

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.

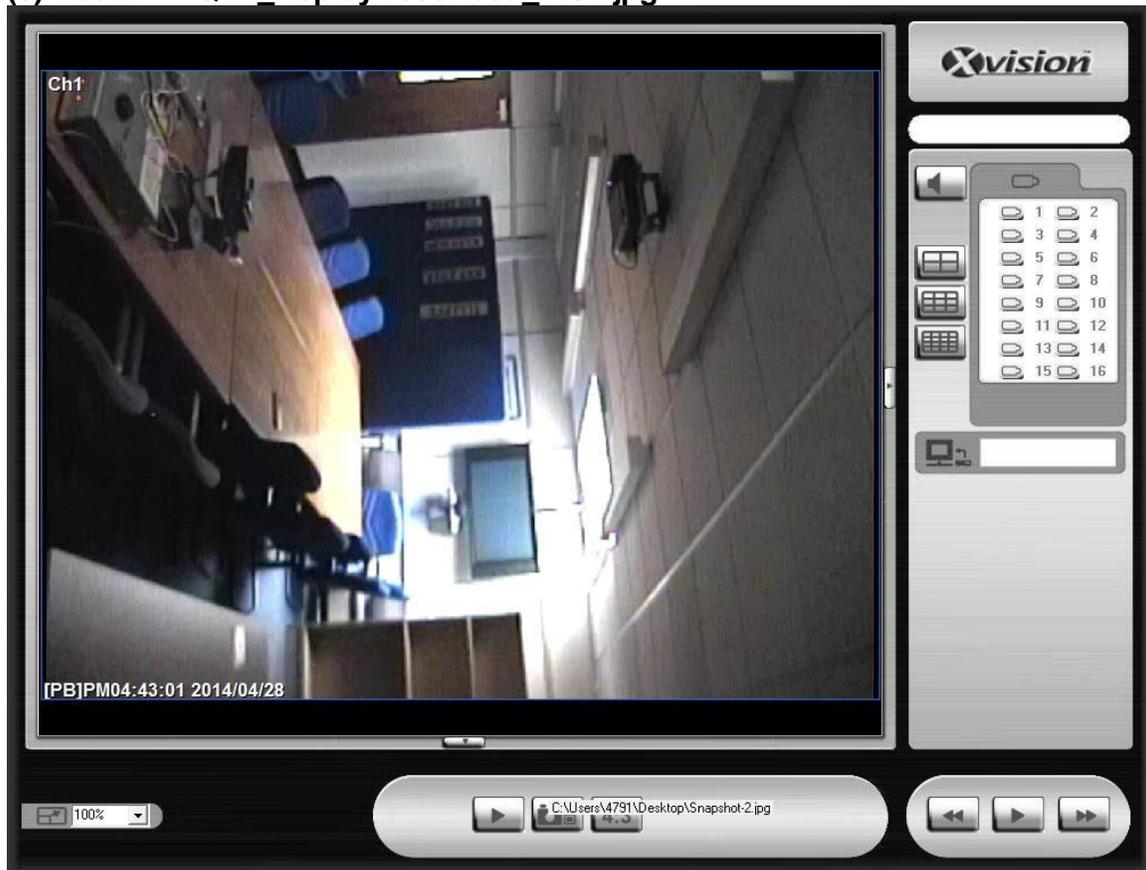
(1) Run “DVR_Player” supplied replay software and load the video sequence,

(2) enable “4:3”,

(3) choose the 1st frame,

(4) press “snapshot”,

(5) Result – “Q1A_ReplayDescribed_ID07.jpg” :



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.

(1) Run “NetVu ObserVer” supplied replay software and load the video sequence,

(2) go to the first frame,

(3) right click,

(4) “save” as “JPEG file”,

(5) Result – “Q1B_ReplayDescribed_ID07.jpg”

DS2 1:Camera 1 Apr 28, 2014 4:43:30 PM GMT



Qn.1C

Frame Size of source file recording used in Qn.1A

1008 x **767** pixels

Frame Size of source file recording used in Qn.1B

720 x **594** pixels

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

Q1A: Because the first video frame / sequence is brighter and the number of pixels that compose it is bigger, we have a better result with a sharper image.

Q1B: There is a lot of information loss.

**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.

(1) Run “Amped FIVE”,

(2) load,

(3) sequence loader (load all 249 frames),

(4) Deblocking (Strength: 0,500 / Size: 99 / Threshold: 0) → Apply,

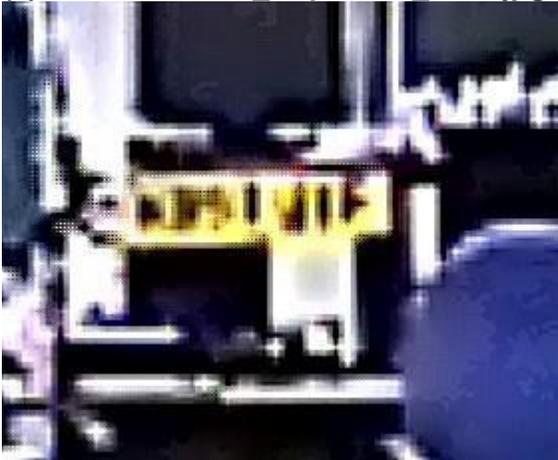
(5) Resize (Width: 144 / Height: 120 / Zoom: 3) → Apply,

(6) Super Resolution (Zoom: 2 / Iterations :10) → Apply,

(7) Laplacian Sharpening (Strength: 0,2000)

(8) Unsharp Masking (Strength: 0,5000 / Size: 99 / Threshold: 0) → Apply,

(9) Result – “Q2A_SuperRes_ID07.jpg” :



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?.....) Use any space you need 1.

2.

3.

4.

5.

Etc

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. Use any space you need

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

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

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”

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.

Amped FIVE Report

Report Generation: 2015-04-30 14:09:47

Project Name:

Author:

Description:

Amped FIVE version info:

Build date: 20141029

Revision: 6579

Platform: Microsoft Windows, 32 bit

Project File: Q2B_SuperRes_ID07.afp

Exported Images

Chain 1

1. Video Loader: Loads a video from file. (File)

Chain 2

2. Video Loader: Loads a video from file. (File)

3. Crop: Crops a region of interest of the image.

4. Rotate: Rotates the image.

5. Super Resolution: Merges all frames to improve the resolution of the image.

6. Super Resolution: Merges all frames to improve the resolution of the image.

7. Super Resolution: Merges all frames to improve the resolution of the image.

8. Resize: Resizes the image.

9. Super Resolution: Merges all frames to improve the resolution of the image.

Details:

Summary:

Chain 1

1. Video Loader

Loads a video from file.

Details:

The Video Loader tool renders an video file that can be encoded in a variety of standard formats to a sequence of bitmaps that can be displayed and processed.

Parameters:

File: New folder/TestP_7mDistance_MidElevation.dav

Path of the video to load.

Video Engine: DirectShow

Video decoder to use.

Original File: Not used.

Original video file that has been converted from a proprietary DVR format.

Chain 2

2. Video Loader

Loads a video from file.

Details:

The Video Loader tool renders an video file that can be encoded in a variety of standard formats to a sequence of bitmaps that can be displayed and processed.

Parameters:

File: New folder/TestP_7mDistance_MidElevation.dav-converted.avi

Path of the video to load.

Video Engine: FFMS

Video decoder to use.

Original File: Not used.

Original video file that has been converted from a proprietary DVR format.

3. Crop

Crops a region of interest of the image.

Details:

The Crop tool produces an output image which is only the selected region of the input image.

Parameters:

Selection: Static Region

Reference Selection(s)

0: 155 84 60 102

Selection where the filter is applied. It may be the whole image, a static region, or a region containing a tracked object of interest.

4. Rotate

Rotates the image.

Details:

The Rotate filter rotates the image by the given angle. If the rotation angle is not multiple of 90 degrees, the selected interpolation algorithm is used, otherwise the original pixel values are only transposed.

Parameters:

Angle: -180

Rotation angle.

Resize Image to Fit: true

If unchecked, the image remains of the original size, although part of the actual data could render outside of the visible area.

Interpolation: Bicubic

Interpolation algorithm.

References:

Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 253-255, 1989.

Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 320-322, 1989.

H.S. Hou and H.C. Andrews, Cubic spline for image interpolation and digital filtering, in IEEE Transactions on Acoustic, Speech, and Signal Processing, vol. 26, pp. 508-517, 1978.

5. Super Resolution

Merges all frames to improve the resolution of the image.

Details:

The Super Resolution filter applies a sub-pixel registration to all the frames of a video, then merges the motion corrected frames together, along with a deblurring filtering. If a Selection is set, then the selected area will be optimized.

Parameters:

Zoom: 2

Zoom factor for the output image.

Iterations: 10

Number of deblurring steps.

Selection: 0 0 60 102

Region of the image to optimize.

References:

Hiroyuki Takeda, Peyman Milanfar, Matan Protter, and Michael Elad. 2009. Super-resolution without explicit subpixel motion estimation. Trans.

Img. Proc. 18, 9 (September 2009), 1958-1975. DOI=10.1109/TIP.2009.2023703

<http://dx.doi.org/10.1109/TIP.2009.2023703>

6. Super Resolution

Merges all frames to improve the resolution of the image.

Details:

The Super Resolution filter applies a sub-pixel registration to all the frames of a video, then merges the motion corrected frames together, along with a deblurring filtering. If a Selection is set, then the selected area will be optimized.

Parameters:

Zoom: 2

Zoom factor for the output image.

Iterations: 10

Number of deblurring steps.

Selection: 0 0 113 197

Region of the image to optimize.

References:

Hiroyuki Takeda, Peyman Milanfar, Matan Protter, and Michael Elad. 2009. Super-resolution without explicit subpixel motion estimation. Trans.

Img. Proc. 18, 9 (September 2009), 1958-1975. DOI=10.1109/TIP.2009.2023703

<http://dx.doi.org/10.1109/TIP.2009.2023703>

7. Super Resolution

Merges all frames to improve the resolution of the image.

Details:

The Super Resolution filter applies a sub-pixel registration to all the frames of a video, then merges the motion corrected frames together, along with a deblurring filtering. If a Selection is set, then the selected area will be optimized.

Parameters:

Zoom: 2

Zoom factor for the output image.

Iterations: 10

Number of deblurring steps.

Selection: 0 0 219 387

Region of the image to optimize.

References:

Hiroyuki Takeda, Peyman Milanfar, Matan Protter, and Michael Elad. 2009. Super-resolution without explicit subpixel motion estimation. Trans. Img. Proc. 18, 9 (September 2009), 1958-1975. DOI=10.1109/TIP.2009.2023703 <http://dx.doi.org/10.1109/TIP.2009.2023703>

8. Resize

Resizes the image.

Details:

The Resize tool interpolates the input image by generating an output image of the desired size.

The available interpolation algorithms are:

- Nearest: simply copies the value of the closest pixel in the position to be interpolated;
- Bilinear: uses a bilinear interpolation to resample pixel data;
- Bicubic: uses a bicubic interpolation to resample pixel data.
- Area resamples using pixel area relation.
- Lanczos uses a Lanczos interpolation to resample pixel data.

Parameters:

Size: 862, 1534

Size of output image.

Interpolation: Bicubic

Interpolation algorithm.

References:

Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 253-255, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 320-322, 1989.
H.S. Hou and H.C. Andrews, Cubic spline for image interpolation and digital filtering, in IEEE Transactions on Acoustic, Speech, and Signal Processing, vol. 26, pp. 508-517, 1978.

9. Super Resolution

Merges all frames to improve the resolution of the image.

Details:

The Super Resolution filter applies a sub-pixel registration to all the frames of a video, then merges the motion corrected frames together, along with a deblurring filtering. If a Selection is set, then the selected area will be optimized.

Parameters:

Zoom: 2

Zoom factor for the output image.

Iterations: 10

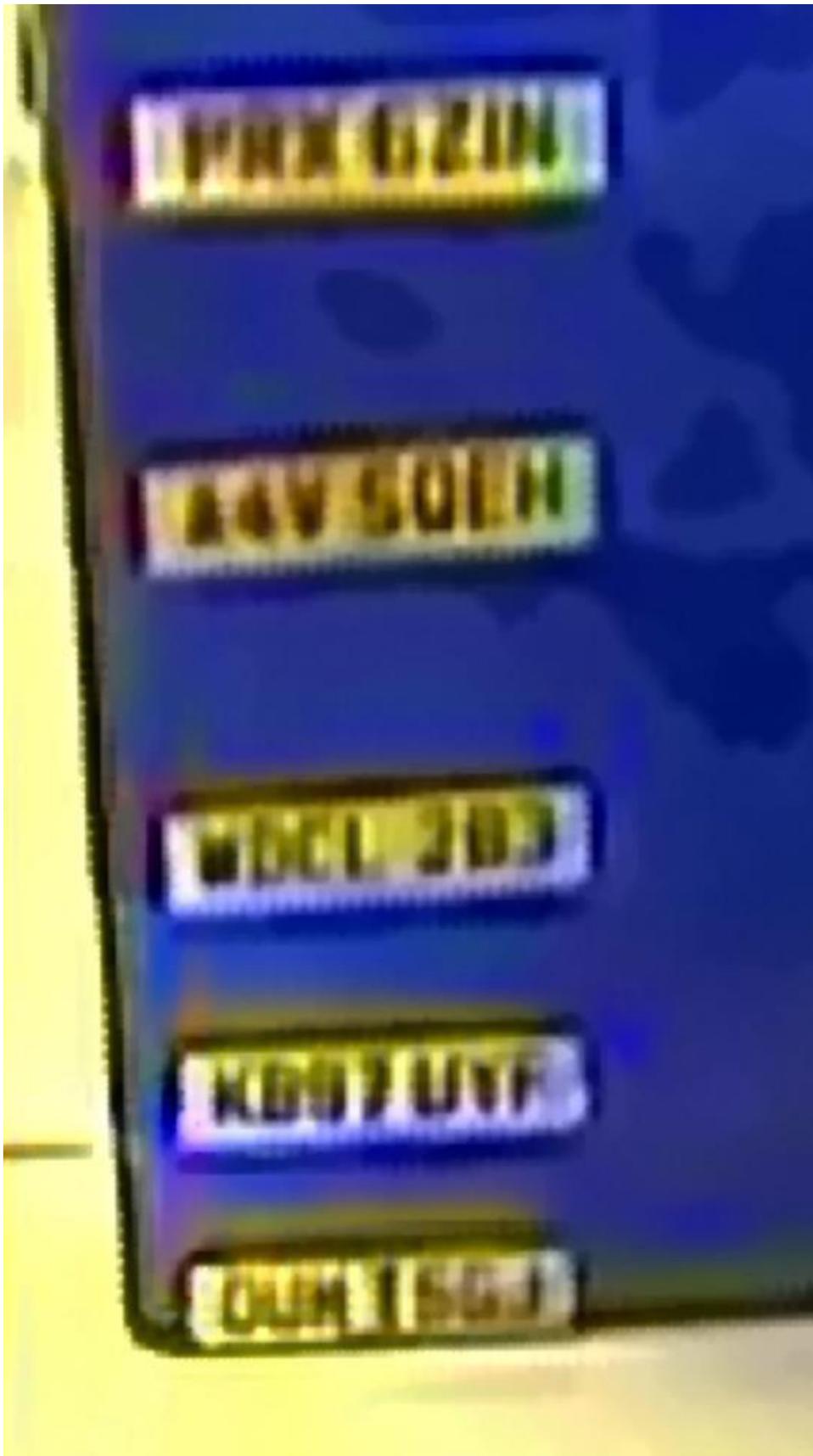
Number of deblurring steps.

Selection: 187 1290 435 138

Region of the image to optimize.

References:

Hiroyuki Takeda, Peyman Milanfar, Matan Protter, and Michael Elad. 2009. Super-resolution without explicit subpixel motion estimation. Trans. Img. Proc. 18, 9 (September 2009), 1958-1975. DOI=10.1109/TIP.2009.2023703 <http://dx.doi.org/10.1109/TIP.2009.2023703>



1. 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? At all number plates together
Decision reached how:

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?.....) Use any space you need

- 1.
 - 2.
 - 3.
 - 4.
 - 5.
- Etc

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.
Use any space you need

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

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

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. Use any space you need

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? Selected no. plate: 1, 2, 3, 4, or 5 Decision reached how:

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?.....) Use any space you need

- 1.
 - 2.
 - 3.
 - 4.
 - 5.
- Etc

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. Use any space you need

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

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

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:

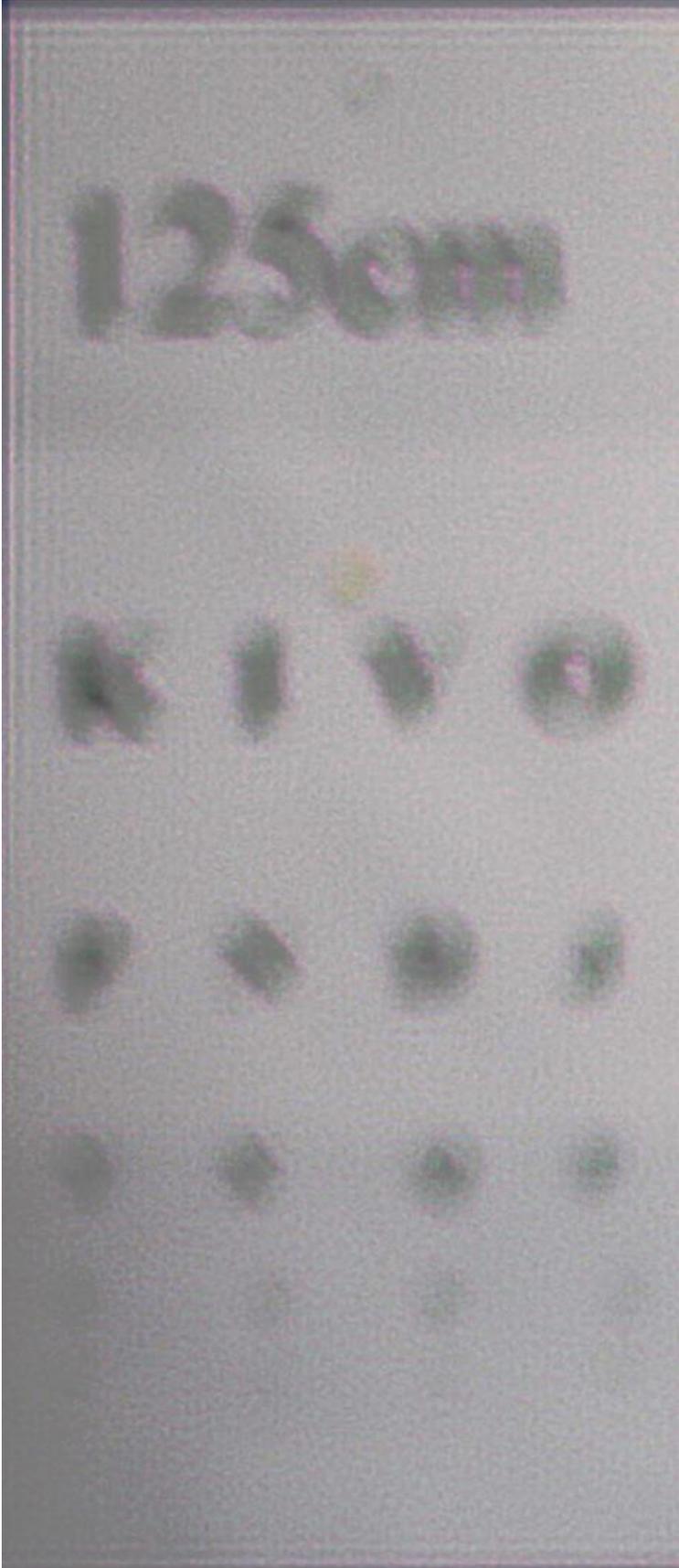
File name: 'Q2C_SuperRes_Procedure2_Plate2_YOURINITIALS' to indicate the best enhancement result you obtained for Plate 2 using the Procedure2 you will describe using a cut-paste repetition of the 6 previous subquestions above, etc.
etc.

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.

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

- (1) Run “Amped FIVE” and load the image,**
- (2) Resize (Width: 16848 / Height: 11232 / Zoom: 3) → Apply,**
- (3) Crop (x: 3467 / y:952 / w: 1449 / h:3371),**
- (4) Levels (Highlights: 255 / Midtones: 186),**
- (5) Optical Deblurring (Size: 38 / Noise: 0,0106),**
- (6) Result – “Q3_125cm_ID07.jpg” :**



Amped FIVE Report

Report Generation: 2015-04-30 12:54:14

Project Name:

Author:

Description:

Amped FIVE version info:

Build date: 20141029

Revision: 6579

Platform: Microsoft Windows, 64 bit

Project File: Q3_125cm_first_ID07.afp

Exported Images

Chain 1

1. Image Loader: Loads an image from file. (File)
3. Resize: Resizes the image.
6. Crop: Crops a region of interest of the image.
22. Optical Deblurring: Corrects the blur of objects that are out of focus (big blur).
18. Levels: Adjusts intensity and color levels.

Details:

Summary:

Chain 1

1. Image Loader

Loads an image from file.

Details: The Image Loader tool renders an image file that can be encoded in a variety of formats to a bitmap that can be displayed and processed.

Parameters: •File: E:/s five test/4791/Question
3/Random_Focus_150cm_from_lens.JPG

The path of the file to load.

3. Resize

Resizes the image.

Details: The Resize tool interpolates the input image by generating an output image of the desired size.

The available interpolation algorithms are:

- Nearest: simply copies the value of the closest pixel in the position to be interpolated;
- Bilinear: uses a bilinear interpolation to resample pixel data;
- Bicubic: uses a bicubic interpolation to resample pixel data.
- Area resamples using pixel area relation.
- Lanczos uses a Lanczos interpolation to resample pixel data.

Parameters: •Size: 16848, 11232

Size of output image.

•Interpolation: Bicubic

Interpolation algorithm.

References:

- Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 253-255, 1989.
- Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 320-322, 1989.
- H.S. Hou and H.C. Andrews, Cubic spline for image interpolation and digital filtering, in IEEE Transactions on Acoustic, Speech, and Signal Processing, vol. 26, pp. 508-517, 1978.

6. Crop

Crops a region of interest of the image.

Details: The Crop tool produces an output image which is only the selected region of the input image.

Parameters: •Selection: Static Region

Reference Selection(s)

0: 3467 952 1449 3371

Selection where the filter is applied. It may be the whole image, a static region, or a region containing a tracked object of interest.

22. Optical Deblurring

Corrects the blur of objects that are out of focus (big blur).

Details: Optical Deblurring reduces the blurring effect due to incorrect focus settings during the image acquisition process. The algorithm is based on a Wiener filtering, having a circle of diameter Size as point spread function (PSF).

In order to filter out the noise it is possible to set the Noise parameter, which represents the estimated noise-to-signal power ratio of the image.

Parameters: •Size: 38

The size of the point spread function.

•Noise: 0.0106

Estimate of the noise-to-signal power ratio.

•Boundary conditions: Symmetric

Reduce ringing artifacts near the boundaries of the image

References:

•J.S. Lim, Two-Dimensional Signal and Image Processing, Englewood Cliffs, Prentice Hall, NY, p. 548, equations 9.44 -- 9.46, 1990.

•Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 276-284, 1989.

18. Levels

Adjusts intensity and color levels.

Details: The Levels filter maps the values of the input image to the values of output image according to a piece-wise linear transformation controlled by the values of Highlights, Midtones and Shadows. The Midtones slider changes the intensity values of the middle range of intensity levels without significantly changing the highlights and shadows in the image. The Highlights and Shadows sliders set the black point and the white point of the image. Each channel of the input image is configured using the sliders of the corresponding parameter: Value, Red, Green or Blue. For each parameter, the histogram of the tonal range of the input image is displayed. If the input image

is in grayscale, changing the setting of Red, Green and Blue parameters has no effect on the output image.

Parameters: •Value: 255, 186, 0

Highlights, Midtones and Shadows settings used to map the pixel values of the grayscale converted image.

•Red: 255, 127, 0

Highlights, Midtones and Shadows settings used to map the pixel values of the red channel of image.

•Green: 255, 127, 0

Highlights, Midtones and Shadows settings used to map the pixel values of the blue channel of image.

•Blue: 255, 127, 0

Highlights, Midtones and Shadows settings used to map the pixel values of the green channel of image.

•Selection: Whole Image

Selection where the filter is applied. It may be the whole image, a static region, or a region containing a tracked object of interest.

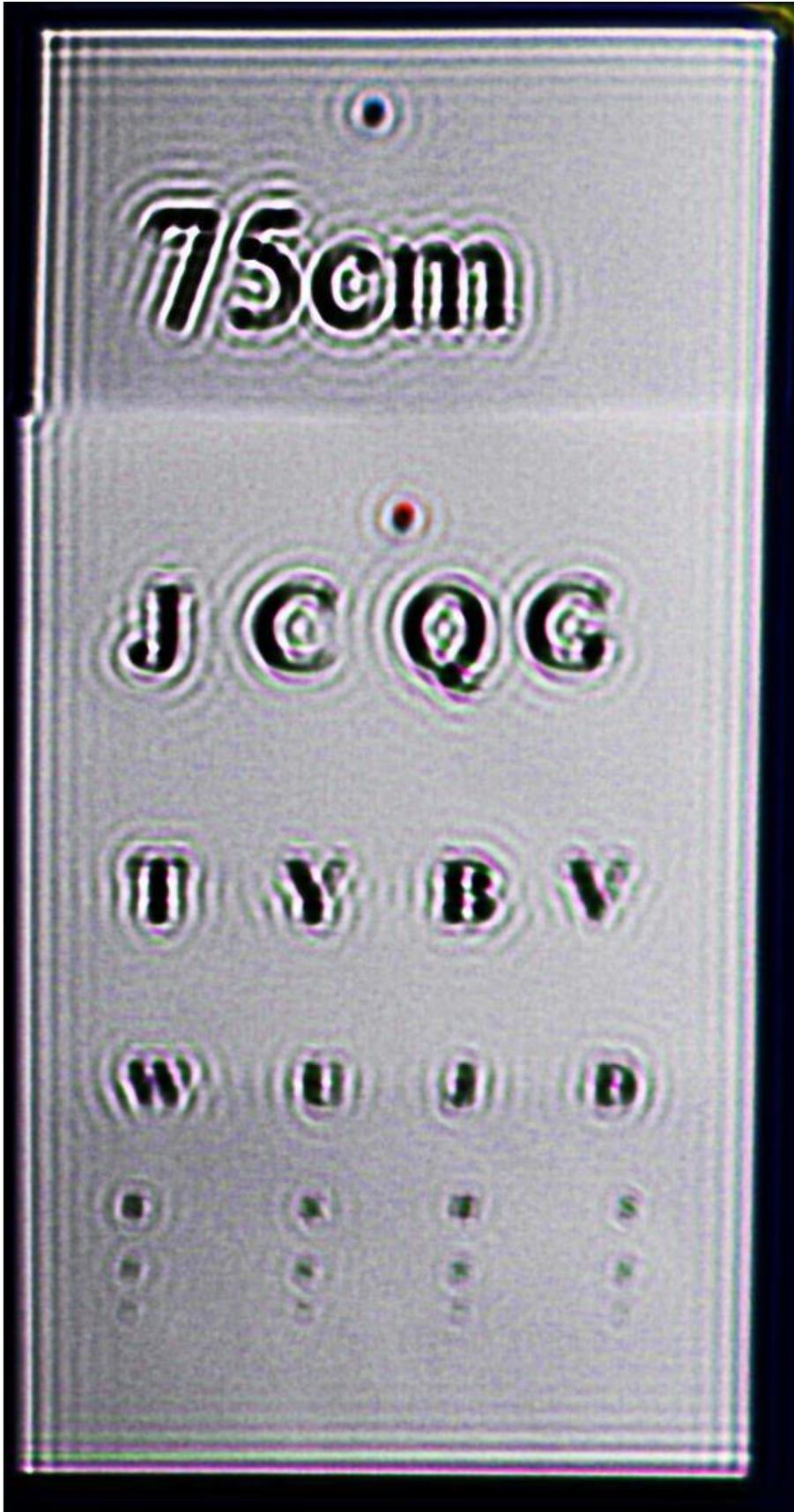
References:

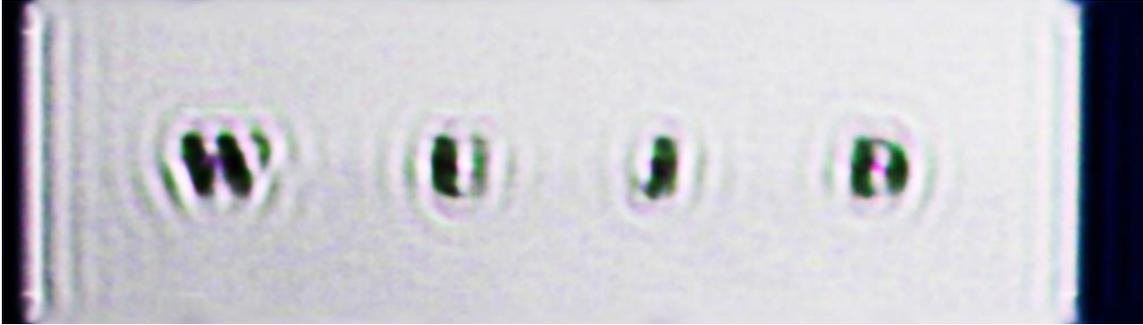
•Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

75 cm, 4th line:

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

- (1) Crop image in Photoshop,
- (2) Run "SmartDeblur v.2.0" program and open the cropped image,
- (3) Defect type: Out of Focus Blur (Radius: 14,1 / Smooth: 79% / Correction Strength: 99% / Edge Feather: 99%) → Save
- (4) Open again the new image in Photoshop
- (5) Levels: 0,58
- (6) Brightness-Contrast: (Brightness: 15 / Contrast: 100)
- (7) Brightness-Contrast: (Brightness: -2 / Contrast: 100)
- (8) Result – "Q3_75cm_Line4_ID07_Main.png" :

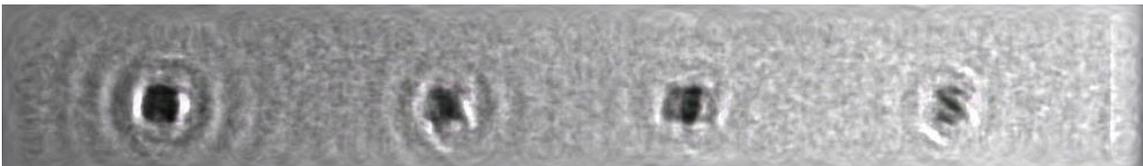




75 cm, 5th line:

Please save and submit your results using filename:
Q3_75cm_Line5_YOURINITIALS'

- (1) Open image in Photoshop,
- (2) Image → Auto Tone,
- (3) Crop image,
- (4) Image Size: 300 resolution,
- (5) Run "SmartDeblur v.2.0" program and open the new image,
- (6) Defect type: Out of Focus Blur (Radius: 16,7 / Smooth: 62% / Correction Strength: 13% / Edge Feather: 67%) → Save
- (7) Open again the new image in Photoshop,
- (8) Levels: 0,58
- (8) Curves: (Output: 186 / Input: 229),
- (9) Image → Adjustments → Vibrance: (Vibrance: -72 / Saturation: -77)
- (10) Filter → Sharpen → Sharpen More
- (11) Result – "Q3_75cm_Line5_ID07.png" :



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:

Use any space you need, repeat section depending on number of regions (max. 5)

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:

Use any space you need, repeat section depending on number of regions (max. 5)