**CM0669 Machine Learning and Computer Vision**

**Lab 6** Introduction to Computer vision, image and video representation

**1. Compression ratio - Pictures and videos**

Open up Matlab and Type in ‘help imread’ and ‘help imwrite’. A helpful description will be given on the built-in functions ‘imread’ and ‘imwrite’ for reading and saving digital pictures. The built-in function ‘imshow’ can be used to display an image.

1. Download the pictures on Blackboard and the Matlab code ‘read\_display\_picture.m’ (default file is image1.jpg’) in a folder Week6. Execute the Matlab code on the other pictures and calculate the compression ratio for each image.

Note: on-line converter to BMP

<http://image.online-convert.com/convert-to-bmp>

<http://www.pictureresize.org/online-images-converter.html>

**For ‘image1.jpg’:**

Uncompressed size: 592 × 896 ×3/1024 = 1554 KB

Compressed size: 142 KB

Compression ratio: 142/1554 = 0.0914

**For ‘image2.jpg’:**

Uncompressed size: 504 × 756 ×3/1024 = 1116 KB

Compressed size: 293 KB

Compression ratio: 293/1116 = 0.2625

**For ‘image3.jpg’:**

Uncompressed size: 512 × 512 ×3/1024 = 768 KB

Compressed size: 92.1 KB

Compression ratio: 92.1/768 = 0.1199

**For ‘image4.pgm’:**

Uncompressed size: 512 × 512 ×1/1024 = 256 KB

Compressed size: 256 KB

Compression ratio: 256/256 = 1 (this means there is no compression in ‘pgm’ format)

1. Download the test videos and the other files in the same folder (Week6). The Matlab code ‘read\_play\_video.m’ reads a video (default ‘video1.mpeg’) and plays the sequence of frames at the corresponding frame rate. Ensure you unzip and add subfolders ‘mmread’ and ‘mmwrite’ in the current directory by using the Matlab command ‘pathtool’. Calculate the compression ratio for each video.
2. **For ‘video1.mpeg’:**
3. Uncompressed size: 144 × 176 × 331× 3/1024 = 24577 KB
4. Compressed size: 526 KB
5. Compression ratio: 526/24577 = 0.0214
6. **For ‘video2.mpeg’:**
7. Uncompressed size: 144 × 176 ×331× 3/1024 = 24577 KB
8. Compressed size: 1.02 × 1024=1044.5 KB
9. Compression ratio: 1044/24577 = 0.0425

**2. Image and video Manipulation**

1. Amend the previous Matlab code ‘read\_display\_picture.m’ to display and save the following for Image3.jpg:
2. Red component image (save it as Image3\_Red.jpg)
3. Green component image (save it as Image3\_Green.jpg)
4. Blue component image (save it as Image3\_Blue.jpg)
5. Red and Green component image (save it as Image3\_Red\_Green.jpg)
6. Red and Blue component image (save it as Image3\_Red\_Blue.jpg)
7. Green and Blue component image (save it as Image3\_Green\_Blue.jpg)

Interpret the results.

The modified code in uploaded on Blackboard. Although the original image contains all primary colours, only the combined colours are visually shown on the displayed images. Observe that the size of the saved pictures is smaller compared to the original one because these images contain less information (one or two planes are set to zero).

1. Amend the previous Matlab code ‘read\_display\_video.m’ to get a processed version of ‘Video1.mpeg’ as follows.
2. Red component video (save it as Video1\_Red.avi)
3. Green component video (save it as Video1\_Green.avi)
4. Blue component video (save it as Video1\_Blue.avi)
5. Red and Green component video (save it as Video1\_Red\_Green.avi)
6. Red and Blue component video (save it as Video1\_Red\_Blue.avi)
7. Green and Blue component video (save it as Video1\_Green\_Blue.avi)

Interpret the results.

**Hints**: use ‘mmwrite.m’ to save the processed videos.

The modified code in uploaded on Blackboard. Although the original video contains all primary colours, only the combined colours are visually shown on the played videos. Observe that the size of the saved videos is smaller compared to the original one because these videos contain less information (one or two planes are set to zero).

1. You are provided with a Matlab programme (Insert\_logo\_Picture.m) which inserts a logo (picture ‘logo.jpg’) at the top left side of a picture (default Image1.jpg). Write another Matlab programme which inserts the same logo into a one of the original MPEG videos (Video1.mpeg or Video2.mpeg). Ensure you include a code to play the video and then save it as an AVI file.

The programme has been uploaded on Blackboard.