**Project Documentation: OMR Sheet Validator**

1. **Introduction**

The OMR Sheet Validator is a robust and scalable application designed to automate the evaluation of OMR (Optical Mark Recognition) sheets. It is tailored for industry-level applications, ensuring high accuracy and efficiency in processing answer sheets. This solution leverages computer vision techniques to dynamically detect and validate shaded bubbles, extract roll numbers, and compare responses with a user-defined answer key.

2. **Constraints for Uploading OMR Sheets**

To ensure optimal performance and accurate results, users must adhere to the following constraints while uploading OMR sheets:

* No Bends: The OMR sheet should not be bent when capturing the photo.
* Complete Area Coverage: The entire sheet must be visible in the photo without any part being cut off.
* Flat Surface: The photo must be taken on a flat, plain surface to avoid distortion.

3. **NEET Application**

3.1 GUI Features

The graphical user interface (GUI) for the NEET application includes the following buttons:

* Upload OMR Sheet Folder: Allows users to select a folder containing OMR sheet images for batch processing.
* Input Answer Key: Opens a webpage to input the correct answer key.
* Load Answer Key: Loads the provided answer key for processing.
* Process OMR Sheet: Initiates the OMR sheet evaluation process.
* Previous: Navigates to the previous sheet result.
* Next: Navigates to the next sheet result.
* Cancel: Cancels the current operation.
* Reset: Resets the window.

3.2 Result Storage

* Results are stored in a CSV file with the following columns:
* Roll Number
* Marked Options
* Score
* Number of Correct Answers
* Number of Wrong Answers
* Number of Unattempt Answers
* Results are also displayed within the GUI for immediate review.

4. **JEE Application**

4.1 GUI Features

The GUI for the JEE application includes the same set of buttons as the NEET version:

* Upload OMR Sheet Folder
* Input Answer Key
* Load Answer Key
* Process OMR Sheet
* Previous
* Next
* Cancel
* Reset
  1. Result Storage

Results are stored in a CSV file with the following fields:

* Roll Number
* Marked Options
* Score (in percentage, out of 100)
* Like the NEET version, results are also displayed within the GUI.

5. **Performance**

The OMR Sheet Validator is optimized for performance and accuracy:

* Processing Speed: It can process up to 30 sheets per minute.
* Accuracy: Delivers an accuracy rate of 98%.

6. **Conclusion**

The OMR Sheet Validator provides a fast, reliable, and accurate solution for evaluating answer sheets for competitive exams like NEET and JEE. Its user-friendly interface, high processing speed, and robust result handling make it an indispensable tool for educational institutions and examination bodies.