



UNIVERSITY AT ALBANY

State University of New York

DEPARTMENT OF COMPUTER SCIENCE

ICSI-533/433 Theory and Practice of Multimedia Computing – Fall 2019

Homework 2

Due date: October 27, 2019, 11:59 p.m.

Total marks: 15

Objective

The purpose of this assignment is to solidify the concepts related to video compression, image retrieval and video summarization that were discussed in class.

Description

This assignment has two computing problems. You are free to use any programming tool and/or environment (e.g. Java, VC++, Matlab, Python) as long as I can evaluate your submission.

Problems

1. You are given two images that belong to a video shot. You are required to write a program for computing the Motion Estimation between the two frames by picking a macroblock from the reference frame and estimating its position in the target frame. You are free to choose any part of the reference frame (which contains a set of macroblocks) for your program that you think is trackable in the target frame. You need to highlight your chosen part in the reference and the target frames using a bounding box (programmatically). You may use any of the search algorithms discussed in class.

[5 marks for ICSI533, 8 marks for ICSI433]

2. You are given three images (see the data set section). You are required to write a program to compute the color histogram similarity (or distance) measure using at least two distance metrics between each pair of images and present the results in a tabular form as shown below.

| | Image 1 | Image 2 | Image 3 |
|---------|---------|---------|---------|
| Image 1 | | | |
| Image 2 | | | |
| Image 3 | | | |

Present your findings and observations.

[5 marks for ICSI533, 7 marks for ICSI433]

3. **[This question is only for ICSI533]** A video shot is a continuous recording of one or more video frames describing a contiguous action in time and space. You are required to write a program that reads the input video and outputs its key frames. To extract key frames, you may use any method that was discussed in class. The key frame of a video shot is the frame which is sufficiently different from its subsequent frames. Then, compare the size of the video containing only the key frames with the original video.

You may use any freely available software to decode the video into a sequence of frames and then input this sequence of frames to your program (or you can use Matlab).

[5 marks]

Data Set

For Que 1: Two video frames (reference.jpg and target.jpg):

Dataset_Q1.zip

For Que 2: Three image files (Image1: car_black.jpg, Image2: car_red.jpg, and Image3: car_white.jpg):

Dataset_Q2.zip

For Que 3: One video file (PKA.mp4):

Dataset_Q3.zip

Submission

You must submit the following via UAlbany Blackboard:

- 1) Source code files along with the instructions to run it.
- 2) Source code typed in a pdf or word file.
- 3) A pdf file containing answers to the problems and the output images as mentioned above.
- 4) A video (of max 5 min) that shows the working of your programs.