

Question 1: Image Extraction at Best Quality

Qn.1A, if you used the supplied replay software:

please save and submit your results using the filename:
'Q1A_ReplayDescribed_YOURINITIALS' or

Please specify (i) the investigation method used to a) examine the video sequence and b) extract and examine the frame, and (ii) all steps executed. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

Qn.1A, if you used another method:

Please save and submit your results using the filename:
'Q1A_OtherMethod_YOURINITIALS'

Please specify (i) the investigation method used to a) examine the video sequence and b) extract and examine the frame, (ii) all tools used, and (iii) all steps executed. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

Answer: We determined that the codec for the .drv file is H264 and we used FFMPEG with `ffmpeg -f h264 -i [000001].drv -vcodec bmp [000001].avi`

To decode the .drv sequence to obtain the entire uncompressed decoded .avi file. We provide this entire raw encoded. The first frame was extracted by using the proprietary Cognitech Video Investigator's frame accurate lossless Video Player.

Qn.1B, if you used the supplied replay software:

Please save and submit your results using the file name:
'Q1B_ReplayDescribed_YOURINITIALS'

Please specify (i) the investigation method used to a) examine the video sequence and b) extract and examine the frame, and (ii) all steps executed. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

Use any space you need

Qn.1B, if you used another method:

Please save and submit your results using the filename
'Q1B_OtherMethod_YOURINITIALS'

Please specify (i) the investigation method used to a) examine the video sequence and b) extract and examine the frame, (ii) all tools used, and (iii) all steps executed. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

We determined that the raw content for the provided PAR file is concatenated JPEG/JFIF files. Time stamp of every frame is written as char string in comment part (start tag is 0xFF 0xFE) of JFIF header. We therefore extracted every single raw frame using a Cognitech proprietary PARExtract Tool. Each frame was saved with a time code inserted into the frame filename. We provide three frames corresponding to the raw encoded frames at the timecode requested by S-FIVE, and immediate preceding and the immediate following time frame.

Qn.1C

Frame Size of source file recording used in Qn.1A				Frame Size of source file recording used in Qn.1B			
720	x	288	pixels	720	x	288	pixels

What are your conclusions about the raw, encoded quality of the provided video frame/sequence in Q1A and Q1B?

Q1A exhibits typical MPEG/H264 blocking artifacts due to an average 28:1 compression ratio. The dynamic range is a full 0-255.

Q1B exhibits typical JPEG blocking artifacts due to approximate 33:1 compression ratio. The dynamic range is roughly half of the 0-255 gray scale.

Question 2: Super-Resolution from supplied sequence of 249 .bmp files

Qn.2A

Please select your best result, i.e.: a single best quality super-resolution image:

Please save and submit your results using filename: "Q2A_SuperRes_YOURINITIALS"

1. How have you ingested the material into your enhancement system and super-resolution software tools?

Please detail all steps of any conversion performed including all software tools and settings used. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

The 249 .bmp files are read by the Cognitech Video Investigator as an uncompressed video sequence with 249 frames.

2. Please specify all software tools and all Enhancement Filters used (in order) and specific parameter settings; e.g. Super-Resolution Filter (Method? Zoom factor? Number of Iterations? Interpolation?.....)

The Cognitech Video Investigator Frame Fusion Reconstruction Tool is used to Fuse/Superresolve the 249 frames using the subpixel accurate proprietary US Patented algorithm (see e.g. US patent US 6,452,637 B1)

3. Did you select a "region of interest" for directing the super-resolution tool? If so please specify co-ordinates of the region (if used) in the format given by the tool.

The entire frame was used.

4. Did you select any specific frames or image? If so, please provide details of range of frames or specific frames you used.

All 249 frames were used.

5. Please provide any other information that would be needed so that others would be able to repeat and reproduce your work.

See US patent US 6,452,637 B1 for the algorithm specifications.

Qn.2B

Please select your best result, i.e.: a single best quality super-resolution image:

Please save and submit your results using filename: "Q2B_SuperRes_YOURINITIALS"

1. How have you ingested the material into your enhancement system and super-resolution software tools?

Please detail all steps of any conversion performed including all software tools and settings used. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

Cognitech Video Investigator's frame accurate lossless Video Player. The Cognitech Video Investigator Frame Fusion Reconstruction Tool is used to Fuse/Superresolve the 1250 frames exported into .avi by the provided Player.exe using the subpixel accurate proprietary US Patented algorithm (see e.g. US patent US 6,452,637 B1)

2. Which of the 5 number plates have you concentrated your efforts on (1=closest number plate, ..., 5=most distant) and how did you decide on selecting this number plate?

All plates were reconstructed.

3. Please specify all software tools and all enhancement filters used (in order) and specific parameter settings; e.g. Super-Resolution Filter (Method? Zoom factor? Number of Iterations? Interpolation?.....)

See above.

4. Did you select a "region of interest" for directing the super-resolution tool? If so please specify co-ordinates of the region (if used) in the format given by the tool.

Region has been processed with the following diagonal (X, Y) coordinate pairs (Upper-Left), (Lower-Right)
(158,81) (225,243)

5. Did you select any specific frames or image? If so, please provide details of range of frames or specific frames you used.

All frames were used.

6. Please provide any other information that would be needed so that others would be able to repeat and reproduce your work.

see e.g. US patent US 6,452,637 B1

Qn2B. (continued): optional:

As indicated on the Collaborative Exercise webpage you may choose to submit multiple results. If this is the case then please specify how you obtained your results by replicating the previous 6 points for each Procedure/toolset used and/or each possible license plate you focussed on.

For example:

Please save and submit your results using filename:

'Q2B_SuperRes_Procedure1_PlateAll_YOURINITIALS' to indicate the best enhancement result you obtained for all plates using the Procedure1 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.

and/or

Please save and submit your results using filename:

File name: 'Q2B_SuperRes_Procedure2_Plate1_YOURINITIALS' to indicate the best enhancement result you obtained for Plate 1 using the Procedure2 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.

and/or

Please save and submit your results using filename:

File name: 'Q2B_SuperRes_Procedure2_Plate2_YOURINITIALS' to indicate the best enhancement result you obtained for Plate 2 using the Procedure2 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.

etc.

Qn.2C (optional)

Please select your best result, i.e.: a single best quality super-resolution image:
please save and submit your results using filename: "Q2C_SuperRes_YOURINITIALS"

1. How have you ingested the material into your enhancement system and super-resolution software tools?
Please detail all steps of any conversion performed including all software tools and settings used. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

See 2B

2. Which of the 5 number plates have you concentrated your efforts on (1=closest number plate, ..., 5=most distant) and how did you decide on selecting this number plate?

See 2B

3. Please specify all software tools and all enhancement filters used (in order) and specific parameter settings; e.g. Super-Resolution Filter (Method? Zoom factor? Number of Iterations? Interpolation?.....)

See 2B

4. Did you select a "region of interest" for directing the super-resolution tool? If so please specify co-ordinates of the region (if used) in the format given by the tool.

Yes

5. Did you select any specific frames or image? If so, please provide details of range of frames or specific frames you used.

See 2B

6. Please provide any other information that would be needed so that others would be able to repeat and reproduce your work.

See 2B

Qn2C. (continued): optional:

As indicated on the Collaborative Exercise webpage you may choose to submit multiple results. If this is the case then please specify how you obtained your results by replicating the previous 6 points for each Procedure/toolset used and/or each possible license plate you focussed on.

For example:

Please save and submit your results using filename:

'Q2C_SuperRes_Procedure1_PlateAll_YOURINITIALS' to indicate the best enhancement result you obtained for all plates using the Procedure1 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.

and/or

Please save and submit your results using filename:

File name: 'Q2C_SuperRes_Procedure2_Plate1_YOURINITIALS' to indicate the best enhancement result you obtained for Plate 1 using the Procedure2 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.

and/or

Please save and submit your results using filename:

File name: 'Q2C_SuperRes_Procedure2_Plate2_YOURINITIALS' to indicate the best enhancement result you obtained for Plate 2 using the Procedure2 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.

etc.

Question 3: Focal deblur test

Please specify (i) all software tools or processing steps, (ii) all enhancement filters used (in order) and (iii) all specific parameter settings. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

(i) Cognitech Video Investigator (CVI)

(ii) CVI : Proprietary Adaptive Kernel Deblur Plug-in, Proprietary Custom Kernel and Standard Kernel Total Variation Deblur Plug-in, Proprietary Custom Kernel and Standard Kernel Wiener Filter Plug-in

(iii) The results can be reproduced independently only by using the Cognitech Video Investigator proprietary software with the Cognitech proprietary patented algorithms. We can provide the parameter sets as well as the custom kernels computed and used by CVI. Some of Cognitech deblurring algorithm are based on a proprietary non-linear space-variant kernel estimation, which means that each point in the image has its own deblurring parameters and its own deblurring kernel. Hence it is not possible to list such data.

A single processed image provides all the given-processed charts
The viewers are to make their own character recognition decisions.

125 cm chart:

Please save and submit your results using filename: 'Q3_125cm_YOURINITIALS' or 'Q3_125cm_LineNUMBER_YOURINITIALS'

75 cm, 4th line:

Please save and submit your results using filename: 'Q3_75cm_Line4_YOURINITIALS'

E,A,B,S

75 cm, 5th line:

Please save and submit your results using filename: 'Q3_75cm_Line5_YOURINITIALS'

The viewers are to make their own character recognition decisions.

any other results: optional:

Please save and submit your results using filenames: 'Q3_DISTANCEcm_LineNUMBER_YOURINITIALS'

Use any space you need

Question 4: Motion deblur test

Qn.4A:

Please specify (i) all software tools or processing steps, (ii) all enhancement filters used (in order) and (iii) all specific parameter settings. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

If you wish to provide results for different regions of interest in the image, please specify their coordinates and/or indicate the region in a small thumbnail, and use the filenames: "Q4A_RegionNUMBER_YOURINITIALS".

Region NUMBER: coordinates and/or thumbnail:

- (i) Cognitech Video Investigator (CVI)
- (ii) CVI Space-Variant Adaptive Motion Kernel Deblur Plug-in
- (iii) Each image point has its individual estimated motion kernel

Qn.4B:

Please specify (i) all software tools or processing steps, (ii) all enhancement filters used (in order) and (iii) all specific parameter settings. The information you provide should have sufficient detail so that anyone could independently reproduce your results.

If you wish to provide results for different regions of interest in the image, please specify their coordinates and/or indicate the region in a small thumbnail, and use the filenames: "Q4A_RegionNUMBER_YOURINITIALS".

Region NUMBER: coordinates and/or thumbnail:

Four separate regions have been processed with the following diagonal (X, Y) coordinate pairs (Upper-Left, Lower-Right)

Region 1: (175,773) (1446,1208)

Region 2: (182,1209) (1440,1564)

Region 3: (1441,1186) (2088,1857)

Region 4: (1744,619) (2591,1182)

- (i) Cognitech Video Investigator (CVI)
- (ii) CVI Adaptive Motion Kernel Deblur Plug-in
- (iii) Each region has its individual curvilinear non-uniform estimated motion kernel

Do you have any comments with respect to this Exercise?

DROPBOX INFO

The S-FIVE project is a project funded by the *Prevention of and Fight against Crime Programme*; *European Commission - Directorate-General Home Affairs*, through the European Network of Forensic Science Institutes (ENFSI) Monopoly 2011 programme "Improving Forensic Methodologies across Europe" (IFMAE).