DIGITAL IMAGE PROCESSING USING NTEC FACILITIES

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ABSTRACT

Digital image enhancement refers to the improvement of a given image for human interpretation. Digital image processing facilities are those in which hardware and software computing elements are combined in such a way as to enable the processing of digital images. This report describes the use of the Naval Training Equipment Center (NTEC) Computer Systems Laboratory computing facilities to enhance digital images. Described are two major hardware systems, the IKONAS RDS-3000 raster display graphics system and the VAX-11/780, and the digital image processing program (DIMPRP) written by the author. Digital image enhancement theory and practice are addressed through a discussion of the DIMPRP software. Finally, enhancements to the NTEC digital image processing facility such as improvements in hardware reliability, documentation, and increased speed of program execution are discussed.

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TABLE OF CONTENTS

LIST OF FIGURES vi

Chapter
1. INTRODUCTION 1

Digital Images 1
Digital Image Processing 2
Digital Image Processing Facilities 4

2. A DIGITAL IMAGE PROCESSING FACILITY 8

Hardware 8
The IKONAS RDS-3000 Raster Diplay Graphics System . . 8
IKONAS RDS-3000 VI8 Video Input Module 10
IKONAS RDS-3000 DR64 Image Memory 11
IKONAS RDS-3000 LUVO Module 12
VAX/IK Interface 14
The VAX-11/780 Minicomputer 14
VAX Virtual Memory Architecture 15
Mass Memory Storage Devices 18
Software 19
VAX/VMS Operating System 19
FORTRAN Subroutines IKPRD,IKPWR,IKBWR 20
Introduction to DIMPRP 22

3. A GENERAL DIGITAL IMAGE PROCESSING PROGRAM 23

The DIMPRP Menu 23
Obtaining an Image 26
Displaying an Image 28
Image Enhancement 29
The Image Histogram 30
Image Enhancement by Histogram Modification 32
Image Smoothing 37
Edge Enhancement 41
Image Sharpening 44
Gray Level Reduction 47
Gray Scale Inversion 49
Thresholding 51
Pseudocolor Enhancement 52
Program Usage 54

4. CONCLUSION 57

NTEC Facility Enhancement 57
Hardware 57
Software 58

APPENDIX: DIMPRP Source Listing 60

LIST OF REFERENCES 77

LIST OF FIGURES

1. Elements of a Digital Image Processing System 5
2. Digital Image Processing Facility Architecture 9
3. VAX-11/780 Hardware Architecture 16
4. Author Executing the DIMPRP Software 24
5. The TEK 4014-1 Graphics Terminal 25
6. The IKONAS Hardware 25
7. Image Histograms 31
8a. Original Image 35
8b. Enhanced Image 35
9a. Original Image Histogram 36
9b. Enhanced Image Histogram 36
10a. Original Image 40
10b. Mean Filtered Image 40
11a. Original Image 40
11b. Median Filtered Image 40
12a. Original Image 45
12b. Edge Enhanced Image using Implmt1 45
12c. Edge Enhanced Image using Implmt2 45
12d. Edge Enhanced Image using Implmt3 45
13a. Original Image 48
13b. Sharpened Image 48

14a. Original Image with 256 Gray Levels 50

14b. Image with 32 Gray Levels 50

14c. Image with 4 Gray Levels 50

15a. Original Image 55

15b. Pseudocolor Enhanced Image 55

CHAPTER 1

INTRODUCTION

Digital Images

Throughout this report, the term monochrome image or simply image, refers to a two-dimensional light intensity function i(x,y), where x and y denote spatial coordinates and the value of i at any point (x,y) is proportional to the brightness (or gray level intensity) of the image at that point. It is sometimes useful to view an image function in perspective with the third axis being brightness. An image viewed in this way appears as a series of active peaks in regions with numerous changes in brightness levels and smoother regions or plateaus where the brightness levels are constant or vary little. If assigning proportionally higher values to brighter areas, the height of the components in the plot would be proportional to the corresponding brightness in the image.

A digital image is an image i(x,y) which has been discretized and quantized in both spatial coordinates and in brightness. A digital image may be considered as a matrix whose row and column indices identify a point in the image and the corresponding matrix element value identifies the gray level at that point. The members of such an array are called "image elements", "picture elements", or "pixels", where pixels is the commonly used abbreviation of "picture elements".