042.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0042.jpg
Saved extracted frame: extracted_frames\frame_0043.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0043.jpg
Saved extracted frame: extracted_frames\frame_0044.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0044.jpg
Saved extracted frame: extracted_frames\frame_0045.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0045.jpg
Saved extracted frame: extracted_frames\frame_0046.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0046.jpg
Saved extracted frame: extracted_frames\frame_0047.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0047.jpg
Saved extracted frame: extracted_frames\frame_0048.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0048.jpg
Saved extracted frame: extracted_frames\frame_0049.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0049.jpg
Saved extracted frame: extracted_frames\frame_0050.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0050.jpg
Saved extracted frame: extracted_frames\frame_0051.jpg

[illegible]

segmented_0067.jpg
Saved extracted frame: extracted_frames\frame_0068.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0068.jpg
Saved extracted frame: extracted_frames\frame_0069.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0069.jpg
Saved extracted frame: extracted_frames\frame_0070.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0070.jpg
Saved extracted frame: extracted_frames\frame_0071.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0071.jpg
Saved extracted frame: extracted_frames\frame_0072.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0072.jpg
Saved extracted frame: extracted_frames\frame_0073.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0073.jpg
Saved extracted frame: extracted_frames\frame_0074.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0074.jpg
Saved extracted frame: extracted_frames\frame_0075.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0075.jpg
Saved extracted frame: extracted_frames\frame_0076.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0076.jpg
Saved extracted frame: extracted_frames\frame_0077.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0077.jpg
Saved extracted frame: extracted_frames\frame_0078.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0078.jpg
Saved extracted frame: extracted_frames\frame_0079.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0079.jpg
Saved extracted frame: extracted_frames\frame_0080.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0080.jpg
Saved extracted frame: extracted_frames\frame_0081.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0081.jpg
Saved extracted frame: extracted_frames\frame_0082.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0082.jpg
Saved extracted frame: extracted_frames\frame_0083.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0083.jpg

Saved extracted frame: extracted_frames\frame_0084.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0084.jpg
Saved extracted frame: extracted_frames\frame_0085.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0085.jpg
Saved extracted frame: extracted_frames\frame_0086.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0086.jpg
Saved extracted frame: extracted_frames\frame_0087.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0087.jpg
Saved extracted frame: extracted_frames\frame_0088.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0088.jpg
Saved extracted frame: extracted_frames\frame_0089.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0089.jpg
Saved extracted frame: extracted_frames\frame_0090.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0090.jpg
Saved extracted frame: extracted_frames\frame_0091.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0091.jpg
Saved extracted frame: extracted_frames\frame_0092.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0092.jpg
Saved extracted frame: extracted_frames\frame_0093.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0093.jpg
Saved extracted frame: extracted_frames\frame_0094.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0094.jpg
Saved extracted frame: extracted_frames\frame_0095.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0095.jpg
Saved extracted frame: extracted_frames\frame_0096.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0096.jpg
Saved extracted frame: extracted_frames\frame_0097.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0097.jpg
Saved extracted frame: extracted_frames\frame_0098.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0098.jpg
Saved extracted frame: extracted_frames\frame_0099.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0099.jpg
Saved extracted frame: extracted_frames\frame_0100.jpg

[illegible]

segmented_0116.jpg
Saved extracted frame: extracted_frames\frame_0117.jpg
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segmented_0117.jpg
Saved extracted frame: extracted_frames\frame_0118.jpg
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segmented_0118.jpg
Saved extracted frame: extracted_frames\frame_0119.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0119.jpg
Saved extracted frame: extracted_frames\frame_0120.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0120.jpg
Saved extracted frame: extracted_frames\frame_0121.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0121.jpg
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Saved segmented frame with edge detection: segmented_frames\
segmented_0122.jpg
Saved extracted frame: extracted_frames\frame_0123.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0123.jpg
Saved extracted frame: extracted_frames\frame_0124.jpg
Saved segmented frame with edge detection: segmented_frames\
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Saved segmented frame with edge detection: segmented_frames\
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Saved segmented frame with edge detection: segmented_frames\
segmented_0126.jpg
Saved extracted frame: extracted_frames\frame_0127.jpg
Saved segmented frame with edge detection: segmented_frames\
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Saved segmented frame with edge detection: segmented_frames\
segmented_0129.jpg
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Saved segmented frame with edge detection: segmented_frames\
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Saved segmented frame with edge detection: segmented_frames\
segmented_0132.jpg

Saved extracted frame: extracted_frames\frame_0133.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0133.jpg
Saved extracted frame: extracted_frames\frame_0134.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0134.jpg
Saved extracted frame: extracted_frames\frame_0135.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0135.jpg
Saved extracted frame: extracted_frames\frame_0136.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0136.jpg
Saved extracted frame: extracted_frames\frame_0137.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0137.jpg
Saved extracted frame: extracted_frames\frame_0138.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0138.jpg
Saved extracted frame: extracted_frames\frame_0139.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0139.jpg
Saved extracted frame: extracted_frames\frame_0140.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0140.jpg
Saved extracted frame: extracted_frames\frame_0141.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0141.jpg
Saved extracted frame: extracted_frames\frame_0142.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0142.jpg
Saved extracted frame: extracted_frames\frame_0143.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0143.jpg
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Saved extracted frame: extracted_frames\frame_0145.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0145.jpg
Saved extracted frame: extracted_frames\frame_0146.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0146.jpg
Saved extracted frame: extracted_frames\frame_0147.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0147.jpg
Saved extracted frame: extracted_frames\frame_0148.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0148.jpg
Saved extracted frame: extracted_frames\frame_0149.jpg

[illegible]

Saved extracted frame: extracted_frames\frame_0166.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0166.jpg
Saved extracted frame: extracted_frames\frame_0167.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0167.jpg
Saved extracted frame: extracted_frames\frame_0168.jpg
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Saved extracted frame: extracted_frames\frame_0169.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0169.jpg
Saved extracted frame: extracted_frames\frame_0170.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0170.jpg
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Saved segmented frame with edge detection: segmented_frames\segmented_0171.jpg
Saved extracted frame: extracted_frames\frame_0172.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0172.jpg
Saved extracted frame: extracted_frames\frame_0173.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0173.jpg
Saved extracted frame: extracted_frames\frame_0174.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0174.jpg
Saved extracted frame: extracted_frames\frame_0175.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0175.jpg
Saved extracted frame: extracted_frames\frame_0176.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0176.jpg
Saved extracted frame: extracted_frames\frame_0177.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0177.jpg
Saved extracted frame: extracted_frames\frame_0178.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0178.jpg
Saved extracted frame: extracted_frames\frame_0179.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0179.jpg
Saved extracted frame: extracted_frames\frame_0180.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0180.jpg
Saved extracted frame: extracted_frames\frame_0181.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0181.jpg
Saved extracted frame: extracted_frames\frame_0182.jpg

[illegible]

segmented_0198.jpg
Saved extracted frame: extracted_frames\frame_0199.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0199.jpg
Saved extracted frame: extracted_frames\frame_0200.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0200.jpg
Saved extracted frame: extracted_frames\frame_0201.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0201.jpg
Saved extracted frame: extracted_frames\frame_0202.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0202.jpg
Saved extracted frame: extracted_frames\frame_0203.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0203.jpg
Saved extracted frame: extracted_frames\frame_0204.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0204.jpg
Saved extracted frame: extracted_frames\frame_0205.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0205.jpg
Saved extracted frame: extracted_frames\frame_0206.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0206.jpg
Saved extracted frame: extracted_frames\frame_0207.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0207.jpg
Saved extracted frame: extracted_frames\frame_0208.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0208.jpg
Saved extracted frame: extracted_frames\frame_0209.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0209.jpg
Saved extracted frame: extracted_frames\frame_0210.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0210.jpg
Saved extracted frame: extracted_frames\frame_0211.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0211.jpg
Saved extracted frame: extracted_frames\frame_0212.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0212.jpg
Saved extracted frame: extracted_frames\frame_0213.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0213.jpg
Saved extracted frame: extracted_frames\frame_0214.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0214.jpg

Saved extracted frame: extracted_frames\frame_0215.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0215.jpg
Saved extracted frame: extracted_frames\frame_0216.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0216.jpg
Saved extracted frame: extracted_frames\frame_0217.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0217.jpg
Saved extracted frame: extracted_frames\frame_0218.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0218.jpg
Saved extracted frame: extracted_frames\frame_0219.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0219.jpg
Saved extracted frame: extracted_frames\frame_0220.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0220.jpg
Saved extracted frame: extracted_frames\frame_0221.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0221.jpg
Saved extracted frame: extracted_frames\frame_0222.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0222.jpg
Saved extracted frame: extracted_frames\frame_0223.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0223.jpg
Saved extracted frame: extracted_frames\frame_0224.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0224.jpg
Saved extracted frame: extracted_frames\frame_0225.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0225.jpg
Saved extracted frame: extracted_frames\frame_0226.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0226.jpg
Saved extracted frame: extracted_frames\frame_0227.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0227.jpg
Saved extracted frame: extracted_frames\frame_0228.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0228.jpg
Saved extracted frame: extracted_frames\frame_0229.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0229.jpg
Saved extracted frame: extracted_frames\frame_0230.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0230.jpg
Saved extracted frame: extracted_frames\frame_0231.jpg

[illegible]

segmented_0247.jpg
Saved extracted frame: extracted_frames\frame_0248.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0248.jpg
Saved extracted frame: extracted_frames\frame_0249.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0249.jpg
Saved extracted frame: extracted_frames\frame_0250.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0250.jpg
Saved extracted frame: extracted_frames\frame_0251.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0251.jpg
Saved extracted frame: extracted_frames\frame_0252.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0252.jpg
Saved extracted frame: extracted_frames\frame_0253.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0253.jpg
Saved extracted frame: extracted_frames\frame_0254.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0254.jpg
Saved extracted frame: extracted_frames\frame_0255.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0255.jpg
Saved extracted frame: extracted_frames\frame_0256.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0256.jpg
Saved extracted frame: extracted_frames\frame_0257.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0257.jpg
Saved extracted frame: extracted_frames\frame_0258.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0258.jpg
Saved extracted frame: extracted_frames\frame_0259.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0259.jpg
Saved extracted frame: extracted_frames\frame_0260.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0260.jpg
Saved extracted frame: extracted_frames\frame_0261.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0261.jpg
Saved extracted frame: extracted_frames\frame_0262.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0262.jpg
Saved extracted frame: extracted_frames\frame_0263.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0263.jpg

Saved extracted frame: extracted_frames\frame_0264.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0264.jpg
Saved extracted frame: extracted_frames\frame_0265.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0265.jpg
Saved extracted frame: extracted_frames\frame_0266.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0266.jpg
Saved extracted frame: extracted_frames\frame_0267.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0267.jpg
Saved extracted frame: extracted_frames\frame_0268.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0268.jpg
Saved extracted frame: extracted_frames\frame_0269.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0269.jpg
Saved extracted frame: extracted_frames\frame_0270.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0270.jpg
Saved extracted frame: extracted_frames\frame_0271.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0271.jpg
Saved extracted frame: extracted_frames\frame_0272.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0272.jpg
Saved extracted frame: extracted_frames\frame_0273.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0273.jpg
Saved extracted frame: extracted_frames\frame_0274.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0274.jpg
Saved extracted frame: extracted_frames\frame_0275.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0275.jpg
Saved extracted frame: extracted_frames\frame_0276.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0276.jpg
Saved extracted frame: extracted_frames\frame_0277.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0277.jpg
Saved extracted frame: extracted_frames\frame_0278.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0278.jpg
Saved extracted frame: extracted_frames\frame_0279.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0279.jpg
Saved extracted frame: extracted_frames\frame_0280.jpg

[illegible]

segmented_0296.jpg
Saved extracted frame: extracted_frames\frame_0297.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0297.jpg
Saved extracted frame: extracted_frames\frame_0298.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0298.jpg
Saved extracted frame: extracted_frames\frame_0299.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0299.jpg
Saved extracted frame: extracted_frames\frame_0300.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0300.jpg
Saved extracted frame: extracted_frames\frame_0301.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0301.jpg
Saved extracted frame: extracted_frames\frame_0302.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0302.jpg
Saved extracted frame: extracted_frames\frame_0303.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0303.jpg
Saved extracted frame: extracted_frames\frame_0304.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0304.jpg
Saved extracted frame: extracted_frames\frame_0305.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0305.jpg
Saved extracted frame: extracted_frames\frame_0306.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0306.jpg
Saved extracted frame: extracted_frames\frame_0307.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0307.jpg
Saved extracted frame: extracted_frames\frame_0308.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0308.jpg
Saved extracted frame: extracted_frames\frame_0309.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0309.jpg
Saved extracted frame: extracted_frames\frame_0310.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0310.jpg
Saved extracted frame: extracted_frames\frame_0311.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0311.jpg
Saved extracted frame: extracted_frames\frame_0312.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0312.jpg

Saved extracted frame: extracted_frames\frame_0313.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0313.jpg
Saved extracted frame: extracted_frames\frame_0314.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0314.jpg
Saved extracted frame: extracted_frames\frame_0315.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0315.jpg
Saved extracted frame: extracted_frames\frame_0316.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0316.jpg
Saved extracted frame: extracted_frames\frame_0317.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0317.jpg
Saved extracted frame: extracted_frames\frame_0318.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0318.jpg
Saved extracted frame: extracted_frames\frame_0319.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0319.jpg
Saved extracted frame: extracted_frames\frame_0320.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0320.jpg
Saved extracted frame: extracted_frames\frame_0321.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0321.jpg
Saved extracted frame: extracted_frames\frame_0322.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0322.jpg
Saved extracted frame: extracted_frames\frame_0323.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0323.jpg
Saved extracted frame: extracted_frames\frame_0324.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0324.jpg
Saved extracted frame: extracted_frames\frame_0325.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0325.jpg
Saved extracted frame: extracted_frames\frame_0326.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0326.jpg
Saved extracted frame: extracted_frames\frame_0327.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0327.jpg
Saved extracted frame: extracted_frames\frame_0328.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0328.jpg
Saved extracted frame: extracted_frames\frame_0329.jpg

[illegible]

Saved extracted frame: extracted_frames\frame_0346.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0346.jpg
Saved extracted frame: extracted_frames\frame_0347.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0347.jpg
Saved extracted frame: extracted_frames\frame_0348.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0348.jpg
Saved extracted frame: extracted_frames\frame_0349.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0349.jpg
Saved extracted frame: extracted_frames\frame_0350.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0350.jpg
Saved extracted frame: extracted_frames\frame_0351.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0351.jpg
Saved extracted frame: extracted_frames\frame_0352.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0352.jpg
Saved extracted frame: extracted_frames\frame_0353.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0353.jpg
Saved extracted frame: extracted_frames\frame_0354.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0354.jpg
Saved extracted frame: extracted_frames\frame_0355.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0355.jpg
Saved extracted frame: extracted_frames\frame_0356.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0356.jpg
Saved extracted frame: extracted_frames\frame_0357.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0357.jpg
Saved extracted frame: extracted_frames\frame_0358.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0358.jpg
Saved extracted frame: extracted_frames\frame_0359.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0359.jpg
Saved extracted frame: extracted_frames\frame_0360.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0360.jpg
Saved extracted frame: extracted_frames\frame_0361.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0361.jpg
Saved extracted frame: extracted_frames\frame_0362.jpg

[illegible]

segmented_0378.jpg
Saved extracted frame: extracted_frames\frame_0379.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0379.jpg
Saved extracted frame: extracted_frames\frame_0380.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0380.jpg
Saved extracted frame: extracted_frames\frame_0381.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0381.jpg
Saved extracted frame: extracted_frames\frame_0382.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0382.jpg
Saved extracted frame: extracted_frames\frame_0383.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0383.jpg
Saved extracted frame: extracted_frames\frame_0384.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0384.jpg
Saved extracted frame: extracted_frames\frame_0385.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0385.jpg
Saved extracted frame: extracted_frames\frame_0386.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0386.jpg
Saved extracted frame: extracted_frames\frame_0387.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0387.jpg
Saved extracted frame: extracted_frames\frame_0388.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0388.jpg
Saved extracted frame: extracted_frames\frame_0389.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0389.jpg
Saved extracted frame: extracted_frames\frame_0390.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0390.jpg
Saved extracted frame: extracted_frames\frame_0391.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0391.jpg
Saved extracted frame: extracted_frames\frame_0392.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0392.jpg
Saved extracted frame: extracted_frames\frame_0393.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0393.jpg
Saved extracted frame: extracted_frames\frame_0394.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0394.jpg

Saved extracted frame: extracted_frames\frame_0395.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0395.jpg
Saved extracted frame: extracted_frames\frame_0396.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0396.jpg
Saved extracted frame: extracted_frames\frame_0397.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0397.jpg
Saved extracted frame: extracted_frames\frame_0398.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0398.jpg
Saved extracted frame: extracted_frames\frame_0399.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0399.jpg
Saved extracted frame: extracted_frames\frame_0400.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0400.jpg
Saved extracted frame: extracted_frames\frame_0401.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0401.jpg
Saved extracted frame: extracted_frames\frame_0402.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0402.jpg
Saved extracted frame: extracted_frames\frame_0403.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0403.jpg
Saved extracted frame: extracted_frames\frame_0404.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0404.jpg
Saved extracted frame: extracted_frames\frame_0405.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0405.jpg
Saved extracted frame: extracted_frames\frame_0406.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0406.jpg
Saved extracted frame: extracted_frames\frame_0407.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0407.jpg
Saved extracted frame: extracted_frames\frame_0408.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0408.jpg
Saved extracted frame: extracted_frames\frame_0409.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0409.jpg
Saved extracted frame: extracted_frames\frame_0410.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0410.jpg
Saved extracted frame: extracted_frames\frame_0411.jpg

[illegible]

segmented_0427.jpg
Saved extracted frame: extracted_frames\frame_0428.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0428.jpg
Saved extracted frame: extracted_frames\frame_0429.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0429.jpg
Saved extracted frame: extracted_frames\frame_0430.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0430.jpg
Saved extracted frame: extracted_frames\frame_0431.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0431.jpg
Saved extracted frame: extracted_frames\frame_0432.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0432.jpg
Saved extracted frame: extracted_frames\frame_0433.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0433.jpg
Saved extracted frame: extracted_frames\frame_0434.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0434.jpg
Saved extracted frame: extracted_frames\frame_0435.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0435.jpg
Saved extracted frame: extracted_frames\frame_0436.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0436.jpg
Saved extracted frame: extracted_frames\frame_0437.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0437.jpg
Saved extracted frame: extracted_frames\frame_0438.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0438.jpg
Saved extracted frame: extracted_frames\frame_0439.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0439.jpg
Saved extracted frame: extracted_frames\frame_0440.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0440.jpg
Saved extracted frame: extracted_frames\frame_0441.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0441.jpg
Saved extracted frame: extracted_frames\frame_0442.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0442.jpg
Saved extracted frame: extracted_frames\frame_0443.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0443.jpg

Saved extracted frame: extracted_frames\frame_0444.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0444.jpg
Saved extracted frame: extracted_frames\frame_0445.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0445.jpg
Saved extracted frame: extracted_frames\frame_0446.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0446.jpg
Saved extracted frame: extracted_frames\frame_0447.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0447.jpg
Saved extracted frame: extracted_frames\frame_0448.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0448.jpg
Saved extracted frame: extracted_frames\frame_0449.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0449.jpg
Saved extracted frame: extracted_frames\frame_0450.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0450.jpg
Saved extracted frame: extracted_frames\frame_0451.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0451.jpg
Saved extracted frame: extracted_frames\frame_0452.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0452.jpg
Saved extracted frame: extracted_frames\frame_0453.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0453.jpg
Saved extracted frame: extracted_frames\frame_0454.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0454.jpg
Saved extracted frame: extracted_frames\frame_0455.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0455.jpg
Saved extracted frame: extracted_frames\frame_0456.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0456.jpg
Saved extracted frame: extracted_frames\frame_0457.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0457.jpg
Saved extracted frame: extracted_frames\frame_0458.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0458.jpg
Saved extracted frame: extracted_frames\frame_0459.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0459.jpg
Saved extracted frame: extracted_frames\frame_0460.jpg

[illegible]

segmented_0476.jpg
Saved extracted frame: extracted_frames\frame_0477.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0477.jpg
Saved extracted frame: extracted_frames\frame_0478.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0478.jpg
Saved extracted frame: extracted_frames\frame_0479.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0479.jpg
Saved extracted frame: extracted_frames\frame_0480.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0480.jpg
Saved extracted frame: extracted_frames\frame_0481.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0481.jpg
Saved extracted frame: extracted_frames\frame_0482.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0482.jpg
Saved extracted frame: extracted_frames\frame_0483.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0483.jpg
Saved extracted frame: extracted_frames\frame_0484.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0484.jpg
Saved extracted frame: extracted_frames\frame_0485.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0485.jpg
Saved extracted frame: extracted_frames\frame_0486.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0486.jpg
Saved extracted frame: extracted_frames\frame_0487.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0487.jpg
Saved extracted frame: extracted_frames\frame_0488.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0488.jpg
Saved extracted frame: extracted_frames\frame_0489.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0489.jpg
Saved extracted frame: extracted_frames\frame_0490.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0490.jpg
Saved extracted frame: extracted_frames\frame_0491.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0491.jpg
Saved extracted frame: extracted_frames\frame_0492.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0492.jpg

Saved extracted frame: extracted_frames\frame_0493.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0493.jpg
Saved extracted frame: extracted_frames\frame_0494.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0494.jpg
Saved extracted frame: extracted_frames\frame_0495.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0495.jpg
Saved extracted frame: extracted_frames\frame_0496.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0496.jpg
Saved extracted frame: extracted_frames\frame_0497.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0497.jpg
Saved extracted frame: extracted_frames\frame_0498.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0498.jpg
Saved extracted frame: extracted_frames\frame_0499.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0499.jpg
Saved extracted frame: extracted_frames\frame_0500.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0500.jpg
Saved extracted frame: extracted_frames\frame_0501.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0501.jpg
Saved extracted frame: extracted_frames\frame_0502.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0502.jpg
Saved extracted frame: extracted_frames\frame_0503.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0503.jpg
Saved extracted frame: extracted_frames\frame_0504.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0504.jpg
Saved extracted frame: extracted_frames\frame_0505.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0505.jpg
Saved extracted frame: extracted_frames\frame_0506.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0506.jpg
Saved extracted frame: extracted_frames\frame_0507.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0507.jpg
Saved extracted frame: extracted_frames\frame_0508.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0508.jpg
Saved extracted frame: extracted_frames\frame_0509.jpg

[illegible]

Saved extracted frame: extracted_frames\frame_0526.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0526.jpg
Saved extracted frame: extracted_frames\frame_0527.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0527.jpg
Saved extracted frame: extracted_frames\frame_0528.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0528.jpg
Saved extracted frame: extracted_frames\frame_0529.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0529.jpg
Saved extracted frame: extracted_frames\frame_0530.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0530.jpg
Saved extracted frame: extracted_frames\frame_0531.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0531.jpg
Saved extracted frame: extracted_frames\frame_0532.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0532.jpg
Saved extracted frame: extracted_frames\frame_0533.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0533.jpg
Saved extracted frame: extracted_frames\frame_0534.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0534.jpg
Saved extracted frame: extracted_frames\frame_0535.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0535.jpg
Saved extracted frame: extracted_frames\frame_0536.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0536.jpg
Saved extracted frame: extracted_frames\frame_0537.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0537.jpg
Saved extracted frame: extracted_frames\frame_0538.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0538.jpg
Saved extracted frame: extracted_frames\frame_0539.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0539.jpg
Saved extracted frame: extracted_frames\frame_0540.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0540.jpg
Saved extracted frame: extracted_frames\frame_0541.jpg
Saved segmented frame with edge detection: segmented_frames\segmented_0541.jpg
Saved extracted frame: extracted_frames\frame_0542.jpg

[illegible]

```
segmented_0558.jpg
Saved extracted frame: extracted_frames\frame_0559.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0559.jpg
Saved extracted frame: extracted_frames\frame_0560.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0560.jpg
Saved extracted frame: extracted_frames\frame_0561.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0561.jpg
Saved extracted frame: extracted_frames\frame_0562.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0562.jpg
Saved extracted frame: extracted_frames\frame_0563.jpg
Saved segmented frame with edge detection: segmented_frames\
segmented_0563.jpg
Processed 564 frames. Extracted frames saved in 'extracted_frames',
segmented frames saved in 'segmented_frames'.
```

```
#Track the segmented objects across frames to observe changes in
motion and shape.
```

```
import cv2
import os
import numpy as np
```

```
# Path to the video file
```

```
video_path = r"C:\Users\user\Downloads\1507868-
uhd_3840_2160_25fps.mp4"
```

```
# Directories for saving segmented frames
```

```
output_dir_segmented = "tracked_frames"
```

```
# Create directory for saving tracked frames
```

```
if not os.path.exists(output_dir_segmented):
    os.makedirs(output_dir_segmented)
```

```
# Open the video file
```

```
cap = cv2.VideoCapture(video_path)
```

```
# Define the color range for segmentation (HSV format)
```

```
lower_color = np.array([40, 40, 40]) # Example for green
upper_color = np.array([70, 255, 255]) # Example for green
```

```
frame_count = 0
```

```
# To store object centroids across frames for tracking
```

```
previous_centroids = []
```

```
# Process each frame
```

```
while cap.isOpened():
```

```

ret, frame = cap.read()

if ret:
    # Convert the frame to HSV for color thresholding
    hsv_frame = cv2.cvtColor(frame, cv2.COLOR_BGR2HSV)

    # Apply color thresholding
    mask = cv2.inRange(hsv_frame, lower_color, upper_color)
    segmented_frame = cv2.bitwise_and(frame, frame, mask=mask)

    # Convert to grayscale for contour detection
    gray_frame = cv2.cvtColor(segmented_frame, cv2.COLOR_BGR2GRAY)

    # Apply a threshold to get binary image (for contour
detection)
    _, thresh = cv2.threshold(gray_frame, 50, 255,
cv2.THRESH_BINARY)

    # Find contours of the segmented objects
    contours, _ = cv2.findContours(thresh, cv2.RETR_EXTERNAL,
cv2.CHAIN_APPROX_SIMPLE)

    current_centroids = []

    # Loop over each contour
    for contour in contours:
        # Ignore small areas to filter out noise
        if cv2.contourArea(contour) > 500:
            # Get bounding box coordinates
            x, y, w, h = cv2.boundingRect(contour)

            # Draw bounding box around the object
            cv2.rectangle(frame, (x, y), (x + w, y + h), (0, 255,
0), 2)

            # Calculate centroid of the object
            M = cv2.moments(contour)
            if M['m00'] != 0:
                cx = int(M['m10'] / M['m00'])
                cy = int(M['m01'] / M['m00'])
                current_centroids.append((cx, cy))

            # Draw the centroid
            cv2.circle(frame, (cx, cy), 5, (0, 0, 255), -1)

            # Track changes in the bounding box (size)
            bounding_box_area = w * h
            cv2.putText(frame, f"Area: {bounding_box_area}", (x, y
- 10), cv2.FONT_HERSHEY_SIMPLEX, 0.5, (255, 255, 255), 2)

```

```

        # Track centroid motion across frames
        if previous_centroids:
            for prev_cx, prev_cy in previous_centroids:
                # Draw lines to track movement from previous to
                current_centroid
                for curr_cx, curr_cy in current_centroids:
                    cv2.line(frame, (prev_cx, prev_cy), (curr_cx,
curr_cy), (255, 0, 0), 2)

            # Update previous centroids for the next frame
            previous_centroids = current_centroids

            # Save the frame with bounding boxes and motion tracking
            output_frame_path = os.path.join(output_dir_segmented,
f"tracked_{frame_count:04d}.jpg")
            cv2.imwrite(output_frame_path, frame)

            print(f"Processed frame {frame_count}: tracked objects and
saved to {output_frame_path}")

            frame_count += 1
        else:
            break

```

```

# Release the video capture object

```

```

cap.release()

```

```

print(f"Tracking completed. Processed {frame_count} frames.")

```

```

Processed frame 0: tracked objects and saved to tracked_frames\
tracked_0000.jpg

```

```

Processed frame 1: tracked objects and saved to tracked_frames\
tracked_0001.jpg

```

```

Processed frame 2: tracked objects and saved to tracked_frames\
tracked_0002.jpg

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Processed frame 4: tracked objects and saved to tracked_frames\
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tracked_0329.jpg

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tracked_0550.jpg

```
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tracked_0551.jpg
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Processed frame 560: tracked objects and saved to tracked_frames\
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Processed frame 561: tracked objects and saved to tracked_frames\
tracked_0561.jpg
Processed frame 562: tracked objects and saved to tracked_frames\
tracked_0562.jpg
Processed frame 563: tracked objects and saved to tracked_frames\
tracked_0563.jpg
Tracking completed. Processed 564 frames.
```

#Identify the regions that remain consistent over time (foreground vs. background segmentation).

```
import cv2
import os
```

Path to the video file

```
video_path = r"C:\Users\user\Downloads\1507868-
uhd_3840_2160_25fps.mp4"
```

Directories for saving foreground and background frames

```
output_dir_foreground = "foreground_frames"
output_dir_background = "background_frames"
```

Create directories if they don't exist

```
if not os.path.exists(output_dir_foreground):
    os.makedirs(output_dir_foreground)
if not os.path.exists(output_dir_background):
    os.makedirs(output_dir_background)
```

Create a background subtractor object

```
back_sub = cv2.createBackgroundSubtractorMOG2()
```

```

# Open the video file
cap = cv2.VideoCapture(video_path)

frame_count = 0

# Process each frame
while cap.isOpened():
    ret, frame = cap.read()

    if ret:
        # Apply the background subtractor to get the foreground mask
        fg_mask = back_sub.apply(frame)

        # Apply thresholding to the mask to binarize it
        _, fg_mask = cv2.threshold(fg_mask, 200, 255,
cv2.THRESH_BINARY)

        # Optionally apply morphological operations to remove noise
        kernel = cv2.getStructuringElement(cv2.MORPH_ELLIPSE, (5, 5))
        fg_mask = cv2.morphologyEx(fg_mask, cv2.MORPH_OPEN, kernel)
        fg_mask = cv2.morphologyEx(fg_mask, cv2.MORPH_CLOSE, kernel)

        # Save the foreground mask frame
        fg_mask_filename = os.path.join(output_dir_foreground,
f"foreground_{frame_count:04d}.jpg")
        cv2.imwrite(fg_mask_filename, fg_mask)

        # Save the original frame with mask overlay for visualization
        colored_foreground = cv2.bitwise_and(frame, frame,
mask=fg_mask)
        background_filename = os.path.join(output_dir_background,
f"background_{frame_count:04d}.jpg")
        cv2.imwrite(background_filename, colored_foreground)

        print(f"Processed frame {frame_count}: saved foreground mask
and background overlay.")

        frame_count += 1
    else:
        break

# Release the video capture object
cap.release()
print(f"Foreground-background segmentation completed. Processed
{frame_count} frames.")

```

```

Processed frame 0: saved foreground mask and background overlay.
Processed frame 1: saved foreground mask and background overlay.
Processed frame 2: saved foreground mask and background overlay.
Processed frame 3: saved foreground mask and background overlay.

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
Processed frame 544: saved foreground mask and background overlay.
Processed frame 545: saved foreground mask and background overlay.
Processed frame 546: saved foreground mask and background overlay.
Processed frame 547: saved foreground mask and background overlay.
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Processed frame 559: saved foreground mask and background overlay.
Processed frame 560: saved foreground mask and background overlay.
Processed frame 561: saved foreground mask and background overlay.
Processed frame 562: saved foreground mask and background overlay.
Processed frame 563: saved foreground mask and background overlay.
Foreground-background segmentation completed. Processed 564 frames.
```

#Scene Cut Detection:

#Use pixel-based comparison or histogram differences between consecutive frames to detect abrupt changes (hard cuts)

```
import cv2
```

```
import os
```

```
import numpy as np
```

Path to the video file

```
video_path = r"C:\Users\user\Downloads\1507868-  
uhd_3840_2160_25fps.mp4"
```

Directory to save frames with detected cuts

```
output_dir_cuts = "scene_cuts"
```

```
if not os.path.exists(output_dir_cuts):  
    os.makedirs(output_dir_cuts)
```

Open the video file

```
cap = cv2.VideoCapture(video_path)
```

Read the first frame

```
ret, prev_frame = cap.read()
```

Convert the first frame to HSV color space and calculate its histogram

```
prev_frame_hsv = cv2.cvtColor(prev_frame, cv2.COLOR_BGR2HSV)
```

```
prev_hist = cv2.calcHist([prev_frame_hsv], [0, 1], None, [16, 16], [0,  
180, 0, 256])
```

```
cv2.normalize(prev_hist, prev_hist)
```



```

frame_count = 1
cut_frames = []

# Process each frame
while True:
    ret, curr_frame = cap.read()

    if not ret:
        break

    # Convert current frame to HSV and calculate its histogram
    curr_frame_hsv = cv2.cvtColor(curr_frame, cv2.COLOR_BGR2HSV)
    curr_hist = cv2.calcHist([curr_frame_hsv], [0, 1], None, [16, 16],
[0, 180, 0, 256])
    cv2.normalize(curr_hist, curr_hist)

    # Compare histograms using correlation
    correlation = cv2.compareHist(prev_hist, curr_hist,
cv2.HISTCMP_CORREL)

    # If the correlation is below a certain threshold, it indicates a
scene cut
    threshold = 0.5 # Adjust this value based on your needs
    if correlation < threshold:
        print(f"Scene cut detected between frames {frame_count - 1}
and {frame_count}")
        cut_frames.append(frame_count)

        # Save the frame with detected cut
        cut_frame_path = os.path.join(output_dir_cuts,
f"cut_{frame_count:04d}.jpg")
        cv2.imwrite(cut_frame_path, curr_frame)

        # Update previous frame and histogram for the next iteration
        prev_frame_hsv = curr_frame_hsv
        prev_hist = curr_hist

        frame_count += 1

# Release the video capture object
cap.release()
print(f"Scene cut detection completed. Detected cuts at frames:
{cut_frames}.")

Scene cut detection completed. Detected cuts at frames: [].

#Detect gradual scene transitions (Soft cuts) by analyzing frame-to-
frame intensity changes over time.
import cv2
import os

```

```

import numpy as np

# Path to the video file
video_path = r"C:\Users\user\Downloads\1507868-uhd_3840_2160_25fps.mp4"

# Directory to save frames with detected transitions
output_dir_transitions = "soft_cuts"
if not os.path.exists(output_dir_transitions):
    os.makedirs(output_dir_transitions)

# Open the video file
cap = cv2.VideoCapture(video_path)

frame_count = 0
previous_frame_intensity = None
soft_cut_frames = []

# Process each frame
while True:
    ret, frame = cap.read()

    if not ret:
        break

    # Convert the frame to grayscale
    gray_frame = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

    # Calculate the average intensity of the frame
    avg_intensity = np.mean(gray_frame)

    # Detect gradual scene transitions by comparing with the previous frame's intensity
    if previous_frame_intensity is not None:
        intensity_diff = abs(avg_intensity - previous_frame_intensity)

        # Define a threshold for detecting soft cuts
        threshold = 10 # Adjust this value based on the content and frame rate
        if intensity_diff < threshold:
            print(f"Soft cut detected between frames {frame_count - 1} and {frame_count}")
            soft_cut_frames.append(frame_count)

            # Save the frame with detected transition
            transition_frame_path =
os.path.join(output_dir_transitions,
f"soft_cut_{frame_count:04d}.jpg")
            cv2.imwrite(transition_frame_path, frame)

```

```
# Update previous frame intensity for the next iteration
previous_frame_intensity = avg_intensity
frame_count += 1
```

```
# Release the video capture object
```

```
cap.release()
```

```
print(f"Soft cut detection completed. Detected transitions at frames:
{soft_cut_frames}.")
```

```
Soft cut detected between frames 0 and 1
Soft cut detected between frames 1 and 2
Soft cut detected between frames 2 and 3
Soft cut detected between frames 3 and 4
Soft cut detected between frames 4 and 5
Soft cut detected between frames 5 and 6
Soft cut detected between frames 6 and 7
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Soft cut detected between frames 562 and 563
Soft cut detection completed. Detected transitions at frames: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259,

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554, 555, 556, 557, 558, 559, 560, 561, 562, 563].
```

```
#Mark Scene Cuts:
```

```
#Highlight the frames where scene cuts are detected.
```

```
#Create a summary displaying the detected scene boundaries
```

```
import cv2
```

```
import os
```

```
import numpy as np
```

```
# Path to the video file
```

```
video_path = r"C:\Users\user\Downloads\1507868-  
uhd_3840_2160_25fps.mp4"
```

```
# Directory to save frames with detected cuts
```

```
output_dir_cuts = "marked_scene_cuts"
```

```
if not os.path.exists(output_dir_cuts):
```

```
    os.makedirs(output_dir_cuts)
```

```
# Open the video file
```

```
cap = cv2.VideoCapture(video_path)
```

```
# Read the first frame
```

```
ret, prev_frame = cap.read()
```

```
if not ret:
```

```
    print("Failed to read video.")
```

```
    cap.release()
```

```
    exit()
```

```
# Convert the first frame to HSV color space and calculate its
```

```

histogram
prev_frame_hsv = cv2.cvtColor(prev_frame, cv2.COLOR_BGR2HSV)
prev_hist = cv2.calcHist([prev_frame_hsv], [0, 1], None, [16, 16], [0,
180, 0, 256])
cv2.normalize(prev_hist, prev_hist)

frame_count = 1
cut_frames = []

# Process each frame
while True:
    ret, curr_frame = cap.read()

    if not ret:
        break

    # Convert current frame to HSV and calculate its histogram
    curr_frame_hsv = cv2.cvtColor(curr_frame, cv2.COLOR_BGR2HSV)
    curr_hist = cv2.calcHist([curr_frame_hsv], [0, 1], None, [16, 16],
[0, 180, 0, 256])
    cv2.normalize(curr_hist, curr_hist)

    # Compare histograms using correlation
    correlation = cv2.compareHist(prev_hist, curr_hist,
cv2.HISTCMP_CORREL)

    # If the correlation is below a certain threshold, it indicates a
scene cut
    threshold = 0.5 # Adjust this value based on your needs
    if correlation < threshold:
        print(f"Scene cut detected between frames {frame_count - 1}
and {frame_count}")
        cut_frames.append(frame_count)

    # Draw a rectangle or overlay text on the current frame to
mark the cut
    cv2.rectangle(curr_frame, (10, 10), (200, 50), (0, 0, 255), -
1) # Rectangle on the top left
    cv2.putText(curr_frame, "Scene Cut Detected", (15, 35),
cv2.FONT_HERSHEY_SIMPLEX, 0.7, (255, 255, 255), 2)

    # Update previous frame and histogram for the next iteration
    prev_frame_hsv = curr_frame_hsv
    prev_hist = curr_hist

    # Save the marked frame
    marked_frame_path = os.path.join(output_dir_cuts,
f"marked_{frame_count:04d}.jpg")
    cv2.imwrite(marked_frame_path, curr_frame)

```



```

        frame_count += 1

# Release the video capture object
cap.release()

# Create a summary report of detected scene cuts
summary_file_path = "scene_cut_summary.txt"
with open(summary_file_path, 'w') as summary_file:
    summary_file.write("Detected Scene Cuts:\n")
    summary_file.write("=====\n")
    for frame in cut_frames:
        summary_file.write(f"Scene cut at frame: {frame}\n")

print(f"Marked scene cuts detection completed. Detected cuts at
frames: {cut_frames}.")
print(f"Summary report saved to: {summary_file_path}.")

Marked scene cuts detection completed. Detected cuts at frames: [].
Summary report saved to: scene_cut_summary.txt.

#Result Visualization:
#Display frames where scene cuts are identified and show segmentation
results for selected frames.

import cv2
import os
import numpy as np

# Path to the video file
video_path = r"C:\Users\user\Downloads\1507868-
uhd_3840_2160_25fps.mp4"

# Directory to save frames with detected cuts
output_dir_cuts = "marked_scene_cuts"
if not os.path.exists(output_dir_cuts):
    os.makedirs(output_dir_cuts)

# Open the video file
cap = cv2.VideoCapture(video_path)

# Check if the video opened successfully
if not cap.isOpened():
    print("Error opening video file.")
    exit()

# Read the first frame and initialize variables
ret, prev_frame = cap.read()
if not ret:
    print("Failed to read video.")
    cap.release()
    exit()

```

```

prev_frame_hsv = cv2.cvtColor(prev_frame, cv2.COLOR_BGR2HSV)
prev_hist = cv2.calcHist([prev_frame_hsv], [0, 1], None, [16, 16], [0,
180, 0, 256])
cv2.normalize(prev_hist, prev_hist)

frame_count = 1
cut_frames = []

# Process each frame
while True:
    ret, curr_frame = cap.read()
    if not ret:
        break

    # Convert current frame to HSV and calculate its histogram
    curr_frame_hsv = cv2.cvtColor(curr_frame, cv2.COLOR_BGR2HSV)
    curr_hist = cv2.calcHist([curr_frame_hsv], [0, 1], None, [16, 16],
[0, 180, 0, 256])
    cv2.normalize(curr_hist, curr_hist)

    # Compare histograms using correlation
    correlation = cv2.compareHist(prev_hist, curr_hist,
cv2.HISTCMP_CORREL)

    # If the correlation is below a certain threshold, it indicates a
scene cut
    threshold = 0.5 # Adjust this value based on your needs
    if correlation < threshold:
        print(f"Scene cut detected at frame {frame_count}")
        cut_frames.append(frame_count)

    # Draw a rectangle or overlay text on the current frame to
mark the cut
    cv2.rectangle(curr_frame, (10, 10), (200, 50), (0, 0, 255), -
1) # Rectangle on the top left
    cv2.putText(curr_frame, "Scene Cut Detected", (15, 35),
cv2.FONT_HERSHEY_SIMPLEX, 0.7, (255, 255, 255), 2)

    # Perform segmentation on the marked frame (example: color
thresholding)
    # Here, we'll apply a simple color threshold to extract the
red color
    lower_red = np.array([0, 100, 100])
    upper_red = np.array([10, 255, 255])
    mask = cv2.inRange(curr_frame_hsv, lower_red, upper_red)

    # Bitwise-AND mask and original image to get the segmented
result
    segmented_result = cv2.bitwise_and(curr_frame, curr_frame,

```

```

mask=mask)

    # Display the marked frame and segmented result
    cv2.imshow(f"Marked Frame {frame_count}", curr_frame)
    cv2.imshow(f"Segmented Result for Frame {frame_count}",
segmented_result)

    # Save marked frame to disk
    marked_frame_path = os.path.join(output_dir_cuts,
f"marked_{frame_count:04d}.jpg")
    cv2.imwrite(marked_frame_path, curr_frame)

    # Update previous frame and histogram for the next iteration
    prev_frame_hsv = curr_frame_hsv
    prev_hist = curr_hist
    frame_count += 1

# Release the video capture object
cap.release()

# Create a summary report of detected scene cuts
summary_file_path = "scene_cut_summary.txt"
with open(summary_file_path, 'w') as summary_file:
    summary_file.write("Detected Scene Cuts:\n")
    summary_file.write("=====\n")
    for frame in cut_frames:
        summary_file.write(f"Scene cut at frame: {frame}\n")

print(f"Marked scene cuts detection completed. Detected cuts at
frames: {cut_frames}.")
print(f"Summary report saved to: {summary_file_path}.")

# Wait for a key press before closing the windows
cv2.waitKey(0)
cv2.destroyAllWindows()

Marked scene cuts detection completed. Detected cuts at frames: [].
Summary report saved to: scene_cut_summary.txt.

```