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A Supervised Classification of Dermoscopic Images Using Watershed Transform and Recurrent Neural Network

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Abstract
Medical image segmentation is the utmost imperative procedure to assist in the conception of the structure of prominence in medical images. Malignant melanoma is the most recurrent types of skin cancer but it is remediable, if diagnosed at a premature stage. Dermoscopy is a non-invasive, diagnostic tool having inordinate possibility in the prompt diagnosis of malignant melanoma, but their interpretation is time overwhelming. Numerous algorithms were established for classification and segmentation of Dermoscopic images. This Research work proposes the tasks of extracting, classifying and segmenting the Dermoscopic image using a more efficient supervised learning approach, I.e., Recurrent neural networkfor more accurate and computationally efficient segmentation. The features are extracted from the Dermoscopic image using watershed based classification approach and these accurate features are used to train the multi-layer classifier. The trained networks are used for segmentation of malignant melanoma from the skin. The results will be comparing with the ground truth images and their performance is evaluated after completion of work. The results will be in form of various validation parameters and should outperform the existing supervised learning approaches.

Keywords: image segmentation; malignant melanoma; watershed transform; neural network.

Introduction

Skin cancer is one of the most common cancers in humans. Malignant melanoma is the most deadly form of skin cancer, and its incidence has been rapidly increasing over the last years. Successful treatment of melanoma depends directly on early diagnosis, because when detected in an early and non-invasive stage, the malignant melanoma can surgically be removed (excised) with an excellent prognosis for the patient [1, 2].

In order to improve the accuracy of melanoma diagnosis various imaging techniques have been explored. Among these, dermoscopy is clinically one of the most relevant imaging techniques for pigmented skin lesions diagnosis. Dermoscopy is a non-invasive diagnostic technique for in vivo observation, allowing a better visualization of the surface and subsurface structures, and the recognition of morphologic structures not visible by the naked eye [3, 4].

The increasing demand for dermoscopic exams calls for the development of computer-aided diagnosis systems that can assist the clinicians.

Related Work

MACHINE LEARNING ALGORITHMS

Vennila, G.S. proposes the tasks of extracting, classifying and segmenting the Dermoscopic image using the machine learning algorithms. The algorithms such as Back Propagation network (BPN), Radial Basis Function Network (RBF) and Extreme Learning Machine (ELM) are used. [5]

FUZZY CLUSTERING TECHNIQUES

Devi, R.S. explains the task of segmenting skin lesions in Dermoscopy images based on intelligent Fuzzy clustering techniques for the early diagnosis of Malignant Melanoma. [6]

SKIN LESION BORDERS

Lezoray, O. present a novel method to detect skin lesion borders in multispectral dermoscopy images. First, hairs are detected on infrared images and removed by inpainting visible spectrum images. Second, skin lesion is pre-segmented using a clustering of a superpixel partition. Finally, the pre-segmentation is globally regularized at the superpixel level and locally regularized in a narrow band at the pixel level. [7]

PIGMENTED SKIN LESIONS

Wazefi, Y. investigated to what extent the melanoma diagnosis can be impacted by an automatic system using dermoscopic images of pigmented skin lesions. Author proposed a simple fusion strategy (highest-risk approach) with the automatic diagnosis, which improves the dermatologists' daily practice performance. [8]

THRESHOLD

Angellina, S. explains a new image segmentation algorithm, for the early diagnosis of the skin cancer, is proposed where the dermoscopic images are segmented using a threshold. [9]

Research Objective:

Keeping the research indications in view, it has been realized that there exists enough scope to improve the . In this research the objectives are concerned to the followings:

i. To simulate an expert's diagnostic approach
ii. provide essential information for an accurate diagnosis
iii. the extraction of other critical clinical indicators and dermoscopy structures
iv. how to analyze a given digital dermoscopic image for detecting pigment networks and streaks

Methodology:

This research is carried out by using analytical methodology and experimental methodology in which findings from earlier researches are analysed to build software to study skin cancer using watershed algorithm and recurrent neural network. The consequence of algorithm is tested by taking different systems already available. The edges will be located in a superior manner. On the premise of these research methodologies

the acquired result analyse the coding techniques. These research methodologies are the fundamental building blocks of research carried out.

Conclusion:

The proposed methodology will implement in the MATLAB 7.4.Evaluate both the approaches for the modeling of the reusability data. Implement the model and test the performance of the model using following criteria:

i. Perform the training of the dataset.

ii. After training, test it on the basis of error values MAE(Mean Absolute Error) and RMSE(Root Mean Squared Error), and efficiency parameters like accuracy and net reliability in percentage.

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