PROJECT PROPOSAL FOR DIGITAL IMAGE PROCESSING

CST 382-3

MELANOMA SKIN CANCER DETECTION BASED ON IMAGE PROCESSING

D.M.K.L. Dissanayake **UWU/CST/17/017**

Computer Science & Technology

I.K.G.Iddamalgoda **UWU/CST/17/025**

Computer Science & Technology

H.A.H.Tharudini **UWU/CST/17/058**

Computer Science & Technology

Computer Science and Technology

Department of Computer Science and Informatics

Uva Wellassa University

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Project Title

Melanoma Skin Cancer Detection Based On Image Processing

Student Details

Registration No	Name	Degree program	Email	Contact No
UWU/CST/17/017	D.M.K.L. Dissanayake	Computer Science & Technology	cst17017@std.uwu.ac.lk	0716573668
UWU/CST/17/025	I.K.G. Iddamalgoda	Computer Science & Technology	cst17025@std.uwu.ac.lk	0713344084
UWU/CST/17/058	H.A.H. Tharudini	Computer Science & Technology	cst17058@std.uwu.ac.lk	0786339297

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1. Introduction

1.1Project Background

Melanoma is a deadly form of skin cancer that accounts for only 4% of skin cancers but is responsible for 75% of skin cancers. Melanoma can be cured if diagnosed and treated early, but if the diagnosis is delayed, the melanoma can grow deep into the skin and spread to other parts of the body. It is difficult to treat as it spreads to other areas beyond the skin and can be dangerous. Melanoma is caused by the presence of melanocytes anywhere in the body. Severe skin exposure to ultraviolet rays is the leading cause of melanoma.

The number of deaths from melanoma skin cancer has continued to rise over the past few years. Figure 1 shows the estimated new morbidity and mortality due to melanoma skin cancer in the United States, according to the American Cancer Society. According to the table, the estimated number of patients will continue to rise and in 2018 it will reach 91,270. The death toll from melanoma skin cancer peaked in 2016 at 10,130.

Year	Estimated New Cases	Estimated Deaths
2014	76,100	9,710
2015	73,870	9,940
2016	76,380	10,130
2017	87,110	9,730
2018	91,270	9,320

Figure 1:Estimated Skin Cancer Cases and Deaths

Dermoscopy is a non-invasive test method based on the use of incident light and oil immersion to visually examine the intradermal structures of the skin. Although the diagnosis of melanoma using dermoscopy is higher than the 3 diagnoses based on unsupported observations, its diagnostic accuracy depends on the training of the dermatologist. Melanocytes don't diagnose melanoma directly, especially in the early stages.

Early detection of melanoma and other skin cancers can increase a patient's chances of survival. Therefore, there is an increasing need for an automated skin cancer detection system with high accuracy. There are two types of images used to diagnose skin cancer. The dermoscopy image is captured by a specialized dedicated system in the pathology center, focusing on the area of interest with high magnification. A computerized semi-automated system can assign these types of images for sorting. By the way, in this technique, the patient must always go to the pathology center and seek the advice of a skilled dermatologist. On the other hand, if the patient has computer software that can automatically detect skin cancer from a digital image captured by any digital image capture system without paying much attention to the area of interest, the test can be performed at any time, even at home.

1.2Problem Definition

Skin cancer is a deadly disease.Skin has three main layers. Skin cancer begins in the outer layer, the first layer of cells, the second layer of basal cells, and the inner or third layer of melanocytes. Squamous cells and basal cells are sometimes referred to as non-melanoma cancers. Non-melanoma skin cancers always respond to treatment and rarely spread to other skin tissues. Melanoma is more dangerous than most other cancers. If not detected early, it can quickly invade surrounding tissues and spread to other parts of the body.

Researchers found that they help prevent cancer by stopping the growth of free radicals in our body. Early detection of melanoma can dramatically prevent the cause of death from malignant cancer. There are two main problems in diagnosing the disease:

1) Ignoring skin lesions or lack of access to a dermatologist can vary fatally from skin lesions.

2) Skin lesions are not correctly identified due to similar symptoms. For example, melanoma and Clarke are two similar skin lesions, but melanoma has been identified as a deadly cancer and Clarke is a skin lesion. Recently, many systems and algorithms have been developed to detect fatal injuries by dermoscopy.

Since this cancer is a deadly cancer, it would be a great relief to the patient if the cancer could be detected early by images instead of being examined without spreading to other parts of the body. If the disease can be diagnosed without laboratory research, it will be easier for labouratists as well as dermatologists.

1.3Project Aims/ Objectives

- Main objective of the project is to design a small system for detecting melanoma skin cancer from an image of affected skin regions.
- It is used for cancer detection and treatment in earlier.
- Diagnosis of the disease by taking tissue from the wound and taking external images without causing pain to the patient.
- Facilitate researchers and dermatologists as they do not conduct laboratory research.

2. Project Description

At present, it is indeed very important to automatically observe and analyze cancer diseases at regular intervals in the first stage. Irregular stripes have one of the most important features (including in most dermoscopy algorithms), and these features show a high correlation with cancer and basal cell malignant growth diseases. The diagnostic test technology used for detection is the most painful and harmful. Therefore we tend to measure the square of machine-driven inspections. Here, we tend to take a square measure of the detection selected by GLCM. The selected square measurement of skin damage extracts the normalized symmetric gray-level co-occurrence matrices GLCM.GLCM is extracted from each of the four classes based on the texture selected square measurement and provided as input to the multi-class support vector machine for classification purposes.

3. Methodology

As the number of cancers in the world is increasing day by day, the classification of cancer images is an important task and this cancer contains various tools that can be used to capture images from time to time and is used for a wide range of applications. Thus, there is a current field of research for the classification of cancer representations and the classification results can be used for a variety of real-time applications. This method proposed a new approach to classify six classes of actinic keratosis, basal cell carcinoma, cherry nevus, dermatofibroma, melanocytic nevus, and melanoma using carcinogenesis. The system isolates its functions at different stages in order to achieve a system-friendly cancer image classification framework; These stages are important to provide better classification accuracy and the next page describes these stages in detail.**Proposed System Flow Architecture**

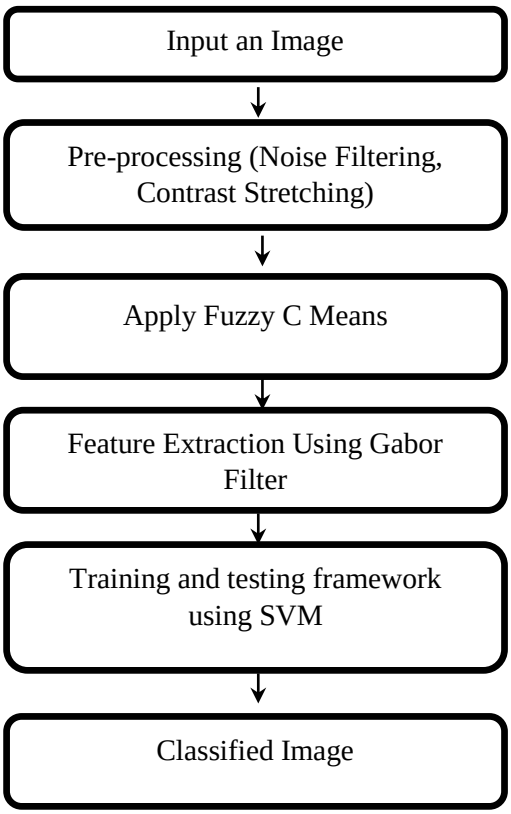

Figure 2:Sytem Flow Architecture

Step 1:-Input image

Select cancer images for classification.

Step 2:-Preprocessing (noise filtering, contrast stretching)

Noise filtering is used to filter out unwanted information, and use the image processing toolbox to remove various types of noise from the image.

Step 3:-Apply fuzzy C-means

Fuzzy C means used for image segmentation and clustering.

Step 4:- Use Gabor filter for feature extraction

The GLCM & Gabor filter extracts feature vectors from the input cancer pictures (such as textures). Texture elements are extracted from RGB color pictures. The GLCM function characterizes these texture features of the image by calculating the frequency of pixel pairs with specific values and specific spatial relationships in the image and the global color histogram to extract the color features of cancer pictures.

Step 6: - Training and testing framework using SVM

Support vector machine algorithm uses these elemental vectors (color and texture) to form and train our proposed structure. Each cancer image is stored in a database containing colors and patterns and this feature classification will be used for the next stage.

This proposed structure categorizes cancer images into different classes using SVM according to the component vectors, color and texture.

For class classification of images with images, different distance parameters are used to measure the similarity of features. Here, evaluate the similarities between the features of the query image and the features of the database images using the achieved SVM classification.

The SVM classifier calculates the feature value of the input image and the feature value of the database images, based on which the SVM classifier classifies the class of input image.

Step 7: - Classified Image

They are classified into five categories or other than these six variants as to whether there is an input image.

4. Individual Contribution and Work Plan

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- Dataset collection
- Test dataset
- preprocessing data
- Experimentation (data balancing)
- Image segmentation & clustering by applying Fuzzy C Means
- Literature review

UWU/CST/17/025

- Dataset collection
- Test dataset
- Preprocessing data
- Experimentation (data balancing)
- Classification using SVM method
- Literature review

UWU/CST/17/058

- Dataset collection
- Test dataset
- Preprocessing data
- Experimentation (data balancing)
- Feature extraction using Gabor Filter
- Literature review

5. Resources Needed

Hardware Requirements

- Laptop/ Personal Computer
- Monitor

Software Requirements

- MATLAB

6. Project Time-line(Gantt chart)

	April	May	June	July	Aug
Identify Research Area					
Literature Review					
Research Design					
Dataset Collection					
Pre-processing					
Apply Fuzzy C Means					
Feature Extraction Using Gabor Filter					
Training and testing framework using SVM					
Skin cancer detect using Classified Image					

Table 1: Project Time-line

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