視訊通訊 **final project – Motion Interpolation**

資工三 B04902021 陳弘梵 B04902086 呂英弘

1. Problem Definition

   Implement “Motion Interpolation”:

   (1) Add new frames between old ones so as to double the frame rate.

   (2) Code working on CIF, QCIF files and written in python.

2. Algorithm

Assumption:

Any motion between two consecutive original frames is rectilinear and uniform.

Linear motion compensated interpolation

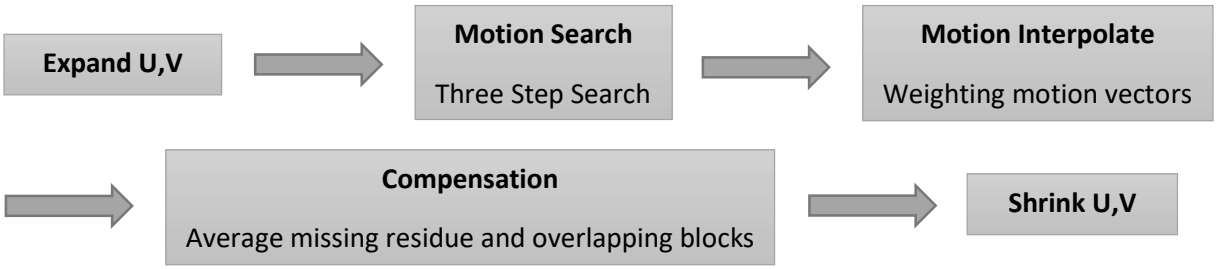
$$MAD(i,j)=\left(\frac{1}{N*N}\right)*\left[\sum_{x=0}^{N-1}\sum_{y=0}^{N-1}\left|f_{k-1}(x,y)-f_{k+1}(x+i,y+j)\right|\right]$$

$$V\left(MV_x, MV_y\right)=\arg\min\left\{MAD\left(i,j\right)\right\}$$

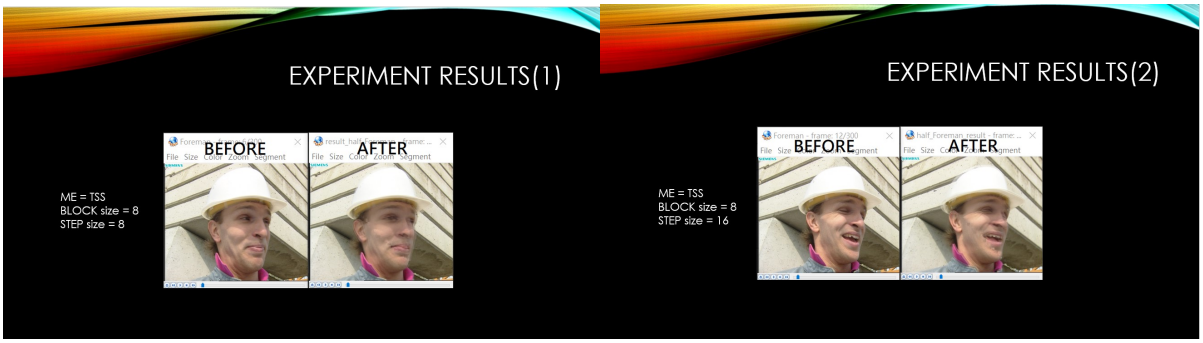
$$f_k(x,y)=\frac{1}{2}\left\{f_{k-1}(x,y)+\left[f_{k+1}\left(x-\frac{MVx}{2}, y-\frac{MVy}{2}\right)\right]\right\}$$

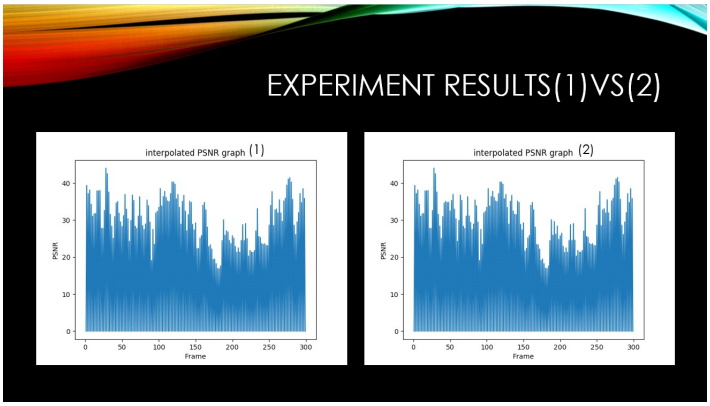
f_k is the interpolating frame. $MV_{x,y}$ is the vector between f_{k-1} and f_{k+1}.

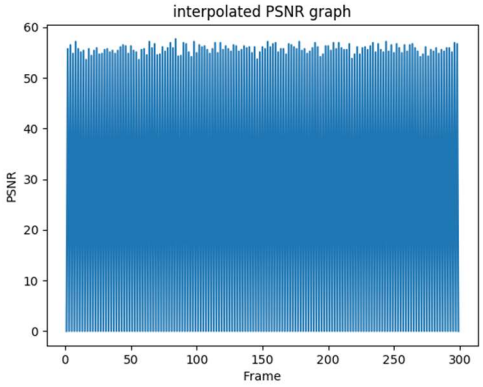
Flow Chart:



3. Experiment Results







4. Discussions
   (1) Limitations of generating unknown part
   (2) Referencing more frames to confirm accurate vectors
   (3) A useful algorithm of motion search considered
   (4) No machine learning :
      -> each video can be interpolated fast
      -> Still owns its mediate accuracy PSNR
      -> Can implement and test on different sets of videos without model