RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CO-PO Mapping of Project in the area of Application of Digital Image Processing

Title of the Project: A Novel Image Enhancement for Electron Microscopic Images.

Area of the Project: Digital Image Processing

Methodology: Simulation

Name of the Supervisor: Dr. V. N SATYA PRAKASH M.Tech, Ph.D., MIETE, FIETE, MIE

Name of the Students:

A. PAVITHRA (19091A04D6)
S. SUMATHI (19091A04M4)
T. MAHESH (20095A0409)
D. MANIK BASHA (19091A04A3)

Abstract:

Electronic microscopic images play a vital role in medical pathology. These images are basically low contrast images. In order to extract the details from these images, it is necessary to enhance these images. In this work, an innovative image enhancement and feature extraction technique is proposed. This technique uses a modified sigmoid function that accommodates the original microscopic input image characteristics. A novel block-based input value coupled with the modified sigmoid function is used in this proposed technique in order to provide good contrast enhancement of an image. Singular value decomposition plays an important role after DCT because the singular value matrix determines the intensity values of the input microscopic images. Changes in the singular values have an immediate impact on the intensity of the microscopic input images. The proposed methodology essentially converts the input image into the SVD-DCT domain, normalizes the singular value matrix, and finally reconstructs the enhanced image using inverse DCT.

HEAD OF THE DEPARTMENT

Dr. T. JAYACHANDRA PRASAD
M.E Ph.D.,
PRINCIPAL
M College of Engg. & Tech.,
(Autonomous)
NANDYAL-518 501, Nandyal (Dt), A.P.

Process of CO-PO attainment for Project thesis of IV-year Main Project

Course Outcomes:

1. To identify the problem formulation of the project after literature survey or study of existing technology
2. To analyze the basic concepts of the project in correlation with the engineering knowledge
3. To apply the concepts of technology with modern tool usage to overcome the problem.
4. To formulate the solution and to design simulation and prototype of the solution with the engineering knowledge.

CO-PO Mapping:

CO/P O	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	2	-	2	-	-	-	-	-	3	-	-	-
CO3	2	-	-	-	-	-	-	-	3	-	3	-
CO4	2	-	2	-	2	-	-	-	3	-	3	-

Evaluation:

Project work	100	External evaluation	This end viva voce in project work for 100 marks
	25	Internal evaluation	These 25 marks will be based on the performance of the student in the project reviews apart from attendance and regularity

Table: Percentage Weightages for each CO:

S.No.	REG	IM 25M	EM grade	TM 125M	EM 100M	%IM	%EM	CO1	CO2	CO3	CO4	N.CO1	N.CO2	N.CO3	N.CO4
1	19091A04D6	23	10	119	96	92	96	22.72	34.4	19.04	19.04	85.22	103.21	95.24	95.24
2	19091A04M4	23	10	112	89	92	89	21.6	32.16	17.92	17.92	81.02	96.48	89.64	89.64
3	20095A0409	20	8	98	78	80	78	18.88	28.16	15.68	15.68	70.81	84.48	78.43	78.43
4	19091A04A3	17	7	86	69	68	69	16.48	24.8	13.76	13.76	61.81	74.40	68.83	68.83

Table: Weightage marks for each CO:

	CO1	CO2	CO3	CO4
Internal	40	20	20	20
External	20	40	20	20
Average	26.66	33.33	19.99	19.99

Table: Percentage Attainment Values for each CO

	Co1		C02		C03		Co4	
Above & Equal 60%	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Between 40-60%	**0**	**2**	**0**	**2**	**0**	**2**	**0**	**2**
Below40%	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
Total students	**4**		**4**		**4**		**4**	
Attainment value		**3.00**		**3.00**		**3.00**		**3.00**
% of attainment		100.00		100.00		100.00		100.00
Attained or not (Greater 50% Y, Not Means N)		**Y**		**Y**		**Y**		**Y**

Dr. KETHEPALLI MALLIKARJUNA
B.E, M.Tech, Ph.D, MISTE, FIETE, MIE
Dr. Kethepalli Mallikarjuna
HOD of ECE
Department of ECE
RGM College of Engg. & Tech. (Autonomous)
NANDYAL - 518 501, Kurnool (Dist), A.P.

Dr. T. Jayachandra Prasad
Principal

DR. T. JAYACHANDRA PRASAD M.E,Ph.D.,
PRINCIPAL
R.G.M College of Engg. & Tech.,
(Autonomous)
NANDYAL-518 501, Nandyal (Dt), A.P.

A PROJECT REPORT ON

A NOVEL IMAGE ENHANCEMENT FOR ELECTRON MICROSCOPIC IMAGES

Submitted in partial fulfilment of the Requirement for the award of the degree of

BACHELOR OF TECHNOLOGY
IN
ELECTRONICS AND COMMUNICATION ENGINEERING

Submitted by

Project Associates	Regd. No
A. Pavithra	19091A04D6
S. Sumathi	19091A04M4
T. Mahesh	20095A0409
D. Manik Basha	19091A04A3

Under the Esteemed Guidance of

Dr. V. N. V SATYA PRAKASH
M.Tech, Ph.D., MIETE, FIETE, MIE

PROFESSOR DEPARTMENT OF ECE

(ESTD-1995)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
Affiliated to J.N.T.U.A - Anantapuramu, Approved by A.I.C.T.E - New Delhi,
Accredited by N.B.A - New Delhi, Accredited by NAAC with A+ Grade – New Delhi
NANDYAL –518501, NANDYAL Dist. A.P.

YEAR: 2019 – 2023

Dr. KETHEPALLI MALLIKARJUNA
B.E, M.Tech, Ph.D, MISTE, FIETE, MIE
Professor & HOD
Department of ECE
RGM College of Engg. & Tech. (Autonomous)
NANDYAL - 518 501, Kurnool (Dist), A.P.

Dr. T. JAYACHANDRA PRASAD
M.E,Ph.D.,
PRINCIPAL
R G M College of Engg. & Tech.,
(Autonomous)
NANDYAL-518 501, Nandyal (Dt), A.P.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY

AUTONOMOUS

(Approved by A.I.C.T.E - New Delhi, Affiliated to JNTUA - Anantapuramu,
Accredited by NBA - New Delhi, Accredited by NAAC with 'A+' Grade - New Delhi)

NANDYAL – 518 501, A.P, India

CERTIFICATE

This is to certify that the dissertation entitled "A NOVEL IMAGE ENHANCEMENT FOR ELECTRON MICROSCOPIC IMAGES" is being submitted by A. Pavithra (19091A04D6), S. Sumathi (19091A04M4), T. Mahesh (20095A0409), D. Manik Basha (19091A04A3) under the guidance of Dr. V.N.V SATYA PRAKASH for the award of B.Tech Degree in Electronics and Communication Engineering, Rajeev Gandhi Memorial College of Engineering & Technology, Nandyal (Autonomous) (Affiliated to J.N.T.U.A Ananthapuramu) is a record of bonafide work carried out by them under our guidance and supervision.

Head of the Department
Dr. K. MALLIKA RJUNA,
M.Tech, Ph.D., MISTE, MIFTEM

Dr. V.N.V. SATYA PRAKASH
B.Tech, M.Tech, Ph.D.MISTE,MIETE, FIETE
Professor
Department of E.C.E.
R.G.M College of Engg. & Tech., (Autonomous)
NANDYAL - 518 501, Kurnool (Dist), A.P.

Project Guide:
Dr.V.N.V SATYA PRAKASH
M.Tech, Ph.D., MIETE, FIETE

Professor
Department of ECE
RGM College of Engg. & Tech. (Autonomous)
NANDYAL-518 501, Kurnool (Dist), A.P.

Signature of the External Examiner:

Date of Viva-Voce: 04/05/23

ABSTRACT

Electronic microscopic images play a vital role in medical pathology. These images are basically low contrast images. In order to extract the details from these images, it is necessary to enhance these images. In this work, an innovative image enhancement and feature extraction technique is proposed. This technique uses a modified sigmoid function that accommodates the original microscopic input image characteristics. A novel block-based input value coupled with the modified sigmoid function is used in this proposed technique in order to provide good contrast enhancement of an image. Singular value decomposition plays an important role after DCT because the singular value matrix determines the intensity values of the input microscopic images. Changes in the singular values have an immediate impact on the intensity of the microscopic input images. The proposed methodology essentially converts the input image into the SVD-DCT domain, normalizes the singular value matrix, and finally reconstructs the enhanced image using inverse DCT.

Dr. KETHEPALLI MALLIKARJUNA
B.E, M.Tech, Ph.D, MISTE, FIETE, MIE
Professor & HOD
Department of ECE
RGM College of Engg. & Tech. (Autonomous)
NANDYAL - 518 501, Kurnool (Dist), A.P.

Dr. T. JAYACHANDRA PRASAD M.E,Ph.D.,
PRINCIPAL
R G M College of Engg. & Tech.,
(Autonomous)
NANDYAL-518 501, Nandyal (Dt), A.P.

Chapter -7

CONCLUSION AND FUTURE SCOPE

7.1 Conclusion:

This work mainly consists of Adaptive contrast enhancement technique with modified sigmoid function and DCT for microscopic image enhancement and feature extraction. This method has been tried on various microscopic and other images with varying contrast and resolution. The proposed work's subjective and qualitative enhancing efficiency has been assessed. Based on MSE, PSNR, EME, the proposed technique's enhancement results are compared to those of other existing enhancement techniques for electron microscopic images. As a result, we can infer that the proposed algorithm outperforms other current image-enhancing approaches for smaller block size in terms of superiority and resilience. The findings depicts that the proposed strategy for contrast enhancement and feature extraction of electron microscopic images works efficiently and effectively. After enhancing electron microscopic pictures of actinomycetes, numerous highly significant and authentic properties such as long _lament, coil or spiral, spore and rod form structures are extracted for feature extraction. This proposed technique can be applied to various images, including satellite images, radar photos, cardiac ECHO images, X-ray images, MRI images, electron microscope images, micro-organism images, and real-life photographic images with poor contrast issues during acquisition.

7.2 Future Scope:

- Electron microscopic images can suffer from various types of image artifacts and noise, which can reduce their quality and make it difficult to interpret the images accurately.

- One novel approach to enhancing electron microscopic images is to use deep learning-based methods. Deep learning is a type of machine learning that can learn complex patterns and relationships in data through multiple layers of neural networks.
- One potential approach is to use a generative adversarial network (GAN) to enhance electron microscopic images. GANs consist of two neural networks, a generator and a discriminator, that work together to generate realistic images from a given input.
- This proposed technique can be applied to various images, including satellite images, radar photos, cardiac ECHO images, X-ray images, MRI images, electron microscope images, micro-organism images, and real-life photographic images with poor contrast issues during acquisition.
- In the case of electron microscopic images, the generator network could be trained on a large dataset of high-quality images to learn the underlying patterns and structures in the images.
- The discriminator network could then be used to evaluate the quality of the generated images and provide feedback to the generator, helping it to improve its output.

Dr. KETHEPALLI MALLIKARJUNA
B.E, M.Tech, Ph.D, MISTE, FIETE, MIE
Professor & HOD
Department of ECE
RGM College of Engg. & Tech. (Autonomous)
NANDYAL - 518 501, Kurnool (Dist), A.P.

Dr. T. JAYACHANDRA PRASAD
M.E., Ph.D.,
PRINCIPAL
College of Engg. & Tech.,
(Autonomous)
518 501, Nandyal (Dt), A.P.