PERFORMANCE EVALUATION OF DIGITAL FUNDUS IMAGES

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Abstract—**The fundus image quality is an important parameter in medical applications because the system can predict accurate diagnosis. Sometimes the images captured are of low quality and cannot be used for diagnosis requiring repeat image acquisition. In existing method, to evaluate fundus image quality histogram based supervised method is used. In this method the retinal parameters can affect the brightness and intensity corresponds to background region. To overcome these limitations to introduce a new proposed method. In this proposed method, the quality of fundus image based on Focus Features (FF) can be improved. This method starts with the preprocessing techniques like contrast limited adaptive histogram equalization method (CLAHEM) using Bilateral Filter Processing (BIFP) and gamma correction using Hybrid Median Filter (HMF). Afterwards, features are extracted by retinal image quality indicator like sharpness and illumination, colour, contrast and focus. Finally, these FF indicators are classified through a different classifier and calculated the system performance.**

I. INTRODUCTION

The quality of an image is very subjective since it highly depends on one's perception of that image. It also depends on the ultimate goal for the use of the image in a specific application. Interpreting an image is different between two persons, who might have a different way to look at the image, a different way in mind to analyze the content of the image, and already thought about the type of analysis and interpretation they want to perform on the image. For example, an ophthalmologist looking at a retinal image may rate the image's quality as very good for lesion detection, while a non-retinal specialist may consider the image quality as poor since he/she does not know how to identify the lesions. Image Quality Extension (IQE) helps remove the subjectivity factor. Continuing with the retinal images example, the IQE process begins with ophthalmology experts manually grading a set of training images, assigning each to a specific class.

II. OBJECTIVE

The main objective of this project is to determine the quality of image whether it is good or bad. The proposed method has been divided into three modules: pre-processing, focus features and classification. For pre-processing, Hybrid Median Filter (HMF) and Bilateral Filter Preprocessing (BIFP) have been employed. Focus Features (FF) has been done using sharpness, illumination, colour, contrast, focus. Then enter into the classification phase, it classifies sharpness, illumination, colour, contrast and focus quality of an image with various classifiers and calculated its system performance is achieved by receiver operating characteristic (ROC).

III.PERFORMANCE EVALUATION

The classifier performance can be evaluated using receiver operating characteristic (ROC) analysis and the respective area under the curve (AUC).

ROC curve

ROC curves plot the true positive fraction (or sensitivity) versus the false positive fraction (or one minus specificity).

Sensitivity

Sensitivity refers to the ability to classify an image as adequate related to focus, when it really is focused.

$$\text{Sensitivity} = TP/(TP+FN)$$

Specificity

Specificity refers to the capacity of classification of images out of focus as defocused.

$$\text{Specificity} = TN/(FP+TN)$$

Accuracy

Accuracy was calculated by the fraction of images correctly assigned in the total number of classified images, at the operating point.

$$\text{Accuracy} = (TP+TN)/(TP+TN+FP+FN)*100$$

Where, TP→True Positive, TN→True Negative, FP→False Positive, FN→False Negative.

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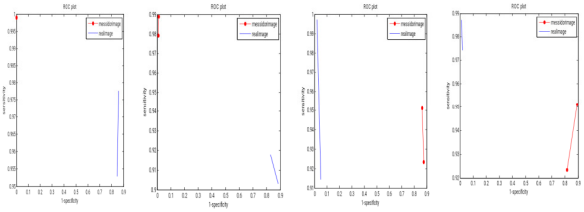
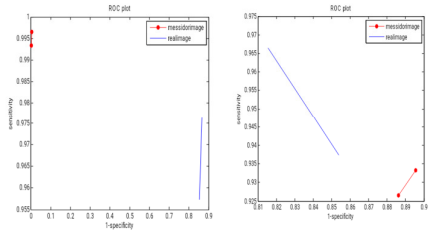
III. IMPLEMENTATION RESULT

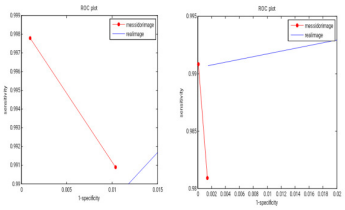
The ROC plot due to sharpness & illumination quality individually in DSVM Classifier using HMF & BIFP. In this graph red line shows that MESSIDOR images and blue line shows that real time images.



The ROC plot due to colour & contrast quality individually in DSVM classifier using HMF & BIFP.



The ROC plot due to combined all FF quality in DSVM classifier using HMF and BIFP.

IV. 

IV.CLASSIFICATION RESULT

The classifier result due to all FF like sharpness, illumination, colour, contrast and focus.

A.Accuracy for All FF Individual Quality in DSVM Classifier

FOCUS FEATURES	ACCURACY FOR MESSIDOR IMAGES		ACCURACY FOR REAL IMAGES	
	USING HMF	USING BIFP	USING HMF	USING BIFP
Sharpness	100	100	99.6	99.2
Illumination	97	97.1	100	100
Colour	95.62	95.4	95	95.17
Contrast	100	100	100	100
Focus	100	95	95	93

B.Accuracy for Combined All FF Quality in Different Classifiers

CLASSIFIER	ACCURACY FOR MESSIDOR IMAGES		ACCURACY FOR REAL IMAGES	
	USING	USING	USING	USING
	HMF	BIFP	HMF	BIFP
KNN	82.19	83.48	84.33	84.09
NB	86.413	87.92	88.08	87.68
SVM	95.47	97.01	96.11	98.07
DSVM	100	100	100	100

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