CSE 515 Multimedia and Web Databases

Phase #1

(Due Sept 13, 2016, midnight)

Description: In this project, you will experiment with

- video features.

This project phase will be performed by each group member; but, you will get group grades.

- Download the sample video files from the project directory. For the following tasks, you can use the VideoReader library:
  - http://mathworks.com/help/matlab/ref/videoreader.html

  All tasks will be performed in the "Y" (i.e., grayscale color channel).
- **Task 1:** Implement a program which creates *video color histograms*: Given a directory, dir, resolution, r, a color histogram size, n, and an output file name, out_file.

  1. for each video file, $v_i \in dir$, in the given directory, the program
     (a) divides each video frame into $r \times r$ cells,
     (b) for cell c_l of frame f_j of the video file v_i
        i. creates an n-bin color histogram, $h_{i,j,l}$ and
        ii. outputs
        $$\langle i; j; l; h_{i,j,l} \rangle$$
        into the output file, $out\_file.chst$, in an human-readable format.

  You can use MatLab's `imhist(I,n)` function for this purpose; see
  - http://mathworks.com/help/images/index.html
  - http://mathworks.com/help/images/ref/imhist.html
- **Task 2:** Implement a program which extracts *SIFT vectors*: Given a directory, dir, an output file name, out_file.

  1. for each video file, $v_i \in dir$, in the given directory, the program
     (a) divides each video frame into $r \times r$ cells,
     (b) for cell c_l of frame f_j of the video file v_i
        i. extracts and outputs
        $$\langle i; j; l; sift\_vector_{i,j,l,k} \rangle$$
        into the output file, $out\_file.sift$, in an human-readable format. Note that each sift vector is of the form
        $$[x, y, scale, orientation, a_1, \ldots, a_{128}].$$

See

- the supporting instructions we will provide
- http://www.cs.ubc.ca/∼lowe/keypoints/

for SIFT feature extraction.

- **Task 3:** Implement a program which extracts *motion vectors*: Given a directory, dir, an output file name, out_file.

  1. for each video file, $v_i \in dir$, in the given directory, the program
     (a) divides each video frame into $r \times r$ cells,
     (b) for cell c_l of frame f_j of the video file v_i
        i. extracts and outputs

$$\langle i; j; l; motion\_vector_{i,j,l,k} \rangle$$

into the output file, $out\_file.mvect$, in an human-readable format. Note that each motion vector is of the form

$$[source, w, h, src_x, src_y, dst_x, dst_y],$$

where

- $source$: negative value when it comes from the past, positive value when it comes from the future;
- w: width of the block
- h: height of the block
- src_x: absolute source position, x
- src_y: absolute source position, y
- dst_x: absolute destination position, x
- dst_y: absolute source position, y

See

- the supporting instructions we will provide
- https://www.ffmpeg.org/doxygen/2.5/structAVMotionVector.html

for motion feature extraction from compressed video files.

Deliverables:

- Your code (properly commented) and a README file.
- Your outputs for the provided sample inputs.
- A report describing your work and the results.

Please place your code in a directory titled "Code", the outputs to a directory called "Outputs", and your report in a directory called "Report"; zip or tar all off them together and submit it through the digital dropbox.