FROM VIDEO TO SUPER-RESOLUTION PICTURES (BZ2-12)

Prof. Bing ZENG

AU Ho Chuen (10462397)
Chan Kam Fai (10463626)
Wong Wing Yin (10040864)

OVERVIEW
This project is to reconstruct a better quality image by utilizing multi frames in the videos. It is possible to build a Super Resolution (SR) from several low resolutions (LR) images if sub-pixel movement exists.

Traditional single frame enlargement cannot be defined as super resolution since it cannot recover the high frequency component in the image. The multi frames resolution algorithms provide possibility to retrieve the lost data.

AIMS AND OBJECTIVES
The aim of the project is to produce a program that is able to perform super-resolution reconstruction with a compressed video input. A resolution enhanced image will be generated. This application assists in a number of applications for example the medical field and assistance with security and police investigations.

METHODOLOGY
Nonuniform Interpolation Approach
It is the most intuitive method for SR reconstruction. The objective is to find new pixel value that nonuniformly spread around the LR grid.

Motion Estimation
Motion estimation is the key to extract new pixel data from the reference frames. Block matching algorithm is implemented.

Six Tap Filter
Six Tap Filter is part of technology applied in H.264 for calculate sub-pixel value.

Observability Map
Not all data gathered from the motion estimation are good enough to be used in reconstruction. A systematic algorithm is needed to define what pixel value is acceptable.

Bilateral Filter
A bilateral filter is an edge-preserving and noise reducing smoothing filter. It helps to cancel the artificial effect after super resolution reconstruct.

RESULT
To test our proposed algorithm, the whole video is down-sampled by a predefined scale. Build the SR image by using traditional method and out approach. Then compare with the original image.

CONCLUSION
By software algorithms, it is possible to reconstruct and recover a low quality using several reference frames. This helps the image quality to break through the limitation of manufactory of high density optical sensor.