Implementation of a Squint Eye Using Support Vector Machine & Image Tool

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Abstract— Squint Analysis comes under a Biometrical study, which is a very important research problem with respect to Testing of medical problem for diagnosis. So far most of & Biometrical research work has been carried out using template based approach for & Testing of medical problem. Squint eye Detection (SED) is one of the biometrical research problems, which can be applied for medical diagnosis. As per literature most of the work has been carried out for the detection of various problem like left or right squint detection, red eye detection, angle of squint detection, recovery type of problems using squint analysis, Training and Testing phases using soft-computing tools and so on. The methods that have been applied so far are not based on support vector machine. Very slight extent of work has been carried out with Training and Testing set using SVM tools like Artificial Neural Network (ANN). In the present thesis work Neural Network approach (SVM) has been applied for SED problem that is completely based on training feature and testing feature. The work has been carried out in two different phases: Training set and Testing set. In the Training set, first an input eye image is enriched and compressed for the removal of distortion with loss less information, and then relevant geometrical features are extracted, which are then used in neural network in Testing phase for the detection of squint eye problem. This process has been carried out by implementing an algorithm developed in the present thesis work. To summarize this detection process first an unknown eye image has been studied with proper enhancement, pre-processing and post processing. In the enhancement stage removal of noise from the eye image has been carried out. Later processing stage has been applied for further compression. Hence enhancement and compression has been done using known method SVM. After pre-processing, post processing stage has been carried out for relevant geometric features extraction. The extracted geometric features are used for obtaining Textural Feature and additional features of a particular eye. The present work has been tested only on still images.

Keywords- Divergent squint, Vertical squint, SVM, Training Set, Testing Set.

I. INTRODUCTION

The medical name for squint is abnormal condition. It's a condition wherever the eyes don't look within the same direction. While one eye appearance forwards to specialize in associate object, the opposite eye turns either inwards, outwards, upwards or downward. Within the modern times most of the work ended human eye has been administered for the detection of left, right squint, detection of red eye, detection of angle of squint, recovery form of drawback exploitation squint analysis and applied mathematics approach with PCA and example matching on soft-computing like Artificial Neural

Network, Training section and Testing section so on. This work has been administered exploitation Support Vector Machine (SVM) for detection of squint eye, within which essentially coaching and testing of options are done.

I. ROLE OF BIOMETRIC

During this study, "Biometrics" means that "life measurement" however the term is typically related to the utilization of distinctive physiological characteristics to spot a private. The appliance that most of the people escort statistics is security. Statistics identification has eventually a far broader connection as laptop interface becomes a lot of natural. Knowing the person with whom you're conversing is a crucial a part of human interaction and one expects computers of the longer term to possess identical capabilities. A number of biometric traits are developed and are wont to evidence the person's identity. The concept is to use the special characteristics of someone to spot him. By exploitation special characteristics they have a tendency to mean the exploitation the options like face, iris, fingerprint, signature etc.

There are many styles of identification schemes and frequently divided into 2 quantities that is:

- Physiological
- Behavioral

1. Physiological

- **Face:** the analysis of facial characteristics
- **Fingerprint:** the analysis of somebody's distinctive fingerprints.
- **Hand geometry:** the analysis of the form of the hand and therefore the length of the fingers.
- **Retina:** the analysis of the capillary vessels situated at the rear of the attention.
- **Iris:** the analysis of the coloured ring that surrounds the eye's pupil.

2. Behavioral

- **Signature**: the analysis of the approach someone signs his name.
- **Vein:** the analysis of pattern of veins within the back if the hand and therefore the wrist joint
- **Voice**: the analysis of the tone, pitch, cadence and frequency of somebody's voice.

II. METHOLODGY USED

There are four problems that can be associated with Squint eye Testing (SET).The First problem is the detection of noise and loss-less information in the image. Due to presence of noise the performance of the system may degrade. The second problem is the selection and extraction of relevant features from enhanced and compressed image, the third problem is forming neural network for squint eye analysis. The fourth problem is the Testing problem: given an input eye image, the goal is to find out whether the eye is squint eye or normal eye using neural network.

1. **Training set**

A training set is a set of data used in various areas of information science to discover potentially predictive

relationships. Training sets are used in artificial intelligence, machine learning, genetic programming, intelligent systems, and statistics. In all these fields, a training set has much the same role and is often used in conjunction with a test set.

2. **Testing set**

A test set is a set of data used in various areas of information science to assess the strength and utility of a predictive relationship. Test sets are used in artificial intelligence, machine learning, genetic programming and statistics. In all these fields, a test set has much the same role.

3. Support Vector Machine

In machine learning, support vector machines are supervised learning models with associated learning algorithms that analyse data and recognize patterns, used for classification and regression analysis. The basic SVM takes a set of input data and predicts, for each given input, which of two possible classes forms the output, making it a non-probabilistic binary linear classifier. Given a set of training examples, each marked as belonging to one of two categories, an SVM training algorithm builds a model that assigns new examples into one category or the other. An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible.The steps of accomplishing this objective are: Training of data set or sample is done.

- Trained data are obtained.
- Testing of trained data is done.
- Test result are obtained
- Finally result is obtained with detection squint eye.

Training set

The construction of the Squint Model Consists of various steps as depicted in figure. The present work has been divided into two sets· Training Set and Testing Set. The Training starts with a pre-processing step, which consists of two major tasks: De-noising of image and compression of image. The De-noising has been used to obtain the distortion free enhanced image for further processing. The compression of the noise free image is to obtained by using some compression techniques such that the information should not be lost. In this present work compression has been used to compress the noise free image. After obtaining the compressed image some relevant geometric features are extracted, that are fed as input to a neural network for Testing of squint or normal eyes in the Testing set. In this present work some statistical parameters have also been extracted such as: Mean Variance, Skewness, and Kurtosis energy and entropy and so on. In the Testing set the trained neural network can recognize the squint or normal eye by classification based on best fit matching .The neural network performs best fit matching by SVM. In this present work, by using the methods of Support Vector Machine and the relevant geometric features a computer has been formulated.

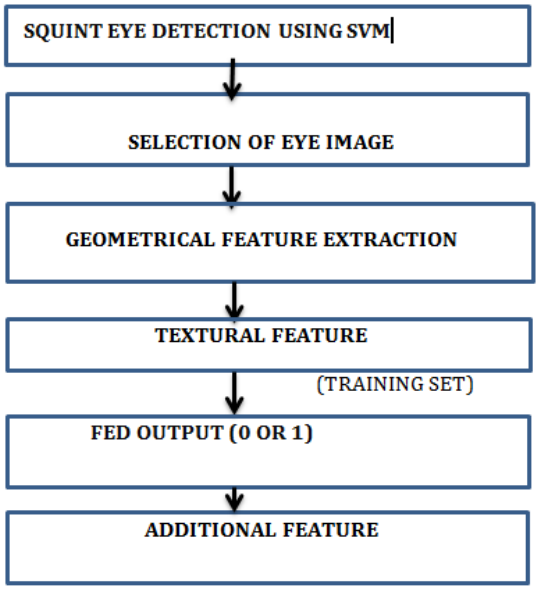

Fig 1.Representation of steps for training set

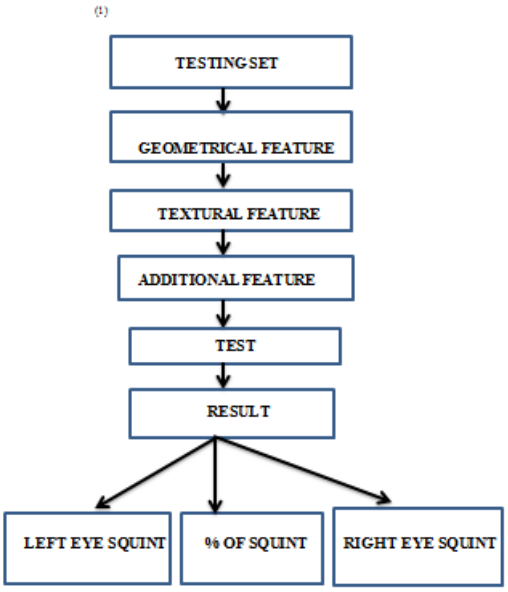

Fig 2. Representation of steps for testing set

Testing set.

This section describes the detection process of the present work. The Testing process for Squint Eye Testing has been depicted in figure 3.4. The Testing process starts with feeding the geometric parameters based on selected geometric natures to the SVM. The neural network then computes the output based on inputs. The binary output generated by neural network has been used for making the decision about Testing process i.e. whether the eye is normal or squint. On the other hand, the statistical parameters calculated in the Training phase of present work that have been used to form the corpus: 'Squint Detection' .Then this trained data can be used in the Testing phase to automate the squint Testing process. In this automatic squint Testing process an unknown eye image is to be pre-processed by de-noising and compression technique for obtaining enhanced image. The relevant statistical features are to be calculated from enhanced image. These calculated features have to be compared against the training model for squint eye Testing.

III. RESULT

To start with first eye image has been read as input in training set and some statistical features have been extracted. After extraction of features additional features of selected eye are calculated because it is training set therefore output has to be feed either 0 or 1 mainly, then additional features are evaluated if denoising images are present with the help of JTOOL denoising can be removed and about 32 features of a particular eyes can be calculated with this tool. once training set of selected data is done then training of data set are done .After this testing process is done which is same as training set mainly only difference occur in providing output in this output is not given though it is already fetched in training of data therefore after testing result is obtained which show whether eye is squint or not and as well as percentage of squint of selected eye.

From the fig it is clear that detection of squint is done with the help of SVM, Which describe the popup menu for cooperating with application. Following Labels are Present in the detection of squint eye using SVM

- Train Feature.
- Trained Feature.
- Test Feature.
- Tested Feature.
- Result.

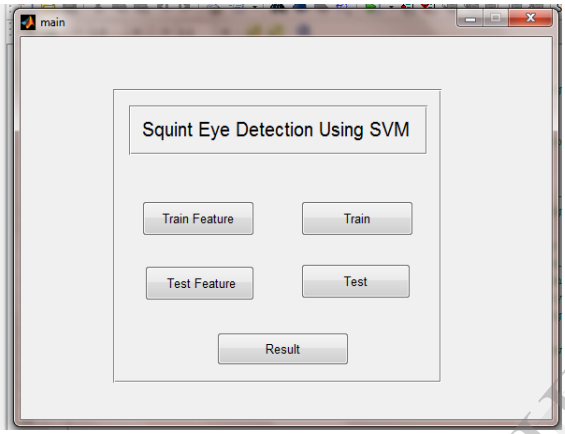

Fig 3. Popup menu for cooperating with application

Shows that after selection of Eye image then geometrical feature are collected for both the eye i.e. for Left eye & Right eye.

Fig 4 : Extraction of Geometric Feature Of selected Eye

Once the geometrical & textural features extraction are done, the OUTPUT is provied to training set i.e. either 0 & 1.With the help of output traininig of seleted data are done and which are strored and obtained with the help of 'TRAIN' option present.

Fig 5: Output Given For Training of Data

After training and testing of data set are done then result are obtained of selected eye image which describe following features:

- Whether eye is squint or not.
- Which eye is squint?
- Percentage of squint.

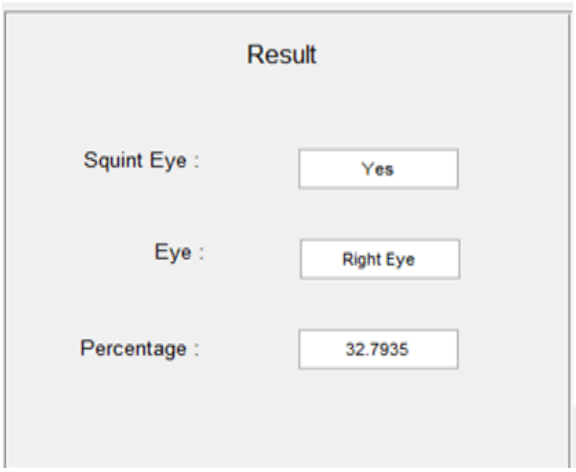

Fig 6: Shows Obtained Result for selected Eye image

3	L		4126	88.46	32.83	78	10	254	52.5	25	54.7	27.3	24.5	84	0.47	0.25
	R		4126	95.45	38.37	82	3	253	52.5	25	52.1	26.9	243	89	0.4	-0.5
4	L		4278	125.6	43.71	162	22	227	55.5	25	53.1	27.9	250	134	-0.3	-1.1
	R		4278	91.84	41.03	84	15	235	54.5	25	48.3	28.2	249	87	-0.3	-1.1
5	L		3788	117.8	62.8	184	4	250	56	21.5	64.9	21.4	243	130	-0.3	-1.1
	R		3788	75.2	48.7	22	2	240	56	21.5	63	21.9	243	76	-0.3	-1.1

Fig 7: Shows Obtained value for specific eye .

Image Tool

Once the detection of squint eye is done then with the help of image tool value of a particular eye can be calculated easily. That is with the help of this tool about 32 feature can of a particular eye can be calculated, which can be compared with the values of normal eye .And a healthy graph can be drawn ,comparing values of squint eye and normal eye and difference can be measured.

DIFFERENT VALUES OBTAINED WITH IMAGE TOOL.

S.No	Eye Type	Image	Area	Mean	Std. dev	Mode	Min	Max	X	Y	Xm	Ym	Per.	Med	Skew	Kurt
1	L		3855	85.15	33.68	85	11	254	53.5	22.6	55.9	24.4	239	86	0.24	0.62
	R		3855	85.15	33.68	85	11	254	53.5	22.6	55.9	24.4	239	86	0.24	0.62
2	L		4524	127.2	56.89	165	9	251	64	22.5	72.9	23.9	272	127	0.01	-1.1
	R		4524	122.2	49.35	88	72	53	64	28.5	58.9	24.6	272	128	0.09	-0.7

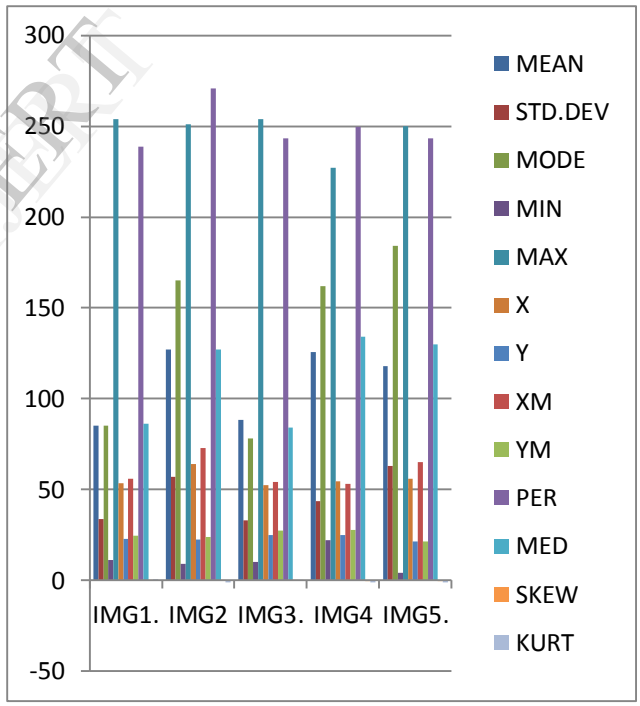

Fig 8 : Graph plotted for all value of left side of eye.

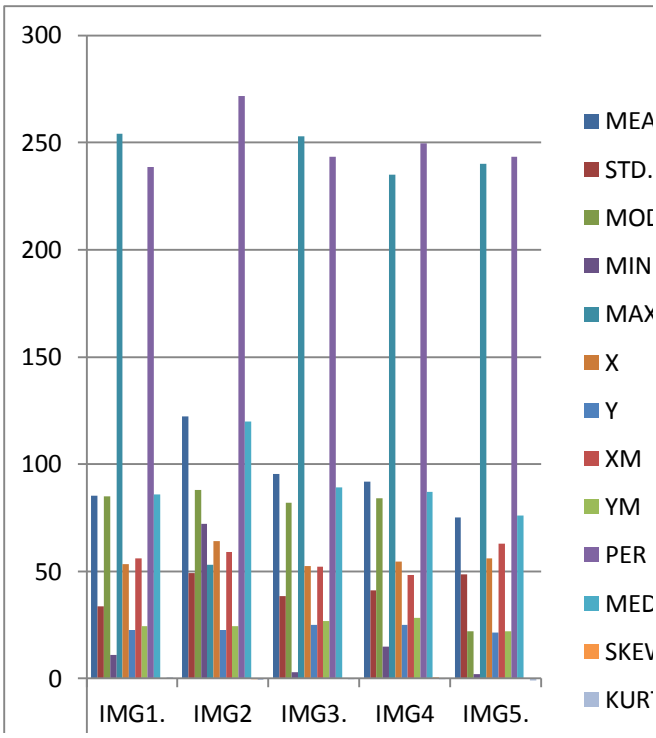

Fig 9: Graph plotted for all value of right side of eye.

V .CONCLUSION AND FUTURE WORK

In this Neural Network approach using SVM has been applied for squint eye detection. The work has been carried out in two different phases: Training phase and Testing phase. In the Training phase first an input image has been de- noised for image enhancement and compressed for distortion removal with loss less information. Then relevant geometric features have been selected and based on the geometric features relevant parameters have been extracted, then using support vector machine the feature vectors have been utilized in the Testing phase to recognize whether the eye is normal or squint as well as percentage of squint is also calculated. . These statistical values have been used for forming the squint model. The present work has been carried out for Testing of eye abnormality of the subjects looking in the straight direction. The present work has been done for recognizing the eye abnormality using only squint images. The further scope of the present work has been indicated out in the next succeeding section . Further the present work can be extended to recognize squint problem from the video. Other direction of sight have to be considered for further study and analysis of squint detection. The flow diagram that has been developed in this work has been tested with necessary test data sets. The efficiency of detection of squint eye has been kept Obtained inception range of 80% and 85%.

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