**Software Engineering**

**Software Requirements Specification**

**(SRS) Document**

**Smart-Board**

**Handwriting Recognizer**

**Date: 11-11-2020**

**Version: 1.0.0**

**By: Team Smart-Board**

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| **Revisions** |

| Version | Primary Author(s) | Description of Version | Date Completed |
| --- | --- | --- | --- |
| 1.0.0 | Ankit Patil  Siddhesh Undre  Aniket Chopade | An android app that allows the user to write or draw on its canvas. And the written content is then recognized and converted into a readable format. | 15-01-2021 |

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| **Review & Approval** |

Requirements Document Approval History

| Approving Party | Version Approved | Signature | Date |
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Requirements Document Review History

| Reviewer | Version Reviewed | Signature | Date |
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1. Introduction

* + **Purpose:** Converting handwriting input into standard text format in real time.

So that it can be used in online education and presentation scenarios.

* + **Intended audience:**  Teachers, Students, Presentation Scenarios, Online Tutors, Corporate Meetings.
  + **Scope:** Providing a complete suite of presentation tools to improve the presenter and audience productivity. Building an efficient handwriting recognition system with suitable ML models.
  + **References:**

1. Bengio, Y., LeCun, Y., Nohl, C., Burges, C.: Lerec: A NN/HMM hybrid for on-line handwriting recognition. Neural Computation.-1995
2. Frinken, V., Uchida, S.: Deep BLSTM neural networks for unconstrained continuous handwritten text recognition. In: ICDAR.-2015
3. Frinken, V., Bhattacharya, N., Uchida, S., Pal, U.: Improved blstm neural networks for recognition of on-line bangla complex words.-2017
4. R. A. Abdul, M. Khalia, C. Viard-Gaudin, E. Poisson, Online Handwriting Recognition Using Support Vector Machine.-2004
5. <https://towardsdatascience.com/understanding-rnn-and-lstm-f7cdf6dfc14e>-2019

## 2. General Description

**2.1 Product perspective:** In this age of digital education and a skyrocketing growth in the Ed-Tech industry, we noticed the problem in digital handwriting input methods. When the presenter (teacher) is writing something on an open canvas, their digital handwriting is not so readable (or accurate to be understood) by the audience (students). To address this problem, we describe an online/offline handwriting system that is able to support 108 languages using a recurrent neural network architecture. And convert the handwritten content into typeset (text) format.

**2.2 Product features:**

1. Handwriting Recognition

2. Emoji and Shape Recognition

3. Save and Share

4. Live Collab / Stream

5. Multiple Languages, font colors and undo/redo

* 1. **User class and characteristics:**
* Teachers: During online classes, for explaining any concept on drawing board.
* Students use the smart board for Note taking purposes.
* Students: To understand the concept in a effective way through live streaming.
* Online Tutors: EdTech companies, Education YouTube Channels can use the tools for improving audience engagement.
* Corporate: For evaluating different topics on drawing board with Live collab/share feature.
  1. **Operating environment:** Current version is support for Android OS. Desktop and Web are currently under development and testing.
  2. **Constraints:** Constant iteration of UI/UX design, improving ML model for more efficient recognition and Scaling up the app audience.

## 3. System Requirements

* Supports Android version 7 and later.
* Display Size 5.6 and later, recommended for better drawing experience.

## 4.External Interface Requirements

4.1 User Interfaces

The app will have a canvas where a user can write/draw the content. The content on the canvas be automatically be converted into standard text.

4.2 Hardware Interfaces

App will run on all the platforms i.e. windows, mac os, andriod, ios, linux, and web.

The recognition models will be downloaded and stored in the device itself.

## 5. Non-Functional Requirements

**5.1 Performance requirements**

The App download size is 22 MB. Downloading each language model requires 5 MB of data.

Supports Android version 7 and later.

**5.2 Safety requirements**

If the user is not using any particular language model, they can delete that one by clicking on delete button. This will save the device memory for better performance.

**5.3 Software quality attribute**

Integrating with Firebase as a backend system to manage the app real-time updates, analytics, app security and performance along with user authentication with Firestore as a Database.

**5.4 Technology Used**

MLkit for importing multiple languages dataset, Recurrent Neural Network usage and Android Studio.