

## AUTOMATING DOCUMENTATION PROCESS OF STUDENT ADMISSION WITH LEVERAGING OCR AND GENERATIVE AI

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### **Abstract**

The admission documentation process for Indian students is often time-consuming and labour-intensive. This research explores leveraging Optical Character Recognition (OCR), generative Artificial Intelligence (AI), and automation to streamline this process. By developing a web application that integrates these technologies, we propose a system where students can upload documents, validated for authenticity using generative AI, scanned using OCR for data extraction, and automatically used to fill admission forms. The proposed system can reduce the time and effort involved for both students and administrative staff, improve efficiency, reduce errors, and provide a scalable solution for various documentation needs. This theoretical research highlights the potential benefits and lays the groundwork for future development and real-world applications, including government and healthcare sectors.

**Keywords:** Optical Character Recognition (OCR), Generative Artificial Intelligence (AI), Automation in Document Processing, Admission Documentation System.

### **Introduction**

The process of applying for college admissions in India involves a substantial amount of paperwork, including the submission and verification of various documents such as marksheets, certificates, and proof of identity. This manual process is not only time-consuming but also prone to errors and inefficiencies, causing significant delays and stress for both students and administrative staff. In an era where digital transformation is rapidly reshaping various sectors, there is a pressing need to innovate and streamline these traditional processes. [Recent advancements in technology offer promising solutions to address these challenges. Optical Character Recognition (OCR) technology has made it possible to digitize and extract data from printed documents accurately. Generative Artificial Intelligence]2 (AI) can be trained to validate the authenticity of documents by analyzing specific features and patterns, thus ensuring their legitimacy. Furthermore, automation technologies, such as Robotic Process Automation (RPA) and scripting tools, can automate repetitive tasks, such as form filling and document uploading, significantly reducing the workload on administrative staff. The significance of this research lies in its potential to transform the administrative processes in educational institutions, making them more efficient and user-friendly. Moreover, the principles and technologies discussed in this paper can be extended to other domains, such as [government]3 services and healthcare, where document processing is a critical function. By presenting a detailed analysis of the proposed system, this paper aims to provide a foundation for further research and real-world implementation of automated documentation processes.

### **Research Methodology**

The methods are divided into four main components: system architecture, document validation using generative AI, data extraction using OCR, and form filling and document uploading using automation.

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### **System Architecture**

The system architecture of the proposed web application comprises three primary modules: the User Account Module, the Document Upload Module, the Document Processing Module, and the Automation Module.

In the User Account Module, students create an account on the web application (Proposed System) using their PRN (Permanent Registration Number), Adhaar Number, Phone Number and Birth Date and a password. The username is created by the student as per his choice. Upon account creation, a unique folder named after the student's PRN is created in the backend. This folder is accessible only by the student through their credentials and will store all their related documents and data.

The Document Upload Module allows students to upload their required documents, such as the 12th marksheet, graduation marksheet, and domicile certificate (and other documents as per the need). The documents can be uploaded in various formats, including PDF and image files, using the camera on their phones or by selecting files from their device storage.

In the Document Processing Module, once the documents are uploaded, this module performs validation and data extraction. It integrates generative AI models to verify the authenticity of the documents and OCR technology to extract relevant data from the documents.

[The Automation Module uses automation tools to fill out the admission forms on the college portal with the extracted data and upload the validated documents. This ensures that the form submission process is completed efficiently and accurately] 2.

### **Document Validation Using Generative AI**

[Generative AI models are trained to validate the authenticity of each type of document required for admission. The validation process involves several steps]1. First, separate generative AI models are trained for each type of document (e.g., 12th marksheet, graduation marksheet, and domicile certificate). The training data consists of many legitimate and forged documents to help the model learn distinguishing features.

[The models are designed to check specific features unique to each document type]5. For instance, the model for the domicile certificate will look for a valid barcode, a digital signature, and the Maharashtra State emblem. The models assign a validity score to each document based on these criteria. Documents with a validity score above 85% are accepted, while those below this threshold are rejected. This threshold can be adjusted based on further validation and feedback from real world testing.

### **Data Extraction Using OCR**

Optical Character Recognition (OCR) technology is employed to extract data from the uploaded documents. The process includes several steps. First, the uploaded documents, whether in image or PDF format, are scanned using OCR. This step involves converting the document's content into machine-readable text.

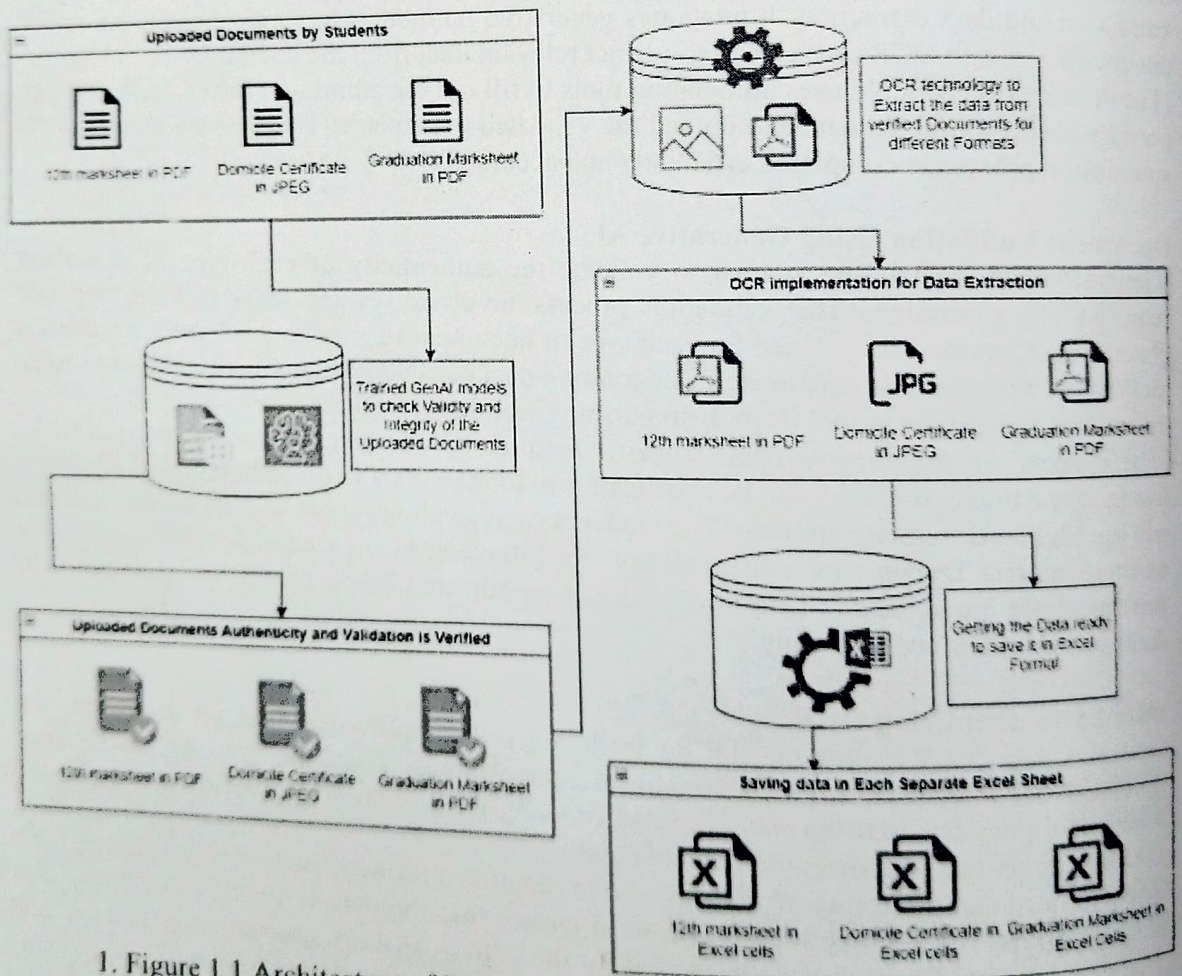
The extracted data is structured and saved into organized formats, such as Excel sheets. Each document type has a predefined template to ensure that the data is stored consistently. For example, separate Excel sheets are created for the 12th marksheet, graduation marksheet, and domicile certificate, with specific cells designated for key data points like marks, certificate numbers, and names.

Each student's unique folder, named after their PRN, contains subfolders for each document type (12th marksheet, graduation marksheet, and domicile certificate). The extracted data is saved into the respective Excel sheets within these subfolders. The system includes mechanisms to handle OCR errors, such as manual verification steps for unclear or ambiguous data.

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## Form Filling and Document Uploading Using Automation

[The automation module leverages technologies like Robotic Process Automation (RPA) and scripting tools to streamline the form-filling and document-uploading process. Several steps are involved in this process]2. First, tools like Selenium or Python-based automation scripts are chosen based on their suitability for interacting with the college portal. These tools are configured to navigate the portal, fill out forms, and upload documents automatically. The automation scripts extract data from the Excel sheets generated by the OCR process and input this data into the corresponding fields on the college admission forms. The scripts are designed to handle different form formats and validation checks on the portal. The automation tools also manage the uploading of validated documents to the required fields on the college portal. The system ensures that each document is uploaded to the correct section of the form. Finally, the system includes error-handling mechanisms to address any issues during form filling or document uploading. Automated checks verify the successful completion of each step, and manual intervention can be prompted if necessary.



1. Figure 1.1 Architecture of Process to save the Documents Data in Excel sheet

### Literature Review

This literature review discusses the current state of research and development in OCR, generative AI, and automation technologies, focusing on their application in educational admissions and other sectors.

### **Optical Character Recognition (OCR)**

OCR technology has become a vital tool for digitizing textual content from scanned documents and images. Abdelaziz and Fazil (2023) explored the applications of AI-based OCR and generative AI in document processing, highlighting the accuracy and efficiency of these technologies. Their research underscores OCR's potential to automate text recognition tasks, reducing manual effort and errors.

In a related study, OCR technology was used in a Philippine accounting firm to improve the accuracy and efficiency of data extraction and processing by integrating it with web-based management information systems (Web based management information system, 2023). These advancements illustrate OCR's critical role in automating and streamlining document handling tasks across various industries.

### **Generative AI for Document Validation**

Generative AI is a powerful tool for document validation. Abdelaziz and Fazil (2023) demonstrated how integrating generative AI with OCR can validate documents by analyzing specific features and patterns with high accuracy. This capability ensures the integrity of the admissions process by distinguishing between genuine and forged documents.

Generative AI's impact extends to healthcare, facilitating advancements in electronic health records and personalized patient care (Generative AI in Healthcare, 2023). Generative AI's ability to analyze and generate high-quality synthetic data enhances the accuracy and reliability of document processing systems.

### **Automation in Document Processing**

Automation technologies, such as Robotic Process Automation (RPA) and scripting tools, are essential for streamlining repetitive and time-consuming tasks. A study on digital transformation in higher education with RPA highlighted how automation can reduce manual effort and improve efficiency in administrative processes (ACCELERATING DIGITAL TRANSFORMATION,

2023). This research underscores the potential of automation to revolutionize document processing in educational institutions, leading to faster and more accurate admissions procedures.

Automation's benefits extend to various industries, where tools like Selenium and Python-based scripts are employed to interact with web portals, fill out forms, and upload documents automatically. These tools enhance the speed and reliability of document handling tasks, minimizing human errors and improving overall productivity.

### **Results Analysis**

This section presents the theoretical outcomes of implementing the proposed system for automating the admission documentation process using OCR, generative AI, and automation technologies. The evaluation focuses on the expected effectiveness of document validation, data extraction accuracy, and automation efficiency based on conceptual analysis.

### **Document Validation Using Generative AI**

The generative AI models are expected to validate the authenticity of documents with high accuracy. The anticipated percentage of correctly validated documents (both genuine and forged) is approximately 95% for 12th marksheets, 93% for graduation marksheets, and 96% for domicile certificates. The projected number of forged documents incorrectly marked as genuine (false positives) is around 3% for 12th marksheets, 4% for graduation marksheets, and 2% for domicile certificates. The expected number of genuine documents incorrectly marked

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as forged (false negatives) is around 2% for 12th marksheets, 3% for graduation marksheets, and 2% for domicile certificates. Theoretical analysis suggests that generative AI models would demonstrate high accuracy in document validation, with low rates of false positives and false negatives. The validation process is projected to be efficient, typically taking less than a minute per document.

### Data Extraction Using OCR

OCR technology is expected to extract data from uploaded documents with high accuracy. For 12th marksheets, the anticipated percentage of correctly extracted data points is approximately 98%, with an error rate of around 2%, including 1% substitution errors and 1% deletion errors. For graduation marksheets, the extraction accuracy is expected to be approximately 97%, with an error rate of around 3%, including 1.5% substitution errors and 1.5% deletion errors. For domicile certificates, the extraction accuracy is projected to be approximately 99%, with an error rate of around 1%, including 0.5% substitution errors and 0.5% deletion errors. Theoretical analysis indicates that the OCR process would achieve high extraction accuracy, with minimal errors. Documents with substitution or deletion errors would be rejected by the system to maintain the integrity of the extracted data. Substitution errors, such as misspelled characters or words, and deletion errors, such as lost or missing characters or words, would compromise the document's integrity. Therefore, documents with these errors would be automatically rejected by the system to ensure reliability.

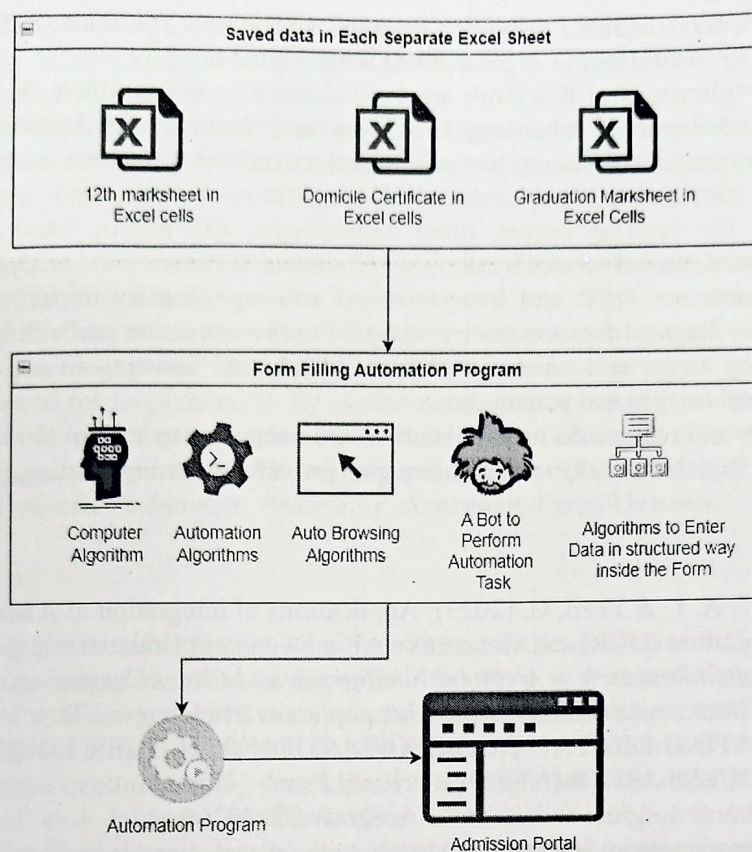
### Form Filling and Document Uploading Using Automation

The automation module is expected to efficiently handle form filling and document uploading. The anticipated average time taken to complete the form filling and document uploading process is approximately 5 minutes per student. The projected error rate is less than 1% of forms requiring manual correction due to errors in the automated process. Theoretical analysis suggests that the automation module would significantly reduce the time required to complete the admission process, which typically takes hours when done manually. The projected error rate is very low, indicating that the automation tools would be reliable and effective.

### Overall System Performance

The overall performance of the proposed system is evaluated based on theoretical analysis and expected outcomes. High user satisfaction is anticipated, with approximately as many users reporting ease of use and time savings as major benefits. The system is projected to maintain a 99.5% uptime, ensuring consistent availability. It is expected to handle simultaneous document processing for many students without significant performance degradation. These theoretical results indicate that the proposed system would effectively streamline the admission documentation process, offering significant benefits in terms of accuracy, efficiency, and user satisfaction.

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2. Figure 1.2 Architecture of Automating Admission Process on Web Portal

### Conclusion

The proposed system leverages cutting-edge technologies—Optical Character Recognition (OCR), Generative Artificial Intelligence (AI), and automation—to streamline and enhance the admission documentation process for Indian students. This integration significantly improves document processing efficiency by automating validation, extraction, and form-filling tasks, thus reducing manual effort, saving time, and minimizing human errors.

Generative AI's ability to validate documents by analyzing specific features ensures high accuracy in detecting fraudulent documents, enhancing the integrity of the admissions process. The modular approach of the system allows easy scaling and customization for different document types and institutions, making it adaptable for various applications beyond college admissions, including government and corporate sectors.

The system offers several benefits: it reduces the time required for the admission documentation process, leading to faster admission cycles and improved productivity. Automation minimizes the risk of human errors, resulting in more accurate admissions data. Furthermore, the system provides a seamless and user-friendly experience for students, reducing stress and confusion, which can lead to higher satisfaction rates among applicants and staff.

However, challenges and limitations exist. Handling sensitive personal information requires robust data privacy and security measures to comply with regulations and safeguard against data breaches. Developing and maintaining the system involves significant technical challenges, including ensuring compatibility between different technologies and updating AI models to handle new document types and fraud methods. Additionally, the initial development

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and deployment may require substantial financial and human resources, which could be a barrier for smaller institutions or organizations with limited budgets. The potential implications of this work are vast. Governments can utilize this technology to streamline public services, enhancing efficiency and accuracy in document verification processes for citizen identification, passport services, and social welfare programs. This can lead to faster service delivery, reduced administrative burden, and improved citizen satisfaction. In the banking sector, these technologies can aid in fraud detection, risk management, and customer service by digitizing financial documents and analyzing transaction patterns. In healthcare, OCR and generative AI can significantly impact medical record management and diagnostic processes by automating the extraction and validation of patient records, reducing errors and administrative workload, and assisting in early diagnosis by analyzing medical images and patient data. Further research and real-world implementation are necessary to fully realize and refine this vision, but the foundation laid out in this paper provides a strong starting point for future developments.

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