ABSTRACT

Recent Studies indicate that autism is a brain growth related disorder. Due to the structural and functional connectivity issues, the persons with autism has impact in making relationship and communication with others. Small and repeated conduct patterns are also seen in the disorder. Deep neural network efficiency is strong in many applications. In this project, we use KNN algorithm to detect the autism children in earlier life cycle stage.

CHAPTER 1

INTRODUCTION

1.1 DOMAIN OF PROJECT

MACHINE LEARNING:

In the statistical context, Machine Learning is defined as an application of artificial intelligence where available information is used through algorithms to process or assist the processing of statistical data. While Machine Learning involves concepts of automation, it requires human guidance. Machine learning is a relatively new discipline within Computer Science that provides a collection of data analysis techniques.

Machine learning and AI-enabled devices can access and store more data than humans, including statistics from mind-blogging. Machines can detect patterns and use this information to generate solutions to any environmental problem.

1.2 PROBLEM STATEMENT

- The problem statement is to find the child is autistic or non-autistic by using image dataset of children.
- In existing system you cannot find the child is autistic or non-autistic by visually.

1.3 OBJECTIVE

(i)To make the image clear, we are using pre-processing method

(ii)In segmentation we are calculating the threshold values.

(iii)In feature extraction we are calculating cA, cH,cV,cD, Contrast,Correlation,Energy,Homogeneity, Mean, Standard_Deviation, Entropy, Variance, Smoothness, Kurtosis, Skewness, IDM

(iv)Finally we are predicting whether the child is autistic or non-autistic by using KNN algorithm.

1.4 SOFTWARE REQUIREMENT

Software : Matlab

Dataset : Image Dataset Of Children

CHAPTER 2

LITERATURE SURVEY

2.1 PREPROCESSING

Preprocessing in Machine Learning refers to the technique of preparing cleaning and organizing the raw data to make it suitable for a building and training Machine Learning models.The aim of pre-processing is to improve the quality of the image so that we can analyse it in a better way. By preprocessing we can suppress undesired distortions and enhance some features which are necessary for the particular application we are working for

2.1.1 RGB TO GREY SCALE IMAGE CONVERSION

In preprocessing Moneeb Ahmed[1] proposed the color image to gray scale image conversion and the gray scale image algorithm experiment that algorithm has preserved the salient of the color image contrast, sharpness and shadow improve. The captured image in RGB image so it necessary to convert from RGB to gray scale image for image processing conversion. The values of three primary color RGB and encodes this linear intensity values convert in gray scale images using probability, The inbuilt function is used to change the image from rgb to gray scale image.

```
C=rgb2gray
```

2.2 SEGMENTATION

Segmentation is the process of partitioning an image into parts or regions. This division into parts is often based on the characteristics of the pixels in the image. For example, one way to find regions in an image is to look for abrupt discontinuities in pixel values, which typically indicate edges.

2.2.1 SEGMENTATION USING FCM ALGORITHM

In segmentation Hayat Al-Dmour; Ahmed Al-Ani[2] proposed the system using fcm and otsu method segmentation is the process of partitioning an image into parts or regions. This division into parts is often based on the characteristics of the pixels in the image. For example, one way to find regions in an image is to look for abrupt discontinuities in pixel values, which typically indicate edges.

2.3 FEATURE EXTRACTION

Feature extraction refers to the process of transforming raw data into numerical features that can be processed while preserving the information in the original data set. It yields better results than applying machine learning directly to the raw data.

2.3.1 FEATURE EXTRACTION USING DWT ALGORITHM:

Gautham Sitaram Yajia , Sankhadeep Sarkara [3] proposed a system, DWT is a wavelet transform for which the wavelets are sampled at discrete intervals. DWT provides a simultaneous spatial and frequency domain information of the image**.** In DWT operation, an image can be analyzed by the combination of analysis filter bank and decimation operation**.** using discrete wavelet transform(DWT) algorithm we are calculating approximation (cA), vertical (cV), horizontal (cH) and diagonal (cD) using inbuilt functions

2.3.2 FEATURE EXTRACTION USING GLCM ALGORITHM

Shijin Kumar P.S , Dharun V.S [4] proposed a system The Gray Level Co-occurrence Matrix (GLCM) texture features are widely used in image classification problems. GLCM represents the second-order statistical information of gray levels between neighboring pixels in an image.using GLCM algorithm we are calculating Entropy,Mean,Variance,Standard deviation,Contrast,Homogenity,Correlation,Dissimilarity etc.

2.4 K-NEAREST NEIGHBOUR ALGORITHM

K-nearest neighbour algorithm is a supervised machine learning algorithm. The algorithm can be used to solve both classification and regression problem statements. The number of nearest neighbours to a new unknown variable that has to be predicted or classified is denoted by the symbol 'K'.

2.4.1 CLASSIFICATION USING KNN

Osman alay and Mustafa ulas [2] proposed a system, With the help of KNN algorithm it is used for the classification**.**we are predicting the child autistic or non autistic child and some other image is given it shows unknown image.

LIMITATIONS:

The above model has low accuracy with 0.70 we are improving the accuracy in this project.

CHAPTER 3

SYSTEM DESIGN AND ARCHITECTURE

3.1 ARCHITECTURE DIAGRAM

(i) Images are pre-processed into RGB to grey and noise removal and image enhancements are done under this process.

(ii)Images are segmented using fcm algorithm and threshold values are calculated.

(iii) In feature extraction, cA, cH,cV,cD, Contrast,Correlation,Energy,Homogeneity, Mean, Standard_Deviation, Entropy, Variance, Smoothness, Kurtosis, Skewness, IDM values are extracted using dwt and glcm algorithm.

(iv)In classification using KNN algorithm we are predicting the autistic child or non autistic child or unknown image.

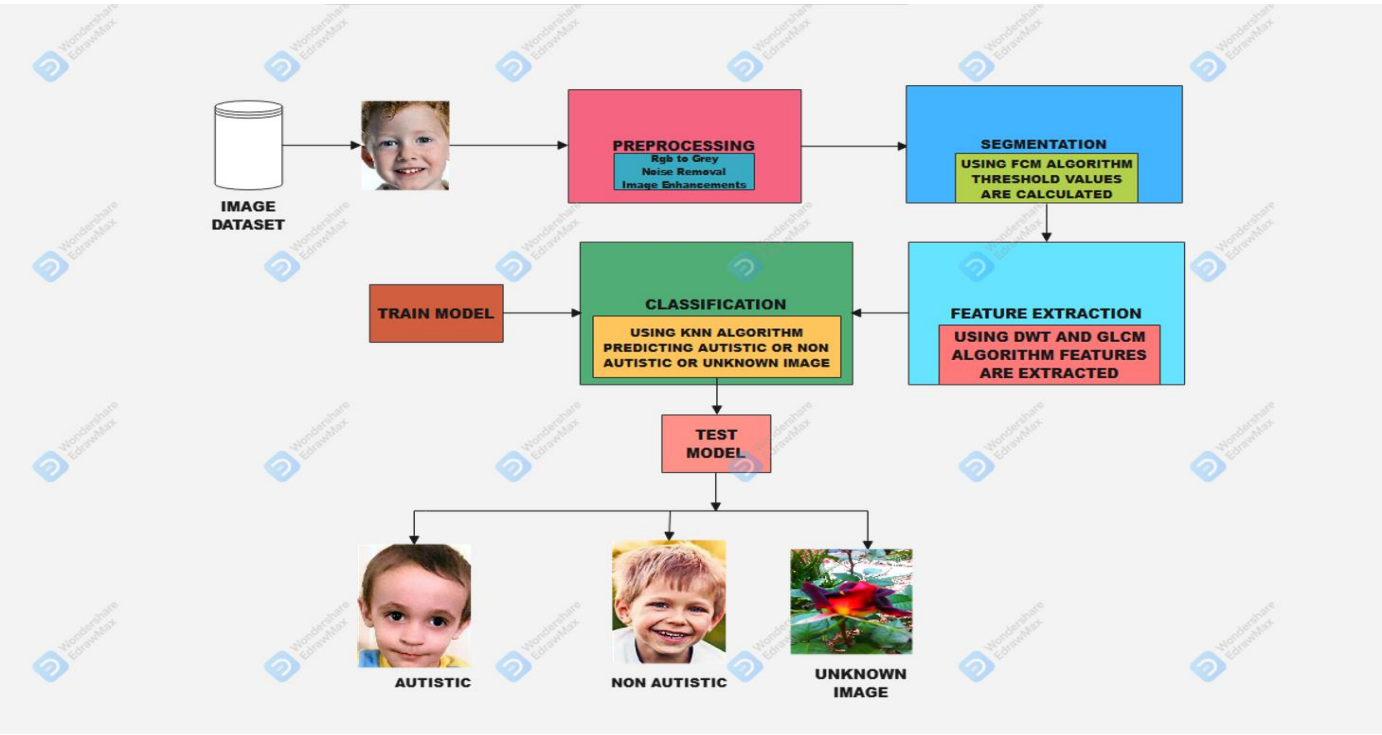


Figure 3.1: System Architecture

3.3 MODULES DESCRIPTION

There are 4 components in the system. They are

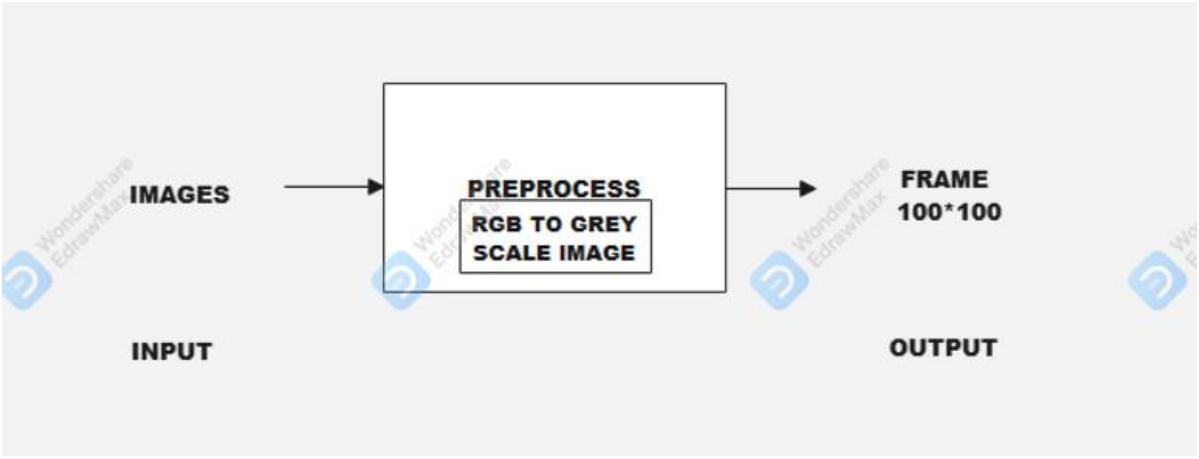
[1] Pre-processing
[2] Segmentation
[3] Feature Extraction

[4] Classification

3.3.1 PRE-PROCESSING

In this module the given input image is converted into grey format.We need to check any external noise is present. If its present that noise has to be removed by gaussian filter.Then the Image is enhanced and sent for segmentation.

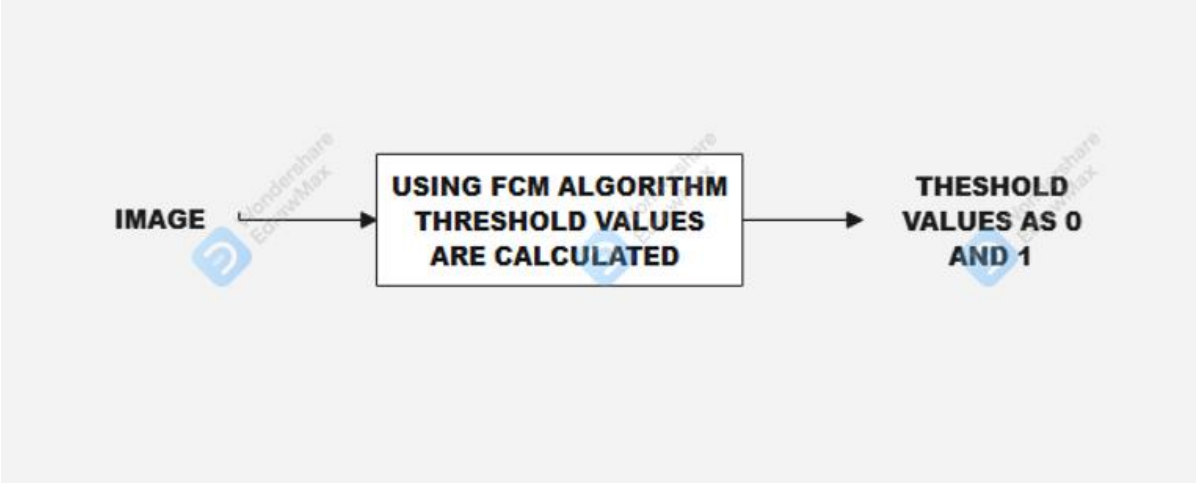
BLOCK DIAGRAM



3.3.2 SEGMENTATION

In this module the given input image in which the threshold value is calculated using pixels.The fcm algorithm used for calculating the pixels.

BLOCK DIAGRAM



3.3.3 FEATURE EXTRACTION

In this module the feature extraction done using dwt and glcm algorithm using dwt algorithm we are calculating approximation (cA), vertical (cV), horizontal (cH) and diagonal (cD) using inbuilt functions and in glcm we are calculating Entropy,Mean,Variance,Standard deviation,Contrast,Homogenity,Correlation,Dissimilarity

BLOCK DIAGRAM

3.3.4 CLASSIFICATION

In this module the image is been classified using K-Nearest Neighbour algorithm. This algorithm will help in finding out whether the child is non autistic child or autistic child or unknown image.

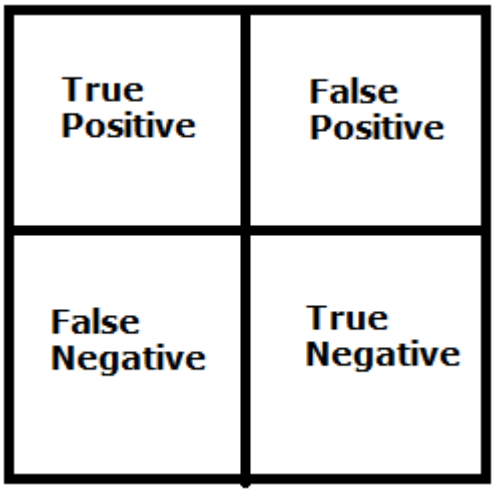
3.3.1 PREDICTING THE TEST DATA

In this step, the KNNMOdel = fitcknn(Trainfeat_training,label)function is used to predict the values for the Test set and the values are stored to the variable y_predict

3.3.2 CONFUSION MATRIX AND ACCURACY

A confusion matrix is a summary of prediction results on a classification problem. The number of correct and incorrect predictions are summarized with count values and broken down by each class.

This is a step that is mostly used in classification techniques. In this, we see the Accuracy of the trained model and plot the confusion matrix.The confusion matrix is a table that is used to show the number of correct and incorrect predictions on a classification problem when the real values of the Test Set are known. It is of the format, using confusion matrix we can calculate the precision, recall,f1score and support values are calculated.



PRECISION

The precision can be calculated using this formula

Precision = TruePositives / (TruePositives + FalsePositives)

RECALL

The recall can be calculated using this formula

Recall = TruePositives / (TruePositives + FalseNegatives)

F1- SCORE

The f1score can be calculated using this formula

F1-score = (2 * Precision * Recall) / (Precision + Recall)

CHAPTER 4

IMPLEMENTATION AND ALGORITHM

4.1 PRE-PROCESSING

In pre-processing the images are converted from rgb to grey scale image format.

PROCESS: In pre-process the original image is converted from RGB to grayscale image.
INPUT: Images are taken from the dataset

1: Start

2: Read the images from the dataset
3: Plot the images using histogram
4: Convert the images from rgb to grey scale image using the formula
C=rgb2gray(B)

5: plot the image as grey scale format

OUTPUT: Images are displayed in a grey scale format

4.2 SEGMENTATION:

In segmentation the images are calculated as threshold values zeros and one's using FCM algorithm

PROCESS: In segmentation, the images are stored as zeros and ones

INPUT: Image dataset is given as input

OUTPUT: The values are stored as 0's and 1's

1: Start

2: Read the input image from the dataset

3: Using fcm algorithm we are calculating the threshold values

4:Using the formula

```
bwfim=im2bw(fim,level);
   [bwfim0,level0]=fcmthresh(fim,0);
   [seg_img,level1]=fcmthresh(fim,1);
```

5:The values are given as output

Algorithm 4.2 SEGMENTATION

4.3 FEATURE EXTRACTION:

In feature extraction the features are extracted using dwt and glcm algorithm

PROCESS: In feature extraction, the features are extracted using images

INPUT: Image dataset is given as input

OUTPUT: The values will be displayed

1: Start

2: Read the input image from the dataset

3: Using dwt and glcm algorithm we are calculating the values as cA, cH,cV,cD, Contrast,Correlation,Energy,Homogeneity, Mean, Standard_Deviation, Entropy, Variance, Smoothness, Kurtosis, Skewness, IDM values

4:Using the formula

```
cA = mean2(cA);
cH = mean2(cH);
cV = mean2(cV);
cD = mean2(cD);
```

5:The values are given as output

Algorithm 4.2 SEGMENTATION

4.4 CLASSIFICATION

Here we use the concept of K-Nearest Neighbour algorithm.

PROCESS: The image is classified using autistic or non autistic child or unknown using KNN algorithm

INPUT: children image is given as input

OUTPUT: Final output is displayed as autistic child or non autistic or unknown image child using accuracy.

Algorithm:

1:start

2:using KNN algorithm, testing dataset of children image is taken and accuracy is calculated and we are predicting the child is autistic or non-autistic child or unknown image.

3.The confusion matrix and accuracy is calculated using precision, recall, f1 score,support

4. The precision is calculated using this formula

Precision = TruePositives / (TruePositives + FalsePositives)

5.The recall is calculated using this formula

Recall = TruePositives / (TruePositives + FalseNegatives)

6.The f1 score is calculated using this formula

F1-score = (2 * Precision * Recall) / (Precision + Recall)

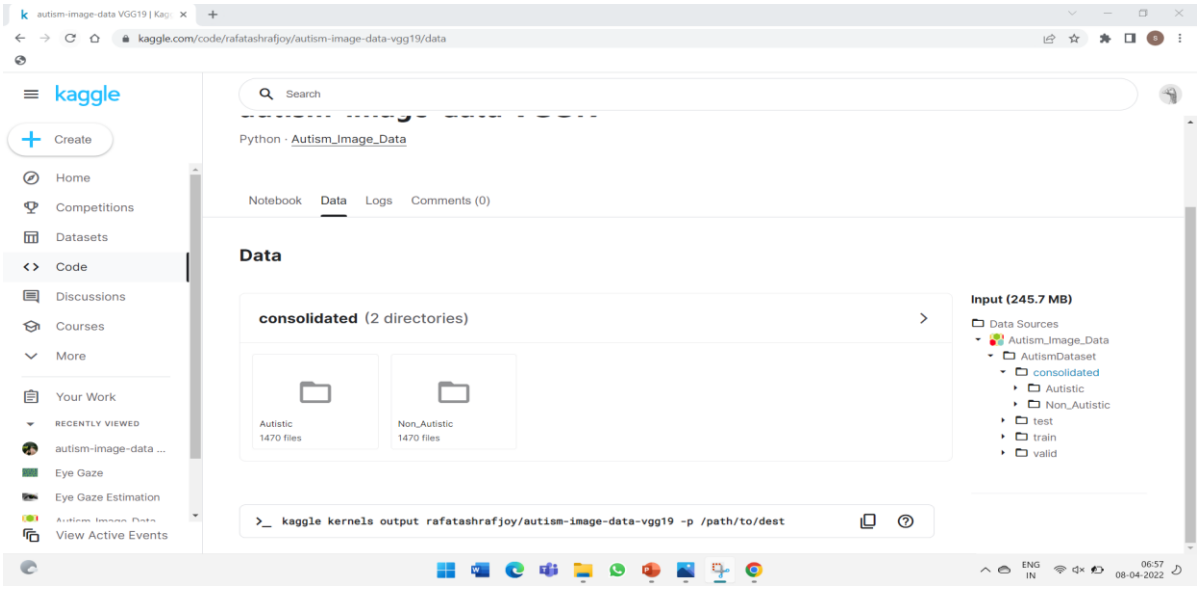
7.The final output is given in classification format

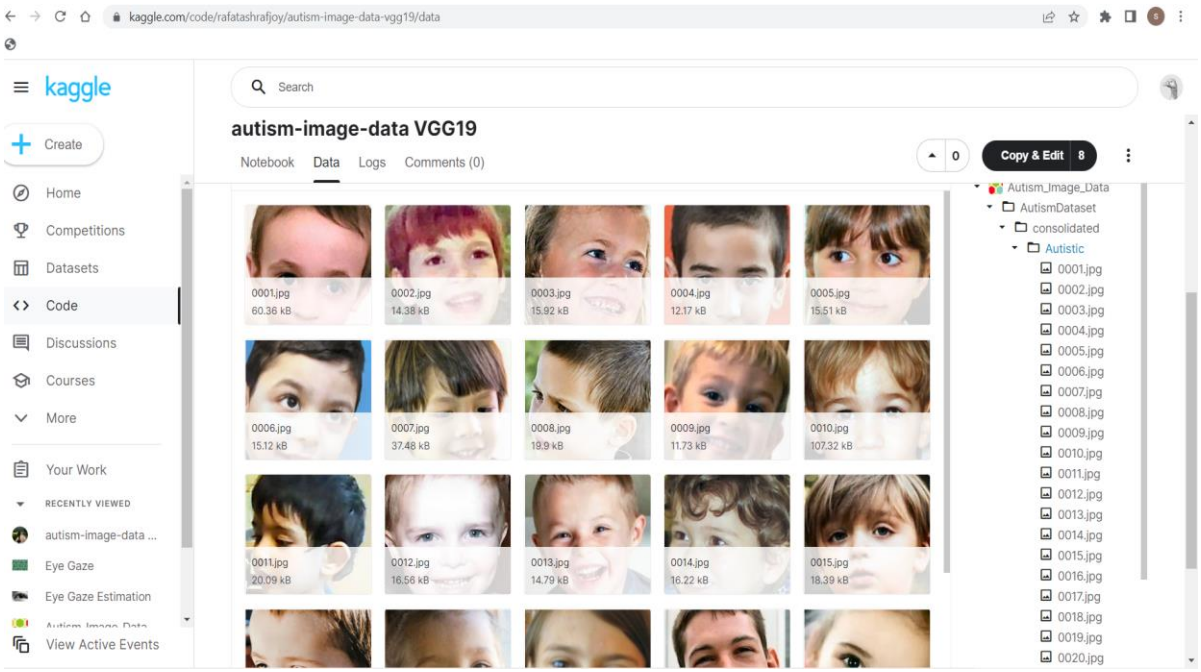
Algorithm 4. 4 Classification

CHAPTER 5

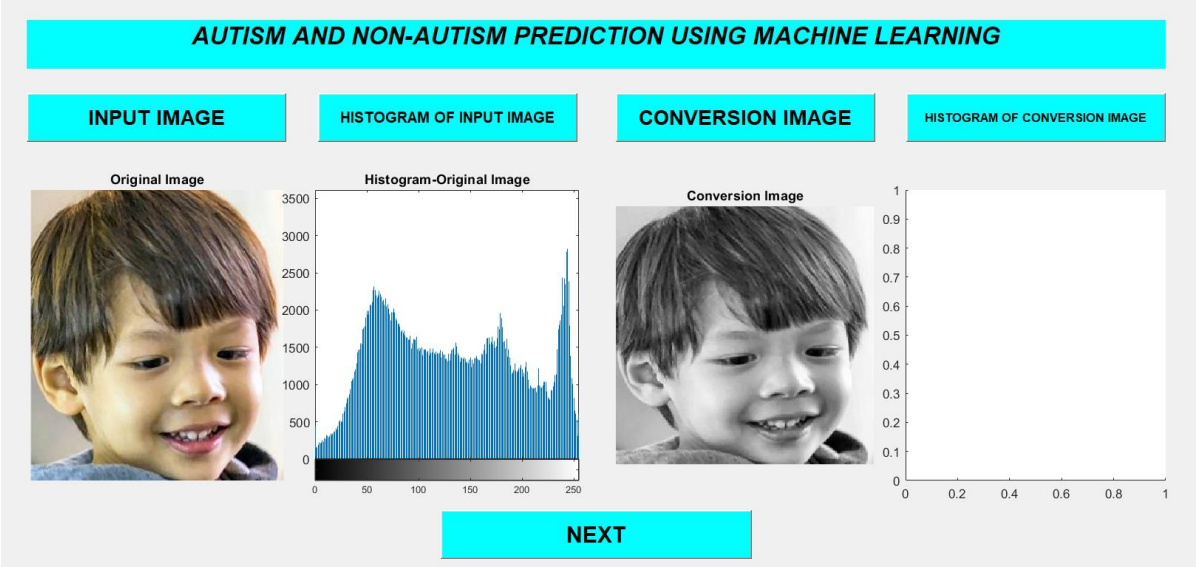
OUTPUT AND SCREEENSHOTS

5.1 DATASET

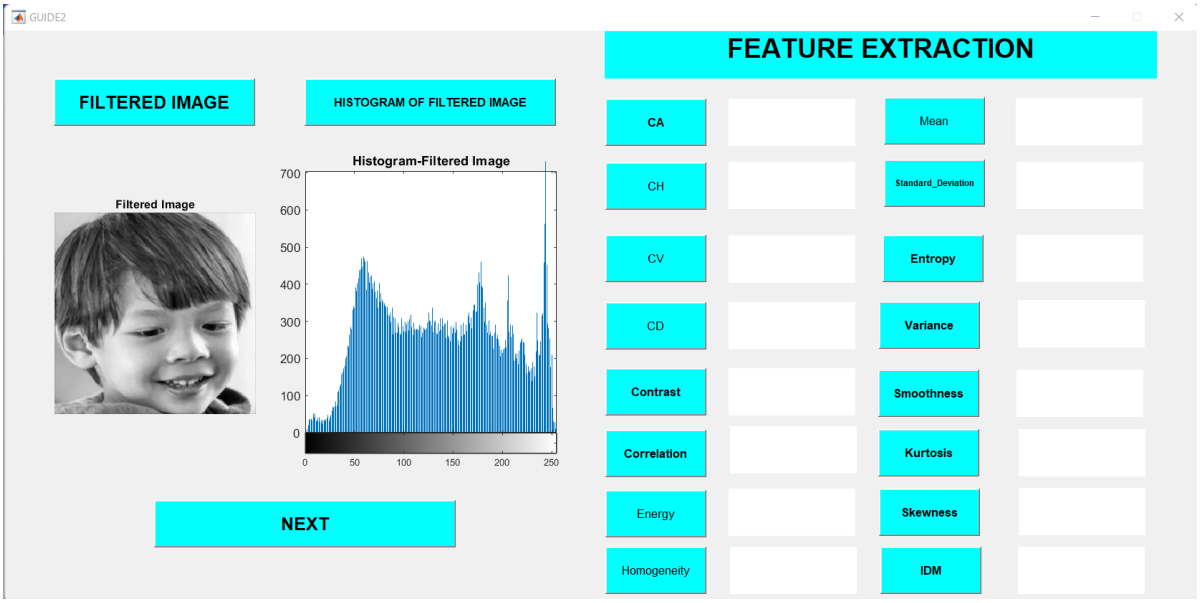




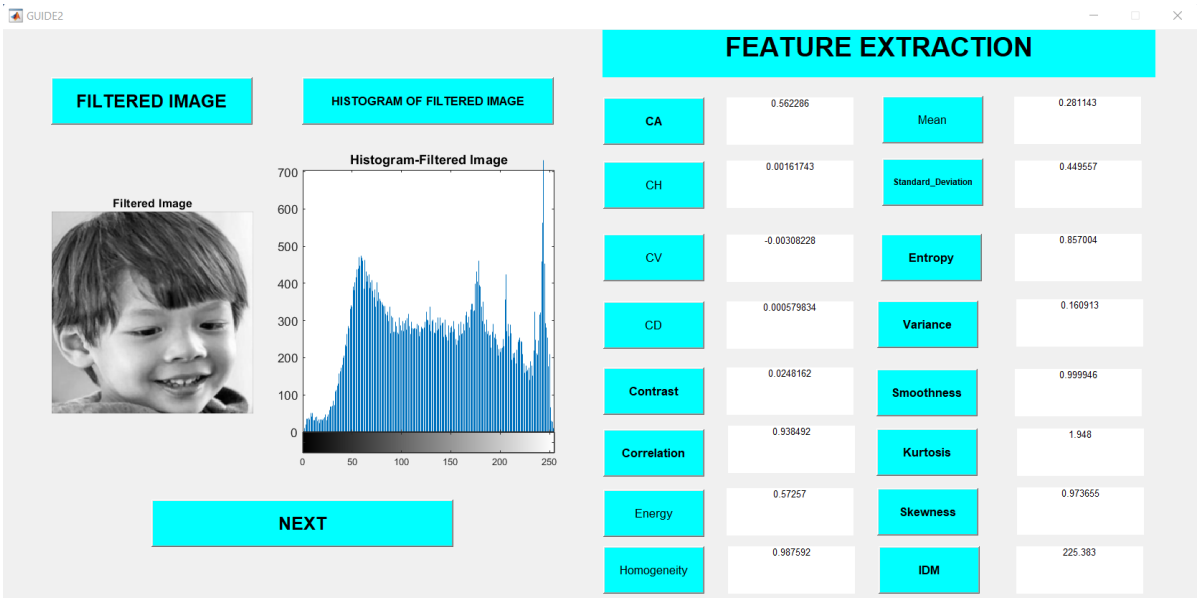
5.2 PRE-PROCESSING



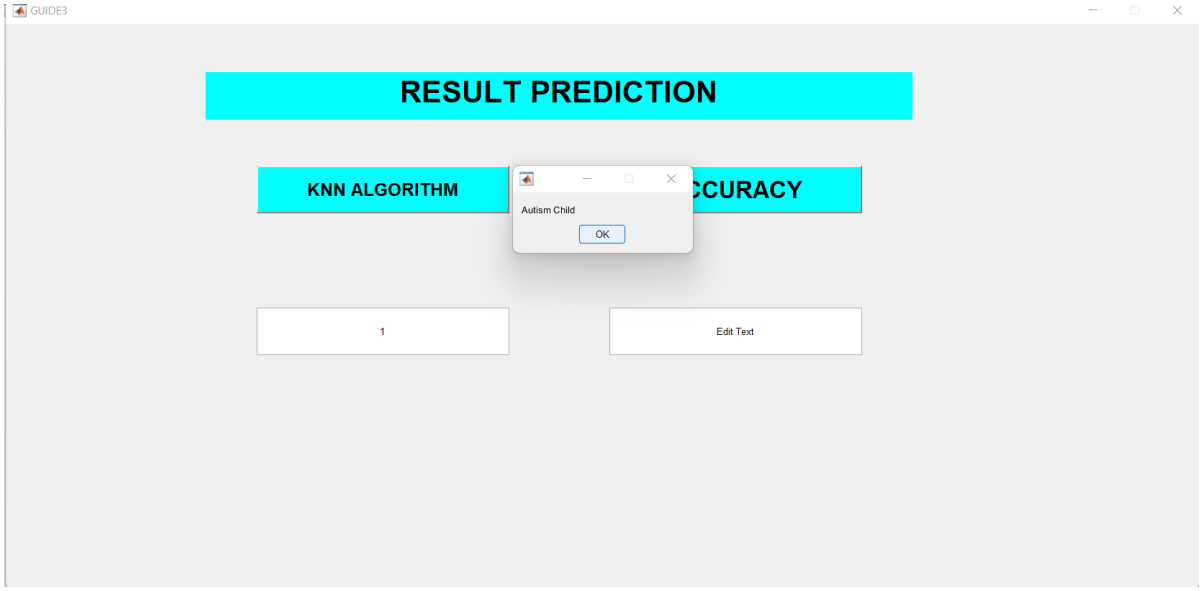
5.2 SEGMENTATION

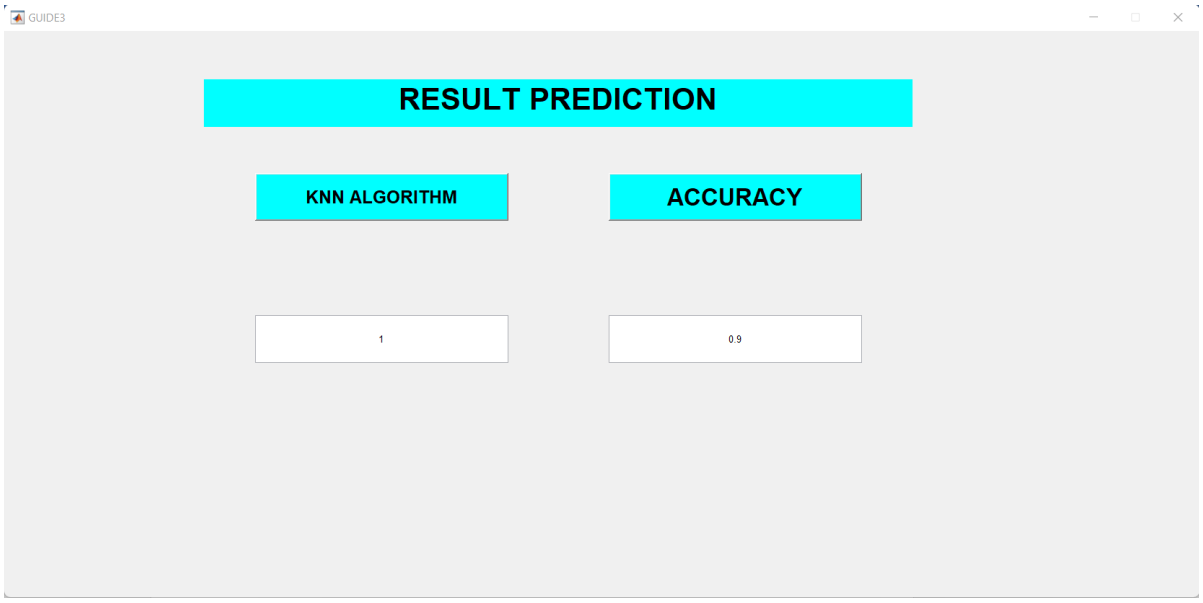


5.3 FEATURE EXTRACTION



5.3 CLASSIFICATION





CHAPTER 6

REFERENCES

[1] Moneeb ahmed "Pliable Algorithm RGB image Convert in Gray image Using Transformation Equation" International journal of computer science and software engineering(IJCSSE) on 12 december 2019.

[2] Osman alay and Mustafa ulas Prediction of the Autism Spectrum Disorder Diagnosis with Linear Discriminant Analysis Classifier and K-Nearest Neighbor in Children in IEEE XPLORE on 1st September 2020

[3] Zhong Zhaol , Xiabin Zhang Applying Machine Learning to Identify Autism With Restricted Kinematic Features in IEEE EXPLORE on 24th September 2021.

ALGORITHM	TESTING DATA	ACCURACY
KNN	500	92
SVM	500	83