Multimedia Analysis and Indexing – Fall 2008

HW#1 (DUE: noon, Tuesday, Oct. 7, 2008)

Note:
1) If you have any questions regarding the homework, send e-mail to the TA at ktchen@cmlab.csie.ntu.edu.tw
2) Submit a soft copy of your write-up (in PDF) and programs to TA **before the due**.
3) Videos and dumped frames are available at the course website.
4) You are highly encouraged to write the homework in English.
5) Please DO write appropriate comments along with your codes.

a)
Various shot boundary detection algorithms have been described in the lecture. Several survey papers are available at the class website. Please read at least one of the papers (or other relevant publications) and then choose one algorithm that you will use in the following experiments.

Please write a brief summary (no more than 2 pages) of the algorithm you choose and explain the reason of your specific choice and also mention the paper you refer to. The reason could be the simplicity of the algorithm, its flexibility, or the matching with the test video data provided in this homework, etc.

b)
Please review the following eight homework videos and fill in the possible transition types you observed.

#	Genre	Transition Types	Frame Counts	Average Shot Length (Frame)
01	News	Cut	828	
02	Anime	Cut	549	
03	Trailer		813	
04	Movie		471	
05	MV		421	
06	Ad		731	
07	Movie		964	
08	Sport		981	

Pick up **01.mpg & 02.mpg** and take a look at them. You can see that each video is composed of several different shots, which are mostly separated by abrupt changes in the frame content. Write a program "shot_detect," to detect the boundaries between the shots for this sequence. You can write the program in the language of your choice. Compare

the results in three different color spaces: RGB, HSV, and YIQ, by plotting the consecutive frame difference figures. Which color space is better? Why?

c)
Pick up **02.mpg & 03.mpg** and take a look at them. Apply your "shot_detect," program to these sequences in any color space you preferred in the previous problem. Does it work well in detecting the kind of transitions in the videos? Modify your algorithms to detect the shot boundaries in the new sequence.

d)
Does your "shot_detect" program work well on the remaining videos? Could you apply the same decision thresholds on them, if applicable? Are the thresholds genre-independent or dependent? Why?

e)
Please measure the average shot length (in frame) for all videos by your algorithm and fill in the previous table. According to your observation, is shot length genre-independent or dependent?

f)
Extra points – Generally, we need to locate a "representative" frame for each video as having a large-scale video collection (e.g., YouTube). According to your observation, how to and what to choose as the representative frames for the videos. Are there any strategies or methodologies? (For example, simply take the middle or first frame, or adopt other informative measurements, etc.) Please describe or (experiment if you like to).