Question 1: Image Extraction at Best Quality

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.

First of all, I checked the integrity of the file using the provided PGP signature. To do so, I used Gpg4Win software (with Kleopatra GUI) in the following way:

- I clicked on "Import certificates" and imported the publick key from 8903E64F.gpg
- I right clicked the certificate and "Certified it" by signing it with my own certificate
- I chose File -> Decrypt/Verify, selected the [000001].sig file, checked the "Input file is a detatched signature" box and browsed to [000001].dvr file. The software gives the following output:

> Signed on 2014-05-08 20:45 by 00D08903E64F ((DG08X Ver 1.0)) (Key ID: 0x07563BE8).
> The signature is valid and the certificate's validity is fully trusted

This is enough to certify the integrity of the file.

I used AMPED FIVE (Rev. 6762) DVR conversion system (File -> Convert DVR) to convert the .drv file to a supported format, choosing:
- "Copy stream if possible"
- "Raw" as video codec so to avoid re-compression.

AMPED Five's engine used ffmpeg library to convert the video to a supported format. Ffmpeg detected a H.264 video stream, as explained in the log file:

> Stream #0:0, 127, 1/1200000: Video: h264 (Baseline), yuv420p, 720x288, 25 fps, 25 tbr, 1200k tbn, 50 tbc

This means that ffmpeg was able to just extract the video stream from the proprietary container, without any decoding/re-encoding step. Then, I imported the obtained file in AMPED Five and used the "Image writer" filter to save the first frame of the video to a bitmap (i.e., uncompressed) file.

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.

I used AMPED FIVE DVR conversion system (File -> Convert DVR) to convert the .drv file to a supported format, choosing:
- “Copy stream if possible”
- “Raw” as video codec so to avoid re-compression.

AMPED FIVE’s engine used ffmpeg library to convert the video to a supported format. Ffmpeg detected a M-JPEG video stream, as explained in the log file:

```
Stream #0:0, 0, 1/50: Video: mjpeg (MJPG / 0x47504A4D), yuvj420p, 720x288 [SAR 50:25 DAR 5:1], q=2-31, 25 fps, 50 tbn, 50 tbc
```

This means that ffmpeg was able to just extract the from the proprietary container, without any decoding/re-encoding step. Then, I imported the obtained file in AMPED FIVE. Since the imported video has no timestamps, I installed the provided Player and checked the framerate of the recorder: by advancing frame-by-frame checking the timestamps, I reached the conclusion that the video was recorded at 6 fps. Since the initial timestamp is exactly 40s before the desired frame, I took the frame number 240 in AMPED Five imported video and used “Image writer” filter to save it to a bitmap, uncompressed file.

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?

As to the file in Qn.1A, the video stream is compressed using H.264, with baseline profile, the GOP structure is static (IPPPPP). Frames show a good contrast and no relevant blocking artifacts.

As to the file in Qn.1B, MJPEG coding is detected (only I-frames). Pixels show annoying blocking artifacts, and levels are poorly distributed, resulting in low contrast.

Both videos show a spatial resolution of 720x288, which suggests the video height is half the standard PAL (576). This can be due to: i) different fields of an interlaced video being stored in two consecutive frames; ii) a memory-saving policy which does not store interpolated fields in each frame.
We believe the second applies to our case, so the aspect ratio can be corrected using AMPED FIVE “Edit -> Correct aspect ratio” filter, which adds interpolated lines (e.g., calculated with cubic interpolation). After application of this filter, the video is at standard PAL resolution: 720x576 pixels.

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.

   I have used AMPED FIVE "Sequence Loader" filter, that is automatically enabled by dragging files into AMPED FIVE.

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 following filters in AMPED FIVE were used:

1. Sequence Loader

Parameters:

- Files: [all files in the uncompressed archive]
- Fps: 25

2. Super Resolution

Parameters:

- Zoom: 2 (*Zoom factor for the output image.*)
- Iterations: 15 (*Number of deblurring steps.*)
- Selection: 6 13 29 9 (*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

3. Optical Deblurring

Parameters:

- Size: 2 (*The size of the point spread function.*)
- Noise: 0.0151 (*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.

4. Unsharp Masking

Parameters:

- Strength: 0.2700 (*Intensity of the sharpening effect: larger values provide increasing amounts of sharpening.*)
- Size: 57 (*Size of the filter.*)
- Threshold: 0 (*The minimum difference in pixel values that indicates an edge where sharpen must be applied.*)
- Mode: Intensity (*Type of adjustment to be done.*)
- Selection: Whole Image

References:

- Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 249-250, 1989.

5. Resize

Parameters:

- Size: 356, 292 (*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. Hue Saturation Value

Parameters:

- Hue: 0 (*Adds or subtracts a constant to the hue of the image. It adjusts the offset of a linear mapping.*)
- Saturation: -78 (*Multiplies by a constant to the saturation of the image. It adjusts the slope of a linear mapping.*)
- Value: 0 (*Multiplies by a constant to the value of the image. It adjusts the slope of a linear mapping.*)
- Selection: Whole Image

References:

- Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
- Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

7. Image Writer

Parameters:

- File: E:/S-FIVE/2A/Q2A_SuperRes_ID12.bmp
- Format: Bitmap

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.

   Yes, the region was 6 13 29 9.

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

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”

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.

   I used AMPED FIVE DVR conversion tool (File -> Convert DVR) to convert the video to a compatible format. I checked the “copy stream if possible” option, and according to the log file AMPED FIVE was able to just extract the H.264 video stream from the proprietary container, without re-compressing it. Frames were just written to a RAW video file (AVI container), that can be imported in AMPED FIVE.

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

   Decision reached how:
   Being closer and near to the center of the image, the number plate 1 is more likely readable. Moreover, we can’t exclude that tuning the filters for that plate will also improve readability of other plates.

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?.....)

   I used AMPED FIVE, with the following chain of filters:
   Video Loader
   Parameters:
   File: TestP_7mDistance_MidElevation.dav-converted.avi
   Path of the video to load.
   Video Engine: FFMS
   Video decoder to use.
   Original File: F:\S-FIVE\2B\TestP_7mDistance_MidElevation.dav
   Original video file that has been converted from a proprietary DVR format.

Crop
Parameters:
Selection: Static Region
Reference Selection(s)
0: 167 90 45 96

Range Selector (Selects frames of the video within an interval with an optional step).
Parameters:
First Frame: 81
Last Frame: 175
Step: 1

Rotate
Parameters:
Angle: 180
Resize Image to Fit: true
Interpolation: Bicubic
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.

Super Resolution
Parameters:
Zoom: 3
Iterations: 10 (Number of deblurring steps).
Selection: 2 2 41 17 (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

Optical Deblurring
Parameters:
Size: 4 (The size of the point spread function.)
Noise: 0.1805 (Estimate of the noise-to-signal power ratio.)
Boundary conditions: Symmetric
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.

Resize
Parameters:
Size: 375, 834
Interpolation: Bicubic
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.

Unsharp Masking
Parameters:
Strength: 0.5300 (Intensity of the sharpening effect: larger values provide increasing amounts of sharpening.)
Size: 115 (Size of the filter.)
Threshold: 0
Mode: Intensity
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 249-250, 1989.

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.

   I selected a square region containing the desired plate. However, coordinate specified in the tool are not those of the original frames, since I cropped the video and rotated it by 180 degrees. Coordinates in the cropped and rotated plane are 2 2 41 17 (x y w h). See the filter list at point 3 for details about cropping and rotation, allowing mapping the above coordinates to those of the original image.

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

   I selected frames in the range [81 175] because lower camera motion is observed in that window.

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

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 used AMPED FIVE, details about each enhancement follow:

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

Image Loader
Parameters:
File: Random_Focus_150cm_from_lens.JPG
The path of the file to load.

Crop
Parameters:
Selection: Static Region
Reference Selection(s)
0: 1006 222 825 1294

Optical Deblurring
Parameters:
Size: 43 The size of the point spread function.
Noise: 0.0068 Estimate of the noise-to-signal power ratio.
Boundary conditions: Edge Tapering
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.

Unsharp Masking
Parameters:
Strength: 1
Size: 85
Threshold: 0
Mode: Intensity
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 249-250, 1989.

Hue Saturation Value
Parameters:
Hue: 0
Saturation: -23
Value: 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Contrast Brightness
Parameters:
Contrast: 31
Brightness: -14
Selection: Whole Image
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'

Image Loader
Parameters:
File: F:/S-FIVE/3/Random_Focus_150cm_from_lens.JPG

Crop
Parameters:
Selection: Static Region
0: 233 950 909 360

Motion Deblurring
Parameters:
Size: 7
Angle: 77
Noise: 0.0090
Boundary conditions: Symmetric
Mode: Replica
Thickness: 15
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.

Unsharp Masking
Parameters:
Strength: 0.5000
Size: 99
Threshold: 0
Mode: Intensity
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 249-250, 1989.

Levels
Parameters:
Value: 217, 155, 93
Red: 255, 127, 0

Green: 255, 127, 0
Blue: 255, 127, 0

Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Hue Saturation Value
Parameters:
Hue: 0
Saturation: -13
Value: 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

75 cm, 5th line:
Please save and submit your results using filename: Q3_75cm_Line5_YOURINITIALS'

Image Loader
Parameters:
File: Random_Focus_150cm_from_lens.JPG

Crop
Parameters:
Selection: Static Region
0: 446 1190 546 88

Optical Deblurring
Parameters:
Size: 18
Noise: 0.0126
Boundary conditions: Symmetric

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.

Unsharp Masking
Parameters:
Strength: 1
Size: 57
Threshold: 0
Mode: Intensity
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 249-250, 1989.

Hue Saturation Value
Parameters:
Hue: 0
Saturation: -40

Value: 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Levels
Parameters:
Value: 233, 154, 75
Red: 255, 127, 0
Green: 255, 127, 0
Blue: 255, 127, 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Resize
Parameters:
Size: 1092, 176
Interpolation: Bicubic
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.

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 used AMPED FIVE.

Region 0: 117 453 2453 505 (x y w h)

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: 117 453 2453 505
Selection where the filter is applied. It may be the whole image, a static region, or a region containing a tracked object of interest.

Motion Deblurring
Parameters:
Size: 28
Angle: 5
Noise: 0.0079
Boundary conditions: Symmetric
Mode: Linear
Thickness: 3
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.

Hue Saturation Value
Parameters:
Hue: 0
Saturation: -12
Value: 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Region 1: 385 1467 502 107 (x y w h)

Crop
Parameters:
Selection: Static Region
0: 385 1467 502 107

Motion Deblurring
Parameters:
Size: 32
Angle: 5
Noise: 0.0100
Boundary conditions: Symmetric
Mode: Linear
Thickness: 2
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.

Levels
Parameters:
Value: 199, 99, 0
Red: 255, 127, 0
Green: 255, 127, 0
Blue: 255, 127, 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Region 2: 1653 1427 309 121 (x y w h)

Crop
Parameters:
Selection: Static Region
0: 1653 1427 309 121

Motion Deblurring
Parameters:
Size: 31
Angle: 0
Noise: 0.0201
Boundary conditions: Symmetric
Mode: Linear
Thickness: 2
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.

Unsharp Masking
Parameters:
Strength: 0.6300
Size: 59
Threshold: 0
Mode: Intensity
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 249-250, 1989.

Levels
Parameters:
Value: 211, 105, 0
Red: 255, 127, 0
Green: 255, 127, 0
Blue: 255, 127, 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Hue Saturation Value
Parameters:
Hue: 0
Saturation: -9
Value: 0
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.

Resize
Parameters:
Size: 618, 242
Interpolation: Bicubic
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.

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".

I used AMPED FIVE.

Crop
Parameters:
Selection: Static Region
0: 470 1614 852 322

Nonlinear Deblurring
Parameters:
Points:
454, 48
459, 49
462, 50
464, 52
466, 56
466, 62
466, 70
467, 76
469, 82
472, 88
478, 91
487, 90
Noise: 0.0100
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.

Hue Saturation Value
Parameters:
Hue: 0
Saturation: -17
Value: -7
Selection: Whole Image
References:
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 60-71, 1989.
Anil. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, pp. 234-241, 1989.