Assignment 2 IVA

Lab Task 1: Setup and Basic Extraction

Objective:

Install the necessary tools and libraries, and extract frame information from a video.

Steps:

1. **Install ffmpeg and ffmpeg-python**:
    - Install the ffmpeg tool and the ffmpeg-python library.
2. **Extract Frame Information**:
    - Extract frame information from a sample video.

Lab Task 2: Frame Type Analysis

Objective:

Analyze the extracted frame information to understand the distribution of I, P, and B frames in a video.

Steps:

1. **Modify the Script**:
    - Count the number of I, P, and B frames.
    - Calculate the percentage of each frame type in the video.
2. **Analyze Frame Distribution**:
    - Plot the distribution of frame types using a library like matplotlib.
    - Plot a pie chart or bar graph showing the distribution of frame types using matplotlib.

Lab Task 3: Visualizing Frames

Objective:

Extract actual frames from the video and display them using Python.

Steps:

1. **Extract Frames**:
    - Use ffmpeg to extract individual I, P, and B frames from the video.
    - Save these frames as image files.
2. **Display Frames**:
    - Use a library like PIL (Pillow) or opencv-python to display the extracted frames.

Tasks:

1. Save I, P, and B frames as separate image files using ffmpeg.
2. Use PIL or opencv-python to load and display these frames in a Python script.
3. Compare the visual quality of I, P, and B frames.

Lab Task 4: Frame Compression Analysis

Objective:

Analyze the compression efficiency of I, P, and B frames.

Steps:

1. **Calculate Frame Sizes**:
    - Calculate the file sizes of extracted I, P, and B frames.
    - Compare the average file sizes of each frame type.
2. **Compression Efficiency**:
    - Discuss the role of each frame type in video compression.
    - Analyze why P and B frames are generally smaller than I frames.

Lab Task 5: Advanced Frame Extraction

Objective:

Extract frames from a video and reconstruct a part of the video using only I frames.

Steps:

1. **Extract and Save I Frames**:
    - Extract I frames from the video and save them as separate image files.
2. **Reconstruct Video**:
    - Use the extracted I frames to reconstruct a portion of the video.
    - Create a new video using these I frames with a reduced frame rate.