***Report on***

**“Hand-Written Optical Recognition”**

*Submitted in partial fulfillment of the requirements for* ***Sem IV***

**IMAGE PROCESSING AND DATA VISUALIZATION USING MATLAB**

**Bachelor of Technology**

**in**

**Computer Science & Engineering**

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*Under the guidance of*

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**January – May 2021**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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(Established under Karnataka Act No. 16 of 2013)

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**PROBLEM STATEMENT :**

**Hand-written optical recognition using matlab.**

*The purpose of our project is to create an algorithm that converts hand-written text into typed text. Our program is able to receive an input image effectively pre-process it, detect, and retrieve text for segmentation and output the corresponding printed text back to the user.*

**MODULE DESCRIPTION:**

* *LineSegment would have the code which takes the scanned image of the written line. The image is converted into grayscale, resized and complemented.*
* *Each letter would be separated based on spaces between. A graph is plotted where peaks represent points where the letters are and valleys represent space between the letters.*
* *The points from the graph will be used to crop the image. This image will then have boxes of separation around each letter.*
* *Before passing through the neural network, the image needs to be classified as a letter. For this 26 percentages (corresponding to 26 letters in the alphabet) are found with respect to each image where the highest percentage signifies which the index of the letter which will be defined by LetterIndex.*
* *The indexes are replaced by letters. Spaces are placed when there’s a certain distance or more between the boxes.*

**HIGH LEVEL DESIGN/ ARCHITECTURE:**

| **INPUT IMAGE** |
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| **PREPROCESSING** |
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| **SEGMENTATION** |
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| **FEATURE EXTRACTION** |
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| **CLASSIFICATION AND RECOGNITION** |
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**Preprocessing:***This step is crucial for making an image segmentation ready. binarization morphological operations and resizing are examples of what this step may consist of .*

**Segmentation:** *In this step,the image’s contents are separated into lines, words, and then characters. Labelling through the use of connected components is necessary to keep track of each object of the foreground order later on. Size normalisation must also be done after the extraction of separate characters takes place.*

**Feature extraction:** *This step can be done using gradient features or geometry-based techniques. While not precisely necessary, this step is useful for training neural networks.*

**Classification/ recognition:**  *In this step neural networks are trained and used to classify and recognise various letters.*

**BREAKUP OF TASKS TO BE PERFORMED INDIVIDUALLY:**

Preprocessing -------> Aparna Kalla

Segmentation -------> Apurva P

Feature Extraction -------> R Shailesh

Classification/recognition -------> Vedanth Mohan