

## SYNOPSIS

1. **Title of the Project** – “Screening tool for early detection of Dyslexia in Children using Handwriting and Eye movement”.
2. **Name of the College** – Bangalore Institute Of Technology
3. **Name of the Department** – Computer Science And Engineering
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6. **Keywords** – ANN, SVM, CNN, Dyslexia, Handwriting, Eye movement, fixation, saccades.

7. **Introduction** –

Dyslexia is a disorder characterized by difficulty in reading such as poor speech and sound recognition. They have less capability to relate letters and form words and exhibit poor reading comprehension. Dyslexia is not a visual impairment disorder but it's a difficulty in phonological processing and word decoding. These difficulties are reflected in their eye movement patterns during reading and in their handwriting.

Dyslexia occurs in children with normal vision and intelligence. Symptoms include late talking, learning new words slowly and a delay in learning to read. Our project aims to develop methods of automating the early detection process taking the burden off of teachers and removing detection bias based on race or socioeconomic status.

8. **Objectives** –

- To develop a screening tool for early detection of dyslexia in children by

observing the features of the handwriting and the eye movement by using different machine learning algorithms.

- The images of handwriting will be transcribed to machine encoded form with the help of Optical Character Recognition (OCR) and then with the help of ANN & SVM, the detection of whether a child is dyslexic or not is carried out.
- For better accuracy, the second test carried out will be based on the eye movement. Machine learning algorithm such as CNN and RFE will be used for this purpose.
- The combined results of both the test carried out will help us to distinguish between dyslexic and a non-dyslexic child.

## 9. Methodology –

Step 1: The web camera is started which captures the video of eye movement from the face detected.

Step 2: The picture of the eyes captured are resized to 128x128.

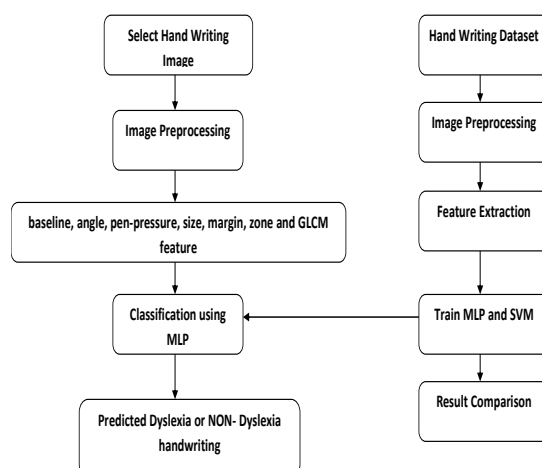
Step 3: The trained Convolution Neural Network (CNN) is used for classification of output on basis of eye movement.

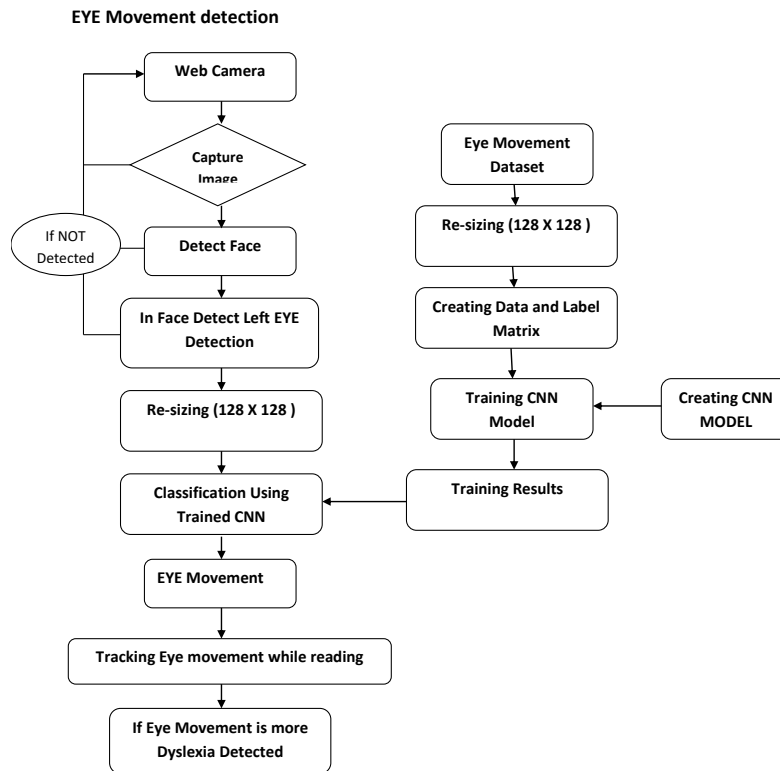
Step 4: The output is displayed on GUI.

Step 5: The scanned images of handwriting are uploaded.

Step 6: The images are pre-processed and feature extracted. Then the trained ANN and SVM is used for classification and their accuracy is compared.

Step 7: The classification with better accuracy is chosen and the output is displayed on GUI.





## 10. Results and Conclusions –

- The outcome of this research provides an effective and efficient approach to detect dyslexia traits for small children.
- Since diagnosing the dyslexia traits is quite a costly and lengthy process, it's often delayed because of the difficulty of detecting dyslexia in children and adolescents.
- With the help of dyslexia screening application tool, an individual can be guided at an early stage that will prevent the situation from getting any worse and reduce costs associated with delayed diagnosis.

## 11. Scope for Future Work –

- The future scope for the model is to take into consideration much larger datasets to enhance the accuracy.
- The user interface would be made more children friendly which would ease the process.
- We plan to use large dataset for the training and hence increasing the accuracy of the model.