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# OMR Sheet Detection

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**Abstract:** *Optical Mark Recognition (OMR) is an efficient technique used for automatic data extraction from marked fields on printed sheets. "OMR Sheet Recognition Using Python and OpenCV" is an innovative approach towards automating the evaluation of multiple-choice answer sheets. The system reads scanned OMR sheets, detects marked responses, and compares them with a predefined answer key to generate results. This solution eliminates manual checking errors and enhances efficiency. Key features include dynamic answer key processing, noise reduction techniques, and automated scoring. Future improvements may involve AI-based answer verification and cloud integration for large-scale assessments.*

**Keywords:** OMR Processing, Optical Mark Recognition, Python, OpenCV, Automated Grading

## I. INTRODUCTION

The evaluation of multiple-choice answer sheets is a crucial task in educational institutions, competitive exams, and recruitment processes. Traditional manual checking methods are prone to human errors, consume significant time, and increase the overall cost of examination administration. As a result, Optical Mark Recognition (OMR) technology has become a reliable solution for automating this process, ensuring accuracy and efficiency. OMR systems scan and process marked responses on predefined answer sheets, making them an essential tool for large-scale assessments.

In recent years, advancements in computer vision and machine learning have enabled the development of more sophisticated OMR systems that do not require specialized hardware. Using open-source tools like Python and OpenCV, it is now possible to implement OMR recognition systems with high precision and minimal computational resources. These systems leverage image processing techniques such as contour detection, thresholding, and morphological operations to identify marked responses effectively.

This paper proposes an OMR sheet recognition system that integrates Python and OpenCV to detect and process marked responses from scanned answer sheets. The system ensures accurate evaluation by dynamically handling answer keys and reducing noise in the scanned images. By automating grading and result generation, the proposed approach eliminates human intervention, significantly improving the efficiency and reliability of the assessment process.

## II. PROBLEM STATEMENT:

Manual checking of OMR sheets presents several challenges:

- **Human Errors:** Inaccurate marking recognition due to fatigue.
- **Time-Consuming:** Large-scale examinations require extensive effort for manual grading.
- **Inefficiency:** Difficulty in handling dynamic answer keys and re-evaluations.
- **Cost:** Hiring personnel for evaluation increases operational costs.

The proposed solution addresses these issues by leveraging OpenCV for automated answer sheet recognition and grading.

## III. LITERATURE SURVEY

Previous research on OMR systems highlights various approaches:

- **Traditional OMR Scanners:** Require specialized hardware with high operational costs.
- **Machine Learning-Based OMR:** Employs deep learning for pattern recognition but demands high computational resources.
- **OpenCV-Based OMR:** Provides a cost-effective and efficient solution using image processing techniques.

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The proposed method integrates OpenCV with Python to provide an accurate and scalable approach for OMR recognition.

## IV. METHODOLOGY

The OMR recognition system follows these steps:

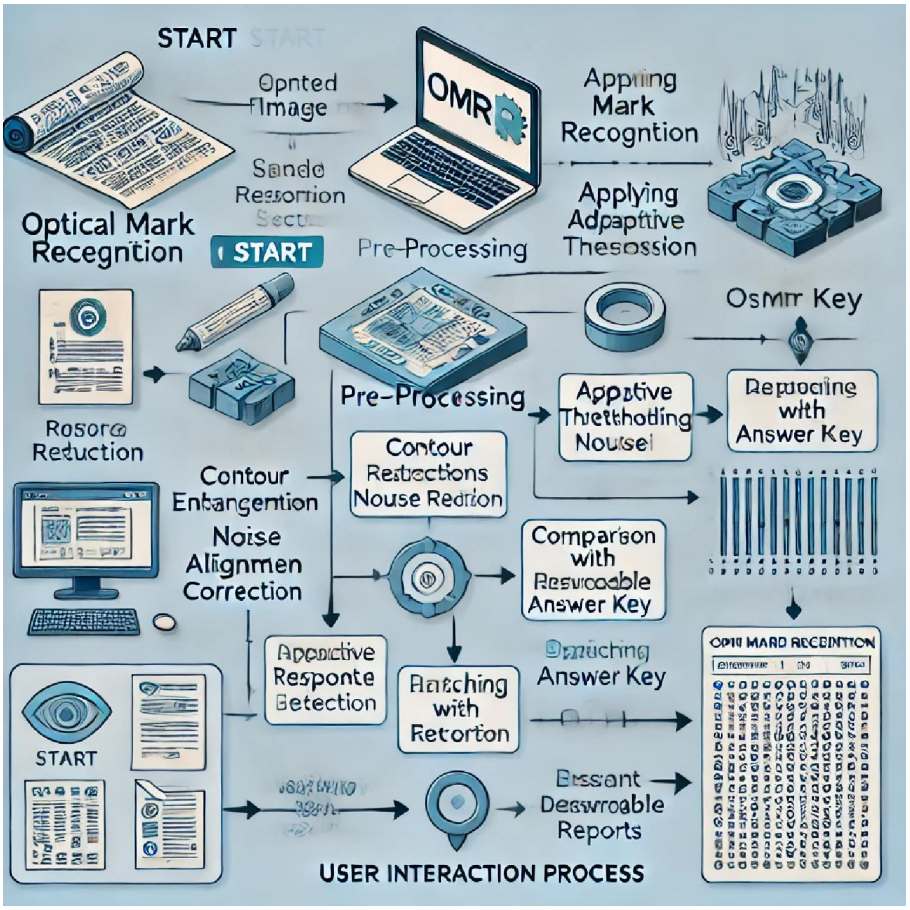
- **Pre-processing:** Scanned image enhancement, noise reduction, and alignment correction.
- **Contour Detection:** Identifying response bubbles on the OMR sheet.
- **Thresholding:** Applying adaptive thresholding for clear response detection.
- **Answer Extraction:** Determining marked responses based on pixel intensity.
- **Comparison with Answer Key:** Matching responses with the correct answers to calculate scores.
- **Result Generation:** Displaying scores in real-time or exporting reports.

### A. User Interaction Process

Upload scanned OMR sheets via a web interface.

The system automatically processes the image and detects responses.

Results are displayed instantly with downloadable reports.



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## V. FUTURE SCOPE

- **AI-Based Answer Validation:** Improving recognition accuracy using machine learning.
- **Cloud Integration:** Storing results on a cloud platform for easy access.
- **Mobile App Interface:** Enabling scanning and grading via mobile devices.
- **Multi-Language Support:** Expanding to recognize OMR sheets in different languages.

## VI. CONCLUSION

The proposed OMR sheet recognition system offers an efficient and automated method for evaluating multiple-choice answer sheets. By leveraging Python and OpenCV, it ensures high accuracy, reduces manual effort, and enhances scalability. Future developments will further improve accuracy, efficiency, and accessibility, making it a valuable tool for educational institutions and examination boards.

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