

| 5 - Years Integrated M.Sc. (IT)/M.Sc.(IT) (Semester - 7/1) Practical List IT7040-Fundamentals of Digital Image Processing | |
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| Practical No : 1 | Enrollment No: |
| Pre-lab Exercise | <ul style="list-style-type: none"> Install image processing library in Python |
| Practical Problems | <ol style="list-style-type: none"> Input an image and display. Also display image resolutions. Observe the variable editor and write your observation for binary image, grayscale image and color image. Input an image as a grayscale and display. Manipulate pixel values and observe the changes in display. Input a gray image, also input a pixel position and display 4-neighbors, diagonal neighbors, and 8-neighbors pixel positions and values. Input a gray image, also input two pixel positions and display are they 4-adjacent, 8-adjacent and m-adjacent? Input two pixels position and display D_e, D_4 and D_8 distances. |
| Objective(s) | To understand image representation. To read and display images. To manipulate images. |
| Pre-requisite | - |
| Duration for completion | 4 hours |
| PEO(s) to be achieved | PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. PEO2: To provide quality practical skill of tools and technologies to solve industry problems. |
| PO(s) to be achieved | PO6: Ability to use the techniques, skills and modern tools as necessary for software development. |
| CO(s) to be achieved | CO1: Describe digital image, its type and processing steps. CO2: Describe image resolutions, classification of image operations and fundamental tools require in digital image processing. |
| Solution must contain | Code |
| Nature of submission | Handwritten |
| Reference for solving the problem | Book: Gonzales R., Woods R., Digital Image Processing – Pearson Sridhar S., Digital Image Processing, OXFORD Web references: https://docs.opencv.org/4.x/d6/d00/tutorial_py_root.html https://www.geeksforgeeks.org/opencv-python-tutorial/ |

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| Practical No : 2 | Enrollment No: |
| Pre-lab Exercise | <ul style="list-style-type: none"> Install image processing library in Python |
| Practical Problems | 6. Write a program to input a grayscale image and display following. <ol style="list-style-type: none"> Brightness of an image. Contrast of an image. Histogram of an image. Minimum color and maximum color. 7. Write a program to perform following image operation on grayscale image. <ol style="list-style-type: none"> Image negative Log transformation Power law transformation |
| Objective(s) | To perform image enhancement |
| Pre-requisite | - |
| Duration for completion | 4 hours |
| PEO(s) to be achieved | PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. PEO2: To provide quality practical skill of tools and technologies to solve industry problems. |
| PO(s) to be achieved | PO6: Ability to use the techniques, skills and modern tools as necessary for software development. |
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| Practical No : 3 | Enrollment No: |
| Practical Problems | 8. Write a program to perform contrast stretching on grayscale image. 9. Write a program to perform range normalization on grayscale image. 10. Write a program to perform intensity slicing with background and without background on grayscale image. 11. Write a program to perform histogram equalization on grayscale image. 12. Write a program to perform binarization on grayscale image using threshold based on middle value, average pixel value and Otsu method. |
| Objective(s) | To perform image enhancement based on intensity transformation. |
| Pre-requisite | - |
| Duration for completion | 4 hours |
| PEO(s) to be achieved | PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. PEO2: To provide quality practical skill of tools and technologies to solve industry problems. |
| PO(s) to be achieved | PO6: Ability to use the techniques, skills and modern tools as necessary for software development. |
| CO(s) to be achieved | CO1: Describe digital image, its type and processing steps. CO2: Describe image resolutions, classification of image operations and fundamental tools require in digital image processing. CO3: Describe and use image enhancement in spatial domain. |
| Solution must contain | Code |
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| Reference for solving the problem | Book: Gonzales R., Woods R., Digital Image Processing – Pearson Sridhar S., Digital Image Processing, OXFORD Web references: https://docs.opencv.org/4.x/d6/d00/tutorial_py_root.html https://www.geeksforgeeks.org/opencv-python-tutorial/ |

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| Practical No : 3 | Enrollment No: |
| Practical Problems | <p>13. Write a program to perform standard averaging, weighted averaging on image and compare the results.</p> <p>14. Write a program to perform blurring on an image with different type of mask size i.e. 3 X 3, 5 X 5, 7 X 7, 13 X 13 and 25 X 25.</p> <p>15. Write a program to perform blurring on image as following:</p> <p>i) Apply 3 X 3 standard blurring mask 3 times on an image.</p> <p>ii) Apply 7 X 7 standard blurring mask and compare result with i).</p> <p>16. Write a program to perform conservative smoothing.</p> <p>17. Write a program to perform median filtering on image.</p> <p>18. Write a program to perform min and max filter on an image.</p> <p>19. Write a program to perform image sharpening using Laplacian filter.</p> <p>20. Write a program to perform image sharpening using un-sharp masking.</p> <p>Show resultant image for different k value as given below:</p> $mask = f(x, y) - \bar{f}(x, y)$ $g(x, y) = f(x, y) + k \times mask$ <p>$k < 1, k = 1$ and $k > 1$</p> |
| Objective(s) | To perform image enhancement using image sharpening. |
| Pre-requisite | - |
| Duration for completion | 4 hours |
| PEO(s) to be achieved | <p>PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field.</p> <p>PEO2: To provide quality practical skill of tools and technologies to solve industry problems.</p> |
| PO(s) to be achieved | PO6: Ability to use the techniques, skills and modern tools as necessary for software development. |
| CO(s) to be achieved | <p>CO1: Describe digital image, its type and processing steps.</p> <p>CO2: Describe image resolutions, classification of image operations and fundamental tools require in digital image processing.</p> <p>CO3: Describe and use image enhancement in spatial domain.</p> |
| Solution must contain | Code |
| Nature of submission | Handwritten |
| Reference for solving the problem | <p>Book:</p> <p>Gonzales R., Woods R., Digital Image Processing – Pearson</p> <p>Sridhar S., Digital Image Processing, OXFORD</p> <p>Web references:</p> <p>https://docs.opencv.org/4.x/d6/d00/tutorial_py_root.html</p> <p>https://www.geeksforgeeks.org/opencv-python-tutorial/</p> |

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| Practical No : 3 | Enrollment No: |
| Practical Problems | <p>21. Write a program to perform following morphological operation on binary image.</p> <ol style="list-style-type: none"> Dilation Erosion Opening Closing <p>22. Write a program to perform internal and external boundary extraction using morphological processing on binary image of English alphabet.</p> <p>23. Write a program to identify any three English letter image using image processing technique.</p> |
| Objective(s) | To perform image enhancement using image sharpening. |
| Pre-requisite | - |
| Duration for completion | 4 hours |
| PEO(s) to be achieved | <p>PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field.</p> <p>PEO2: To provide quality practical skill of tools and technologies to solve industry problems.</p> |
| PO(s) to be achieved | PO6: Ability to use the techniques, skills and modern tools as necessary for software development. |
| CO(s) to be achieved | <p>C01: Describe digital image, its type and processing steps.</p> <p>C02: Describe image resolutions, classification of image operations and fundamental tools require in digital image processing.</p> <p>C03: Describe and use image enhancement in spatial domain.</p> |
| Solution must contain | Code |
| Nature of submission | Handwritten |
| Reference for solving the problem | <p>Book:</p> <p>Gonzales R., Woods R., Digital Image Processing – Pearson</p> <p>Sridhar S., Digital Image Processing, OXFORD</p> <p>Web references:</p> <p>https://docs.opencv.org/4.x/d6/d00/tutorial_py_root.html</p> <p>https://www.geeksforgeeks.org/opencv-python-tutorial/</p> |