UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

SEGMENTATION OF GRANULATION IN DIABETIC FOOT ULCER BY USING IMPROVED FUZZY C-MEANS METHOD

P3S18

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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TABLE OF CONTENTS

ACKNOWLEDGEMENT ii

TABLE OF CONTENTS iii

LIST OF TABLES v

LIST OF FIGURES v

ABSTRACT vii

CHAPTER 1: INTRODUCTION 1

1.1 Overview 1

1.2 Introduction 1

1.3 Problem Statement 4

1.4 Objectives 5

1.5 Significance and Project Benefit 5

1.6 Scope and Limitations 6

1.7 Definition of Terms and Abbreviations 7

CHAPTER 2: BACKGROUND THEORY AND LITERATURE REVIEW 8

2.1 Overview 8

2.2 Image Segmentation 8

2.3 Fuzzy C-Means Method 9

2.3.1 Applications of Fuzzy C-Means Method 14

2.3.2 Mathematical Preliminary of Fuzzy C-Means Method 16

2.4 Morphological Reconstruction 19

2.5 Median Filtering 20

CHAPTER 3: METHODOLOGY AND IMPLEMENTATION 22

3.1 Overview 22

3.2 Phase 1: Data Acquisition 23

3.3 Phase 2: Image Preprocessing 25

3.4 Phase 3: Image Segmentation by using Improved Fuzzy C-Means Method 32

3.5 Phase 4: Image Post Processing 47

3.6 Phase 5: Performance Evaluation 51

3.6.1 Accuracy 51

3.6.2 Sensitivity 54
CHAPTER 4: RESULTS AND DISCUSSION 56
4.1 Overview 56
4.2 Segmentation of Granulation in Diabetic Foot Ulcer by using IFCM 56
4.2.1 Parameter Analysis of Improved Fuzzy C-Means Method 60
4.3 Performance Evaluation 63
4.3.1 Accuracy 63
4.3.2 Sensitivity 65
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS 68
5.1 Overview 68
5.2 Conclusion 68
5.3 Recommendations 69
REFERENCES 70
APPENDICES 74
APPENDIX A: Source Code of IFCM Implemented in MATLAB R2018a 74
APPENDIX B: Another 15 Samples of Parameters Used in IFCM 76
APPENDIX C: Successful Segmentation Results by using IFCM 77
APPENDIX D: The Area of Segmentation Results and Expert Findings 84

ABSTRACT

Fuzzy C-Means (FCM) is a method that has been broadly used in image segmentation of medical imaging. However, up until now it is hard to find a suitable method that can be applied in segmenting the granulation in a diabetic foot ulcer (DFU) images. This is because the complexity of a true colour images which included noise, blur and intensity non-uniformity always cause difficulties in segmentation process. FCM is also related to the repetitive computation of the distance between pixels within clustering centers and local spatial neighbours that makes the images having a complexity in computation. In order to overcome this issue, an Improved Fuzzy C-Means (IFCM) method based on Morphological Reconstruction (MR) and Median Filtering (MR) are used in this study. MR utilize the local spatial information of images in order to enhance the segmentation results. Meanwhile, the employment of MF is to modify the membership partition of the distance computation between pixels within local spatial neighbours in order to improve an image detail preservation and the noise-immunity of the images. The IFCM was tested on 30 DFU images that were taken by using smartphone where the segmentation is focused on the red part of the wound which called as granulation tissue. The performance of the segmentation results is measured in terms of accuracy and sensitivity based on percentage relative error obtained by comparing the area of image segmentation results using IFCM and expert findings. The results show that the percentage average relative error is 6% which implies the accuracy and sensitivity of the method of 94% and 93% respectively. From the results achieved, it is proven that the method used is applicable in segmenting the granulation of DFU images efficiently and effectively. In future study, the use IFCM can be extended to other types of medical imaging, predominantly on open cut wound.