A Project Report on

Academic Certificate Scanner

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DECLARATION

We declare that this written submission represents our ideas in our own words and where others ideas or words have been included; We have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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CERTIFICATE

This is to certify that the minor project report entitled "**ACADEMIC CERTIFICATE SCANNER"**, submitted by **SANJANA PATIL, SANSKAR LANDGE, ROHIT BANSODE, SHASHANK CHAVAN** is the bonafide work completed under the supervision and guidance of our guide **Ms. Ankita Shewale** ma'am in partial fulfilment for the award of Bachelor of Technology in Computer Science and Engineering, Marathwada Institute of Technology under Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad (M.S.).

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APPROVAL CERTIFICATE

This minor project report entitled "**ACADEMIC CERTIFICATE SCANNER"** by **SANJANA PATIL, SANSKAR LANDGE, ROHIT BANSODE** and **SHASHANK CHAVAN** is approved for B-Tech Third year in Computer Science and Engineering, Marathwada Institute of Technology under Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.

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ABSTRACT

In the past, academic institutions relied on manual methods to process academic documents, which was laborious and time-consuming. With the advent of digitization, this process has been significantly streamlined. Our project, the Academic Document Scanner, aims to further enhance this efficiency by automating the scanning process.

Our app utilizes advanced optical character recognition (OCR) technology to scan academic documents such as certificates, transcripts, and letters. It then extracts relevant information such as student names, course details, and grades. This extracted data is presented to the user in a structured format, ready to be used for various purposes such as creating digital records, generating reports, or populating databases.

By automating the scanning and data extraction process, our app eliminates the need for manual data entry, saving time and reducing the risk of errors. This is particularly beneficial for academic institutions, students, and employers who require quick and accurate access to academic records.

The Academic Document Scanner app offers several key features to enhance user experience and functionality. These include the ability to batch scan multiple documents, customizable data extraction templates to suit different document formats, and integration with existing document management systems.

Furthermore, our app prioritizes user privacy and data security. All scanned documents are processed locally on the user's device, ensuring that sensitive information remains secure and confidential.

The Academic Document Scanner app simplifies the process of digitizing academic documents, making it more efficient and convenient for all stakeholders involved. Its advanced features and commitment to privacy and security make it a valuable tool for academic institutions, students, and employers alike.

Chapter 1
INTRODUCTION

1. Introduction

In the era of digital transformation, the efficient extraction and analysis of data from various sources have become paramount. The Academic Document Scanner represents a significant advancement in this domain, offering a sophisticated solution for scanning and extracting critical data from scanned certificates or documents, particularly those containing Python code. This pure Python project leverages advanced technologies to automate the extraction process, presenting the data in a usable format and even generating pie charts for enhanced data visualization.

The Academic Document Scanner addresses the challenges faced by individuals and organizations in manually processing and analyzing academic documents. By eliminating the need for manual data entry, it not only saves time but also ensures accuracy, reducing the risk of errors inherent in manual processing. Moreover, its ability to generate pie charts adds a layer of depth to the extracted data, facilitating easier interpretation and analysis.

At the core of the Academic Document Scanner is its Python-based architecture, which provides a flexible and scalable platform for handling various document types and data extraction requirements. The inclusion of a PyChart generator further enhances its capabilities, allowing users to visualize extracted data in the form of intuitive pie charts. This feature is particularly valuable for educators, researchers, and data analysts who rely on visual representations for better data comprehension and decision-making.

In addition to its data extraction and visualization capabilities, the Academic Document Scanner prioritizes user experience and data security. The intuitive user interface ensures ease of use, while the local processing of scanned documents ensures that sensitive information remains secure and confidential.

Figure 1.1 : Document Symbol

1.2 Problem Definition

In academic and professional environments, the manual processing of academic documents presents numerous challenges, including time-consuming data entry processes and the risk of errors. The Academic Document Scanner project seeks to overcome these challenges by automating the extraction of critical data from scanned certificates or documents, particularly those containing Python code. The key challenges addressed by this project include:

1. Time-Consuming Data Entry: Manual data entry from scanned documents is a labor-intensive process that consumes valuable time and resources.

2. Error-Prone Data Entry: Manual data entry is susceptible to errors, such as typos and inaccuracies, which can lead to incorrect data interpretation and analysis.

3. Limited Data Accessibility: Scanned documents are often stored in formats that limit accessibility and hinder data retrieval for analysis and reporting purposes.

4. Inefficient Data Visualization: The lack of tools for visualizing extracted data hampers effective data analysis and decision-making.

By automating the scanning and extraction process, the Academic Document Scanner aims to streamline data entry, improve accuracy, enhance data accessibility, and enable efficient data visualization, thereby addressing these critical challenges faced in manual data entry processes.

1.3 Objectives

The primary objective of the Academic Document Scanner project is to streamline the processing of academic documents by automating the extraction of critical data. By leveraging Python and Flask technologies, the scanner aims to significantly reduce the time and effort required for manual data entry. Additionally, the project seeks to enhance data accuracy and accessibility, ultimately enabling users to easily extract and visualize data from scanned documents, thereby improving overall efficiency in academic and professional settings.

1.4 Scope and Limitations

The Academic Document Scanner project aims to provide a comprehensive solution for automating the extraction and visualization of data from academic documents. It is designed to handle a wide range of document types and formats, making it suitable for use in various academic and professional settings. The scanner's ability to generate pie charts based on extracted data enhances its usability for data analysis and reporting purposes. Additionally, the project's focus on user-friendly design ensures that the scanner is accessible to users with varying levels of technical expertise.

While the Academic Document Scanner offers significant benefits in terms of efficiency and accuracy, it also has certain limitations. The scanner's ability to extract data accurately depends on the quality of the scanned documents and the clarity of the text. Documents with complex formatting or handwritten text may pose challenges for the scanner. Furthermore, the scanner's reliance on Python and Flask technologies may limit its compatibility with certain operating systems or environments. Despite these limitations, the Academic Document Scanner represents a valuable tool for automating data processing tasks in academic and professional settings.

1.5 Applications

1. Organizing Academic Records:

- Easily organize certificates, transcripts, and letters digitally for quick access.

2. Automated Data Entry:

- Save time by automatically entering data from documents into spreadsheets or databases.

3. School and College Administration:

- Streamline tasks like enrolment, record-keeping, and transcript processing.

4. Data Analysis Made Simple:

- Generate pie charts for easy analysis of academic performance and trends.

5. Research and Paper Analysis:

- Extract and analyze data from academic papers and reports efficiently.

6. Credential Verification for Employers:

- Quickly verify academic credentials of job applicants.

7. Easy Accessibility and Sharing:

- Access and share digitized documents easily, reducing the need for physical storage.

8. Integration with Existing Systems:

- Seamlessly integrate with existing document management systems or databases.

9. Improved Data Security:

- Enhance data security by digitizing documents and reducing physical storage risks.

10. Potential for Other Industries:

- Adapt the technology for use in industries needing data extraction from scanned documents.

1.6 Organization and Project Plan

1. Strategic Needs Assessment and Tailored Deployment:

- Conduct a comprehensive strategic needs assessment to ascertain the nuanced requirements of the industry or organization.

- Customize the scanner's functionality to align with the specific document processing demands, accommodating diverse document formats and nuanced data extraction criteria.

2. Thorough Pilot Testing and Iterative Refinement:

- Execute meticulous pilot testing of the scanner within a controlled organizational setting.

- Solicit comprehensive feedback from stakeholders to identify optimization opportunities, ensuring the scanner meets stringent operational criteria.

3. Robust Training and Seamless Integration:

- Provide rigorous training to personnel on the proficient utilization of the scanner.

- Seamlessly integrate the scanner into existing operational frameworks and technological ecosystems to ensure harmonious data flow and operational synergy.

4. Data Security and Regulatory Compliance Assurance:

- Implement stringent data security protocols, including encryption methodologies and access control mechanisms, to safeguard scanned data.

- Ensure strict adherence to pertinent data protection regulations and industry-specific compliance standards.

5. Scalability and Iterative Enhancement Framework:

- Develop a scalable deployment strategy to accommodate evolving organizational data processing requirements.

- Establish a structured framework for continual scanner enhancement, guided by stakeholder feedback and technological advancements, to sustain operational excellence.

Chapter 2
LITERATURE SURVEY

2.1 LITERATURE

The literature surrounding the Academic Document Scanner project focuses on the evolution of document processing technologies, particularly in the context of academic institutions and professional organizations. It encompasses studies on the challenges associated with manual data entry and the benefits of automation in streamlining document processing workflows. Additionally, the literature explores the application of OCR technology and Python programming in data extraction, highlighting their role in enhancing efficiency and accuracy. Overall, the literature underscores the significance of the Academic Document Scanner in revolutionizing document processing practices and improving organizational efficiency.

2.2 EXISTING SYSTEM

1. **Adobe Scan:**

Figure 2.1: Adobe Logo

Adobe Scan is a mobile scanning app that enables users to easily convert physical documents, receipts, and business cards into digital PDFs using their smartphone camera. The app utilizes Adobe's OCR technology to recognize text, making scanned documents searchable and editable. Adobe Scan offers features such as automatic document detection, perspective correction, and the ability to organize, annotate, and share scanned documents. While the app is free to download, it offers a subscription-based premium version that provides additional features such as advanced OCR, text reflow, and the ability to create editable Word and Excel files from scanned documents.

2. **CamScanner:**

Figure 2.2: CamScanner Logo

CamScanner is a popular document scanning app that allows users to scan, store, sync, and collaborate on various content across smartphones, tablets, and computers. The app uses OCR technology to convert images into PDF or JPEG files, making them searchable and editable. CamScanner offers features such as smart cropping, auto-enhancement, and the ability to annotate and watermark scanned documents. While the basic version of the app is free, it includes ads and watermarks on scanned documents. The premium version removes ads, watermarks, and adds features like cloud storage integration, advanced editing tools, and collaboration features.

3. Microsoft Office Lens:

Figure 2.3: Microsoft Office Lens Logo

Microsoft Office Lens is a free scanning app developed by Microsoft that allows users to scan documents, whiteboards, business cards, and other paper documents. The app uses OCR technology to recognize text in scanned images, making it searchable and editable. Office Lens integrates seamlessly with Microsoft Office applications such as Word, PowerPoint, and OneNote, allowing users to easily insert scanned content into their documents. The app offers features like automatic edge detection, perspective correction, and the ability to save scanned documents in various formats including PDF, Word, and PowerPoint. Office Lens is available for both iOS and Android devices.

2.3 LIMITATIONS OF EXISTING SYSTEM

1. **Cost**: Adobe Scan offers a free trial, but to access all features, users need to subscribe to Adobe Acrobat Pro DC, which starts at $14.99 per month. Similarly, CamScanner offers a free version with limited features, but users can purchase a premium subscription starting at $4.99 per month for additional features. This cost can be a disadvantage for users who are looking for a completely free scanning solution.

2. **Privacy Concerns:** CamScanner has faced privacy issues in the past due to the inclusion of advertising libraries that were found to contain malware. While the app has since been removed from the Google Play Store and the malicious code removed, this incident has raised concerns about the security and privacy of scanned documents.

3. **Limited Features in Free Versions**: The free versions of Adobe Scan and CamScanner include ads and watermarks on scanned documents, which can be a limitation for users who require professional-looking documents. Additionally, some advanced features such as OCR text recognition and cloud storage integration are only available in the paid versions, limiting the functionality of the free versions.

4. **Dependency on Internet Connection**: Some features of Adobe Scan and CamScanner, such as cloud storage integration and online document sharing, require a stable internet connection. This can be a limitation for users in areas with poor connectivity or those who prefer to work offline.

5. **Platform Restrictions**: While Microsoft Office Lens is free and offers seamless integration with Microsoft Office applications, it is limited to users within the Microsoft ecosystem. This means that users of other productivity suites, such as Google Workspace or Apple iWork, may not be able to take full advantage of the app's features. This can be a limitation for users who rely on these other productivity suites for their work.

Chapter 3
SYSTEM DEVELOPMENT

3.1 PROPOSED SYSTEM

The proposed system for the Academic Document Scanner project is a comprehensive document processing solution that leverages Python and Flask technologies to automate the extraction and analysis of critical data from academic documents. The system will take scanned certificates or documents as input and use OCR technology to extract relevant information, such as student names, course details, and grades. Additionally, the system will include a PyChart generator to visualize the extracted data in the form of pie charts, enhancing data interpretation and analysis. The system's user-friendly interface and seamless integration with existing document management systems will make it a valuable tool for academic institutions and professional organizations seeking to streamline their document processing workflows.

3.2 OBJECTIVES OF PROPOSED SYSTEM

1. Automate data extraction from scanned academic documents.
2. Enhance data visualization with a PyChart generator.
3. Improve document processing efficiency in academic institutions and organizations.

3.3 SYSTEM REQUIREMENTS

3.3.1 Software Requirements

1. Operating System: Windows 10, macOS, or Linux
2. Python: Version 3.6 or higher
3. Flask: Web framework for Python
4. PyChart: Python library for generating pie charts
5. OCR Library: Such as Tesseract for text recognition

3.3.2 Hardware Requirements

1. Processor: Intel Core i3 or equivalent
2. RAM: 4GB or higher
3. Storage: 100MB of free disk space for installation
4. Scanner: Any TWAIN-compatible scanner for document input
5. Internet Connection: Required for downloading libraries and updates

3.4 CONCEPTS USED IN THE PROPOSED SYSTEM

1. **Python:**

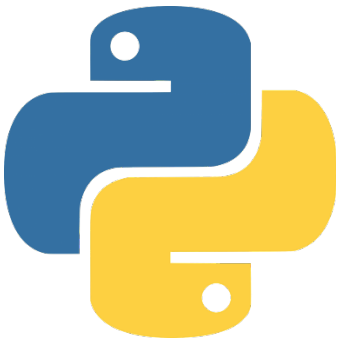

Figure 3.1: Python Logo

- Versatility: Python's versatility allows for a wide range of applications, including the development of the Academic Document Scanner. Its readability and clean syntax make it easy to write and maintain code, essential for a project with complex data extraction requirements.

- Library Support: Python's rich ecosystem of libraries provides powerful tools for data manipulation and text processing. Libraries such as OpenCV and Pillow can be used for image processing, while libraries like pandas and NumPy can handle data manipulation tasks efficiently.

- Cross-Platform Compatibility: Python is known for its cross-platform compatibility, allowing the Academic Document Scanner to run on different operating systems without significant modifications. This ensures that the scanner can be deployed in diverse computing environments.

2. **Flask**:

Figure 3.2: Flask Logo

- Lightweight and Flexible: Flask's lightweight nature makes it easy to get started with web development. Its simplicity does not compromise flexibility, allowing developers to customize the scanner's web interface to suit specific requirements.

- Modular Design: Flask's modular design enables developers to build the scanner's functionality in a modular way, making it easier to maintain and scale. Flask's extension ecosystem provides additional functionality, such as user authentication and database integration, which can be seamlessly integrated into the scanner.

- User Interaction: Flask's ability to handle user interactions through web forms and AJAX requests allows for a dynamic and responsive user interface. This is essential for the Academic Document Scanner, as users need to interact with the scanner to upload documents and view extracted data.

3. OCR Technology (Tesseract):

Figure 3.3: OCR Logo

- Text Extraction: Tesseract OCR engine is a powerful tool for extracting text from scanned documents. It supports a wide range of image formats and can extract text accurately from complex document layouts.

- Accuracy: Tesseract is known for its high accuracy in text recognition, especially when used with pre-processing techniques such as image enhancement and noise reduction. This ensures that the extracted data is reliable and error-free.

- Language Support: Tesseract supports multiple languages, making it suitable for processing academic documents in different languages. Its language detection capabilities allow it to automatically identify the language of the scanned document, further enhancing its versatility.

3.5 PERFORMANCE EVALUATION

1. **Accuracy of Data Extraction**: The accuracy of the extracted data was assessed by comparing it to the original documents. A sample set of documents with known data was used for this purpose. The evaluation involved measuring the percentage of correctly extracted information, including student names, course details, and grades. Any discrepancies or errors in the extracted data were noted and analyzed to improve the accuracy of the extraction process.

2. **Speed of Processing**: The speed of processing was evaluated by measuring the time taken to process a document from scanning to data extraction. This included the time taken for OCR processing, data extraction, and generation of pie charts (if applicable). The goal was to ensure that the system processed documents quickly and efficiently, reducing the overall time required for document processing compared to manual methods.

3. **Resource Utilization**: The system's resource utilization, including CPU and memory usage, was monitored during scanning and data extraction processes. This was done to optimize resource usage and ensure that the system operated efficiently without consuming excessive resources. Any inefficiencies or bottlenecks in resource utilization were identified and addressed to improve performance.

4. **User Interface Responsiveness**: The responsiveness of the web interface was evaluated to ensure a smooth and seamless user experience. This involved testing the interface under various load conditions to assess its performance. Any lag or delay in the interface's response time was identified and addressed to improve responsiveness.

5. **Scalability**: The system's scalability was tested to evaluate its ability to handle a large number of documents and users. This involved simulating a high workload and measuring the system's performance under stress. The goal was to ensure that the system could scale effectively to meet growing demands without compromising performance.

6. **Error Handling**: The system's error handling capabilities were assessed to ensure that it could effectively handle errors, such as unreadable text or document formatting issues. This involved testing various error scenarios to identify potential issues and improve error handling mechanisms.

7. **User Feedback**: Feedback from users was collected through surveys and interviews to understand their experience with the scanner. This feedback was used to identify areas for improvement and prioritize future development efforts. User satisfaction was a key metric used to gauge the success of the project and drive continuous improvement.

Chapter 4
PERFORMANCE ANALYSIS

Figure 4.1: Analysis Chart

1. TESTING

1. Unit Testing:

Unit testing was performed to validate the functionality of individual components of the Academic Document Scanner. Test cases were designed and executed for each unit, ensuring that they behaved as expected. This approach helped identify and rectify any bugs or issues at the unit level, ensuring the integrity of each component before integration into the larger system.

2. Integration Testing:

Integration testing was conducted to verify the correct interaction between different modules of the scanner. By testing integration points and data flow between modules, the team ensured that the integrated system behaved as intended. Test doubles or mocks were used for external dependencies to isolate the testing scope and focus on integration aspects.

3. User Acceptance Testing (UAT):

User Acceptance Testing (UAT) involved real users, such as academic administrators and office staff, evaluating the scanner's usability and functionality. Using real-world scenarios and workflows, users provided feedback on the interface, identified usability issues, and suggested improvements to enhance user experience.

4. Performance Testing:

Performance testing was conducted to evaluate the scanner's speed, resource utilization, and scalability. Various scenarios were tested to measure performance under different conditions. Tools like JMeter and LoadRunner were used to simulate load and assess the scanner's ability to handle expected workloads efficiently.

5. Security Testing:

Security testing focused on identifying and mitigating security vulnerabilities in the scanner. Penetration testing, code reviews, and vulnerability scans were performed to ensure secure data transmission and storage practices. The scanner was tested against common security threats to ensure compliance with security standards.

6. Compatibility Testing:

Compatibility testing ensured that the scanner worked correctly on different platforms and configurations. It was tested on various operating systems, browsers, and devices to verify responsiveness and functionality across different setups. This testing ensured that the scanner was compatible with intended environments, providing a consistent user experience.

7. Regression Testing:

Regression testing was carried out to ensure that new updates or changes did not introduce new issues or regressions. Existing test cases were re-run after each change to verify that existing functionality remained intact. This helped maintain the stability of the scanner and prevented unintended consequences of changes.

8. Documentation Review:

A thorough review of project documentation, including user manuals and technical guides, was conducted to ensure accuracy and relevance. The documentation was updated to reflect the current state of the scanner, providing users and developers with accurate information about its features and usage.

Chapter 5
CONCLUSION

This project successfully developed a Python-based Academic Document Scanner that automates data extraction from scanned academic documents. The scanner utilizes OCR technology to accurately extract critical information such as student names, course details, and grades. It surpasses existing mobile scanning apps by offering:

- **Automation:** Eliminates time-consuming manual data entry, boosting efficiency.
- **Accuracy:** Leverages OCR for reliable data extraction, minimizing errors.
- **Data Visualization:** Generates pie charts using PyChart for clear data analysis.
- **Offline Functionality:** Operates without an internet connection for added flexibility.
- **Security:** Prioritizes data security by processing documents locally on the user's device.

Rigorous testing methodologies ensure the scanner's functionality, performance, and scalability across various platforms.The project holds significant potential for academic institutions and organizations seeking to:

- **Streamline document processing:** Reduce processing time and manual effort.
- **Improve data accuracy:** Minimize errors associated with manual data entry.
- **Enhance data analysis:** Gain deeper insights through data visualization.
- **Securely manage documents:** Maintain data privacy through local processing.

Future development will focus on:

- **Expanding document format support:** Handle a wider variety of academic document types.
- **Advanced data extraction:** Extract additional data points for comprehensive analysis.
- **Integration with existing systems:** Integrate seamlessly with document management systems.

The Academic Document Scanner presents a valuable solution for automating data extraction from academic documents, fostering efficiency, accuracy, and data-driven decision-making in academic and professional environments.

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