A
Mini-Project Report on

FORM AUTOMATION SYSTEM

Submitted in partial fulfillment of the requirements
for the degree of
BACHELOR OF ENGINEERING
IN
Computer Science & Engineering
Artificial Intelligence & Machine Learning

by

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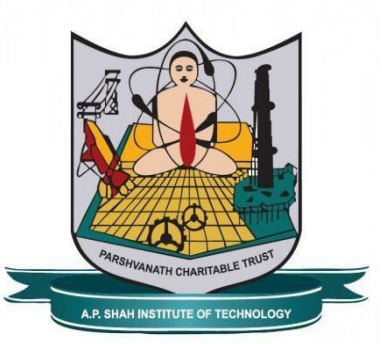

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CERTIFICATE

This is to certify that the project entitled "**Form Automation System"** is a bonafide work of Atul Gupta (21106006), Kapil Surve (21106018), Nishant Hire (21106060), Shipra Asthana (21106039) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning).**

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Project Report Approval

This Mini project report entitled "**Form Automation System"** by **Atul Gupta, Kapil Surve, Nishant Hire and Shipra Asthana** is approved for the degree of ***Bachelor of Engineering*** in ***Computer Science &Engineering***, (AIML) ***2023-24***.

External Examiner: _____

Internal Examiner: _____

Place: APSIT, Thane
Date:

Declaration

We declare that this written submission represents our ideas in our own words and where other's 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 hasnot been taken when needed.

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ABSTRACT

Optical character recognition (OCR) technology converts text images into machine-encoded text. The Form Automation System is a cutting-edge solution designed to simplify and enhance attendance tracking across different domains, including education, corporate, and event management. This innovative system leverages OCR technology, artificial intelligence, and digital interfaces to automate attendance recording while improving accuracy and data management.

Key Components:

OCR Scanning: The core of the system relies on OCR technology to scan and recognize text from various data sources, such as attendance sheets, cards, or digital displays. The OCR engine can decipher printed and even handwritten names, employee IDs, or unique identifiers.

Mobile Application: A user-friendly mobile application is an integral part of the system. Users, whether they are students, employees, or event attendees, can easily access the system via their smartphones. The app allows users to initiate the attendance tracking process. Camera Integration: The mobile app uses the smartphone's camera to capture attendance-related information. When users attend a class, meeting, or event, they simply point their camera at the designated area (e.g., a QR code, a printed list of names). The system then captures the data using OCR technology.

Real-time Data Processing: The OCR engine processes the captured data in real-time, identifying and cross-referencing it with the database of registered participants. This ensures that only valid attendees are recorded.

Biometric Authentication (Optional): For added security, the system can integrate biometric authentication methods such as fingerprint recognition or facial recognition to verify the identity of the attendee.

Cloud-Based Database: All attendance data is securely stored in a cloud-based database, accessible to authorized administrators. This database provides real-time attendance updates and historical records for reporting and analysis. Analytics and Reporting: Administrators can generate comprehensive attendance reports and analytics through the system's dashboard. These reports can help in identifying attendance trends, optimizing resources, and making data-driven decisions.

Keywords: OCR, Image to Text

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CHAPTER 1

INTRODUCTION

1. INTRODUCTION

In the realm of modern education and workforce management, accurate attendance tracking forms the cornerstone of efficiency and productivity. Embracing the revolutionary capabilities of Optical Character Recognition (OCR), our Form Automation project aims to revolutionize form management systems by automating the process of recording and managing form in educational institutions and workplaces. Through the fusion of cutting-edge AI and deep learning technologies, this transformative solution brings unparalleled accuracy, speed, and convenience to attendance tracking, eliminating the need for manual record-keeping and unlocking a new era of streamlined administrative processes. The Form Automation System presents a forward-looking approach to attendance management, leveraging OCR technology and mobile devices to create a seamless and accurate form tracking solution. This abstract concept can be further developed and customized to address the unique requirements of various organizations and institutions. Optical character recognition (OCR) technology converts text images into machine-encoded text. The Form Automation System is a cutting-edge solution designed to simplify and enhance form tracking across different domains, including education, corporate, and event management. This innovative system leverages OCR technology, artificial intelligence, and digital interfaces to automate attendance recording while improving accuracy and data management.

Benefits:

Accuracy: The system eliminates manual data entry errors, ensuring precise form records.

Efficiency: It streamlines the form tracking process, saving time for both attendees and administrators.

Accessibility: Users can access the system via their smartphones, making it convenient and inclusive.

Data Security: Form is securely stored in the cloud, reducing the risk of data loss or tampering.

Customization: The system can be tailored to the specific needs of educational institutions, businesses, or event organizers.

CHAPTER 2

LITERATURE SURVEY

1. LITERATURE SURVEY

2.1-HISTORY

Optical character recognition (OCR) technology converts text images into machine-encoded text. It is widely used as a form of data entry from printed paper data records, such as passport documents, invoices, bank statements, and computerised receipts. Digitising text means it can be easily presented, edited, stored, and searched, making key administrative tasks such as invoicing and sales processing more efficient. Today, we're taking a look at how this technology was developed, and whether it can remain relevant in the era of digitisation. OCR technology traces its roots back to telegraphy. In 1914, on the eve of the First World War, the physicist Emanuel Goldberg invented a machine that could read characters and convert them into telegraph code – an early form of optical character recognition. Later, Goldberg went a step further and created what was perhaps the first electronic document retrieval system. In the 1920s, microfilm had become a popular way for businesses to store financial records – but quickly retrieving specific records from spools of film was almost impossible. To overcome this, Goldberg repurposed existing technologies, using a photoelectric cell to recognise patterns with the help of a movie projector. The US patent for his 'Statistical Machine' was later acquired by IBM. Since then, OCR technology has become more sophisticated and more widespread. Early versions had to be trained with images of each character and were limited to recognising one font at a time – but in the 1970s, inventor Ray Kurzweil commercialised 'omni-font OCR', which could process text printed in almost any font. By the early 2000s, desktop and mobile OCR applications became available online as a cloud-based service. Now more accessible than ever, businesses all over the world began relying on this technology to extract data from paper documents. Today, many OCR service providers offer this technology, often via APIs. Most applications are now capable of recognising most characters and fonts to a high level of accuracy, and the technology continues to improve. The future of data for decades, OCR technology was the only way to turn printouts into data that could be processed by computers. Alongside electronic data interchange (EDI) and invoice portals, it remains a popular tool for converting paper invoices into extractable data that can be integrated into financial management systems (FMS) or enterprise resource planning (ERP) software. Because OCR technology recognises characters, there is always scope for errors. Data accuracy can vary depending on the quality of the document received, and some manual intervention may be required. New data processing technology, such as our Advanced Data Automation solution, utilises machine learning to offer a faster, more accurate, option. Advanced Data Automation

extracts information from the data layer of PDFs or other data-rich documents – guaranteeing 100% data accuracy, every time. Many organisations are adopting this technology to cut operating costs, boost productivity, and free up their staff to focus on higher-value tasks.

2.2-LITERATURE REVIEW

1. IAS- Intelligent Attendance System based on Windows Image Acquisition (WIA), Optical Character Recognition (OCR) and Windows Communication Foundation (WCF) Service Chirag Patel, Maitri Chokshi, Dr. Atul Patel

Taking student attendance in the class and then posting it in online attendance system is a quite time-consuming process for the teachers. In this paper, we have presented a novel approach for posting the attendance in the online attendance system without user intervention. In the proposed work after taking the attendance manually in the attendance sheet, a teacher needs to put attendance sheet in front of camera. Then the camera can capture the image of attendance sheet. After capturing the image of attendance sheet by the Windows Image Acquisition (WIA) technique, the proposed work does the optical character recognition (OCR) of it to find out the lecture/ laboratory details and absent numbers. These details are sent to WCF service to store it in the online attendance system database. We used Tesseract OCR engine which is provided by Google to do OCR. The accuracy of OCR is not 100% so we have applied algorithm to auto correct the data after OCR[1].

2. Vision Tracking and Optical Character Recognition for Augmented Reality based Attendance System D P Kaur, A Mantri

This paper presents a system for smart portable electronic device which is based on computer vision-based techniques for scanning the manually entered data by the user for automatic update on a central database and augmented reality is used for automatic display of updated data to the user. The developed application is in the form of an Android app which is installed in compatible smart portable electronic device. The system for providing an interactive augmented reality-based attendance uses image processing for optical character recognition to identify the characters in the register marked as X' for absence and any numeric data for presence of the student. For capturing the images, an AR enabled device can be used which is connected to a central database through the internet and the user is made to visualize the augmented information in the form of overlaid virtual content on the real scene[2].

3. OCR in Indian Scripts: A Survey Peeta Basa Pati, A G Ramakrishnan

India is a multi-lingual country. A significantly large number of scripts are used to represent these languages. A desire of vision researchers is to develop an integrated Optical Character Recognition (OCR) system which will be able to process all such scripts. Such a development, if objectified, will not only enable faster flow of information across the country, but also have a profound impact on its scientific and economic development. Courageous endeavors have been successfully made towards the development of a system capable of recognizing machine-printed, or hand-written characters and/or numerals. However, most Indian scripts do not have an integrated OCR system. Further the development of a unified system which is capable of processing all Indian scripts is still a dream. This article presents a survey of the current literature on the development of OCR's in Indian scripts. Reviewing the basics of and the motivation towards the development of OCR system, the article analyzes the various methodologies employed in general purpose pattern recognition system. A critical analysis of the work towards OCR system in Indian languages, with pointers towards possible future work is also presented[3].

4. CONVERSION OF IMAGE TO EXCELUSING OCR TECHNIQUE Amitha S, Mithun M, PC Chandana, Mayurjit Borkakoty, Adithya U

This paper proposes regarding the image processing of the text conversion and we use images in literacy education. In this research work, a web application is developed to convert the Attendance register image to excel conversion. Further, several approaches for image-to-excel conversion are reviewed in detail. By overcoming the gaps, which are identified by thorough review of the literature, an improved methodology is proposed. As a result, the development of web-application goes through four major phases including: capturing, extraction, recognition and conversion. Moreover, Optical Character Recognition (OCR) algorithm is particularly used for character extraction and recognition with high accuracy under different environmental circumstances. It translates text just by capturing an image and uploading the image with system and conversion instantly appears on user’s system screen and can view the extracted text. The proposed solution may particularly be helpful in literacy education and for the teaching staff, for using this web application under different circumstances[4].

5. Automated Mobile Attendance System (AMAS) Aditi Dankar, Poornima Panduranga Kundapur

One of the most common academic processes that institutions/universities follow is that of maintaining student/staff attendance. However, it has been observed that the conventional method of taking students attendance on registers to confirm their physical presence is still prevalent. This method is time-consuming, inefficient and prone to human errors. In order to address the attendance issue, this paper proposes a simple user-friendly mobile application "Automated Mobile Attendance System" (AMAS). AMAS is interfaced with a website in the backend for data entry and report generation. The application is able to track students using GPS and Bluetooth beacons to confirm and verify their presence in classrooms. The application maintains a record of the absentees that is synced with the tables in a remote database server regularly. This application reduces the time required to take attendance, prevents the loss of data as well as provisions to edit incorrect responses. AMAS is developed using Android Studio 3.0.1 and is compatible with 4.4 (KitKat version). The mobile and web application integration is via WAMP server. The database used is MySQL[5].

CHAPTER 3

Problem Statement

2.Problem Statement

"In educational institutions, manual data entry processes for student records and assessments are time-consuming and error-prone. Faculty and administrative staff spend a significant amount of time transcribing handwritten assignments, exam papers, and other student documents into digital formats. This manual data entry process not only leads to inefficiencies but also introduces the risk of transcription errors, negatively impacting the quality of student records and assessments. Additionally, the growing volume of paper-based and handwritten student documents exacerbates this problem. There is a need for an efficient and accurate OCR system tailored for educational environments. This system should be capable of automating the conversion of handwritten and printed student documents into digital text, ensuring data accuracy, and streamlining administrative workflows. Such a system would not only save time and resources but also enhance the overall educational experience by providing educators and administrators with easily accessible, organized, and searchable digital student records." This problem statement outlines the challenges associated with manual data entry in educational settings and suggests that an OCR system is a potential solution to address these issues. It highlights the need for an OCR system that can handle handwritten as well as printed documents, improve data accuracy, and streamline administrative processes in educational institutions. "In various organizational and educational settings, manual attendance tracking methods, such as paper sign-in sheets or manual data entry, continue to be prevalent. These traditional methods are not only time-consuming but also prone to errors, making it difficult to maintain accurate and up-to-date attendance records. There is a pressing need for a modern, efficient, and accurate attendance tracking system that utilizes OCR technology to automate the process of capturing attendance data from various sources, including ID cards, badges, or digital sign-ins. Such a system should not only reduce the administrative burden of manual attendance tracking but also provide real-time insights into attendance patterns, enhance security, and support contactless attendance recording in a post-pandemic world." This problem statement underscores the limitations of traditional attendance tracking methods, highlights the importance of accuracy and efficiency, and acknowledges the unique challenges posed by the COVID-19 pandemic. It emphasizes the need for an OCR-based attendance system that can address these challenges and provide organizations and educational institutions with a more reliable and adaptable solution for attendance tracking.

CHAPTER 4

Experimental Setup

2. Experimental Setup

4.1 Hardware Setup

- Operating System – Windows version 10/11

4.2 Software Setup

- Tesseract
- OpenCV
- PyTesseract
- NumPy
- Pandas
- OCR
- Scikit-learn

CHAPTER 5

Proposed System & Implementation

3. Proposed system & Implementation

5.1 Block diagram of proposed system

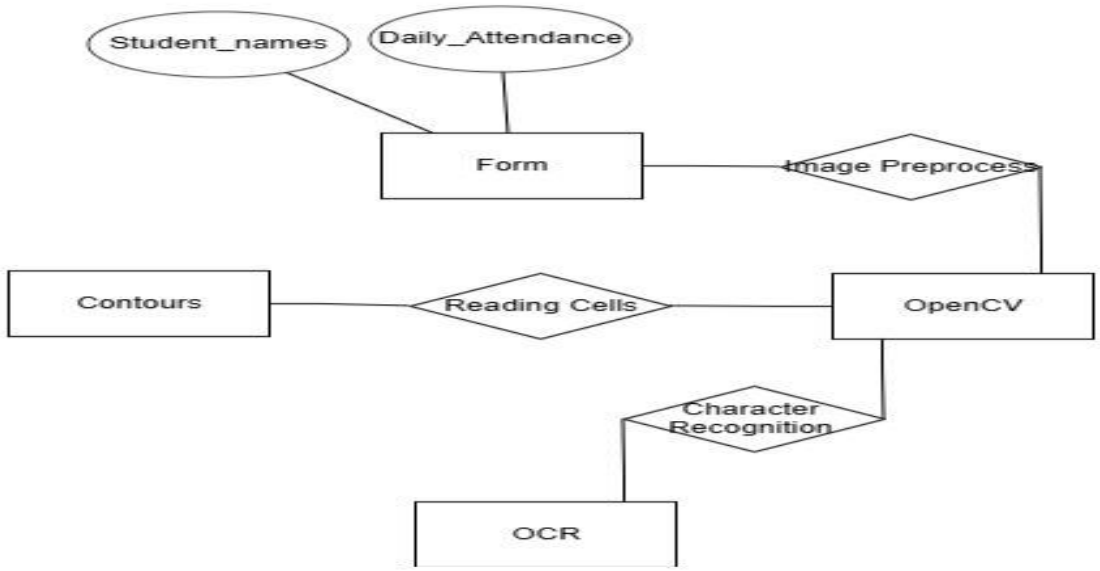

Fig.5.1.1

5.2 Description of block diagram

This block diagram is of the OCR software which we are using to develop the form automation system that is our main topic. In this we scan the data/documents or used a pdf document or image document and can convert all the three forms using OCR software into text editable format. It is used in form automation system as it makes attendance calculation easier. This is the basic representation by the diagram of a proposed system.

5.3 Implementation

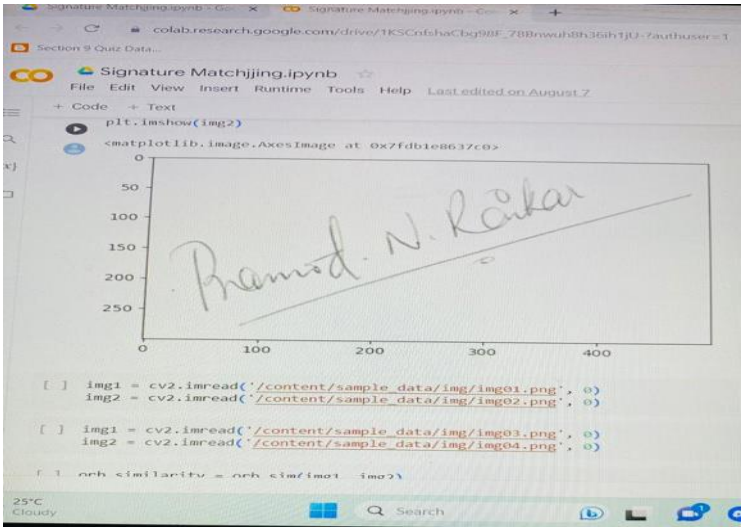

Fig.5.3.1

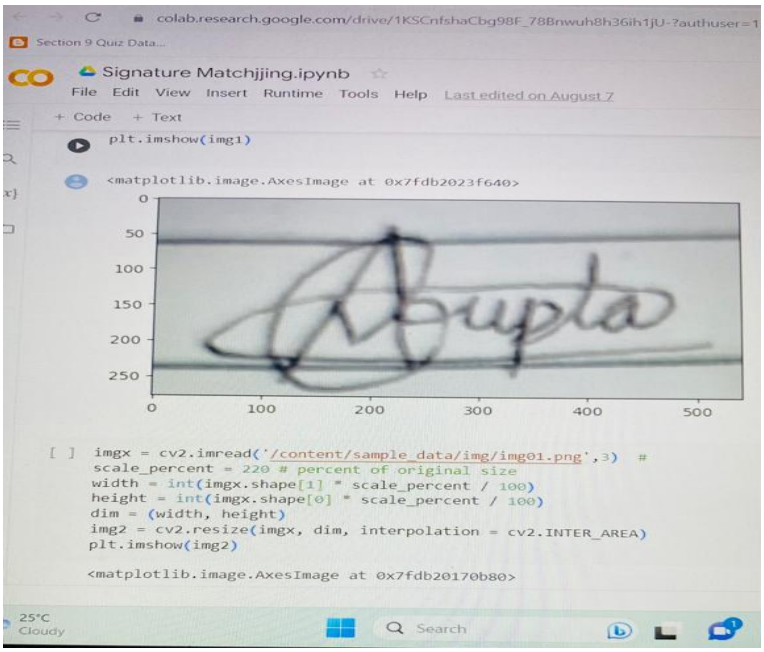

Fig.5.3.2

```
import cv2

img = Image.open('/content/sample_data/Images/test3.jpg')
plt.imshow(img)
```

```
<matplotlib.image.AxesImage at 0x7ea50c2f4880>
```

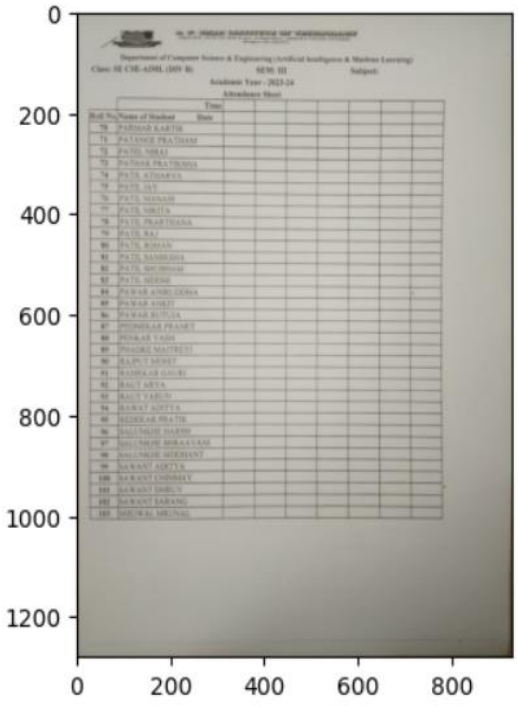

Fig.5.3.3


```
[ ]  text = pytesseract.image_to_string(roi)
     print(text)
```

Fig.5.3.4

```
data_to_insert
```

```
['Name',
 'RAWAT ADITYA',
 'RAUT VARUN',
 'RAUT ARYA',
 'RAMEKAR GAURI',
 'RAJPUT MOHIT',
 'PHADKE MAITREY!',
 'PENKAR YASH',
 'PEDNEKAR PRANET',
 'PAWAR RUTUJA.',
 'PAWAR ANKIT',
 'PAWAR ANIRUDDHA',
 'PATIL SIDDHI',
 'PATIL SHUBHAM',
 'PATIL SAMIKSHA',
 'PATIL ROHAN',
 'PATIL RAJ',
 'PATIL PRARTHANA',
 'PATIL NIKITA',
 'PATIL MANASI',
 'PATIL JAY',
 'PATIL ATHARVA',
 'PATHAK PRATIKSHA']
```

Fig.5.3.5

```
        print("Input text is empty. Please enter some text.
```

```
Enter The Language to be converted into : Hindi
नाम
रावत आदित्य
राउत वरुण
राउत आर्य
रमेकर गौरी
राजपूत मोहित
Phadke Maitrey!
पेनकर यश
पेडनेकर प्रानेत
पवार रुतुजा।
पवार अंकित
पवार अनिरुद्ध
पाटिल सिद्धि
पाटिल शुबम
पाटिल समिक्शा
पाटिल रोहन
पाटिल राज
पाटिल प्रर्थना
पाटिल निकिता
पाटिल मनसी
पाटिल जे
पाटिल अथर्व
पाठक प्रतिपक्ष
```

Fig.5.3.6

```
Enter The Language to be converted into : Marathi
नाव
रावत आदित्य
राउत वरुण
रत आर्य
रमेकर गौरी
राजपूत मोहित
फडके मैत्रे!
पेनकर यश
पेडनेकर प्रनेट
पवार रुतुजा.
पवार अंकित
पवार अनिरुद्ध
पाटील सिद्धि
पाटील शुभम
पाटील समिक्षा
पाटील रोहन
पाटील राज
पाटील प्रार्थना
पाटील निकिता
पाटील मनसी
पाटील जय
पाटील अथर्व
पाठक प्रतिक्षा
```

Fig.5.3.7

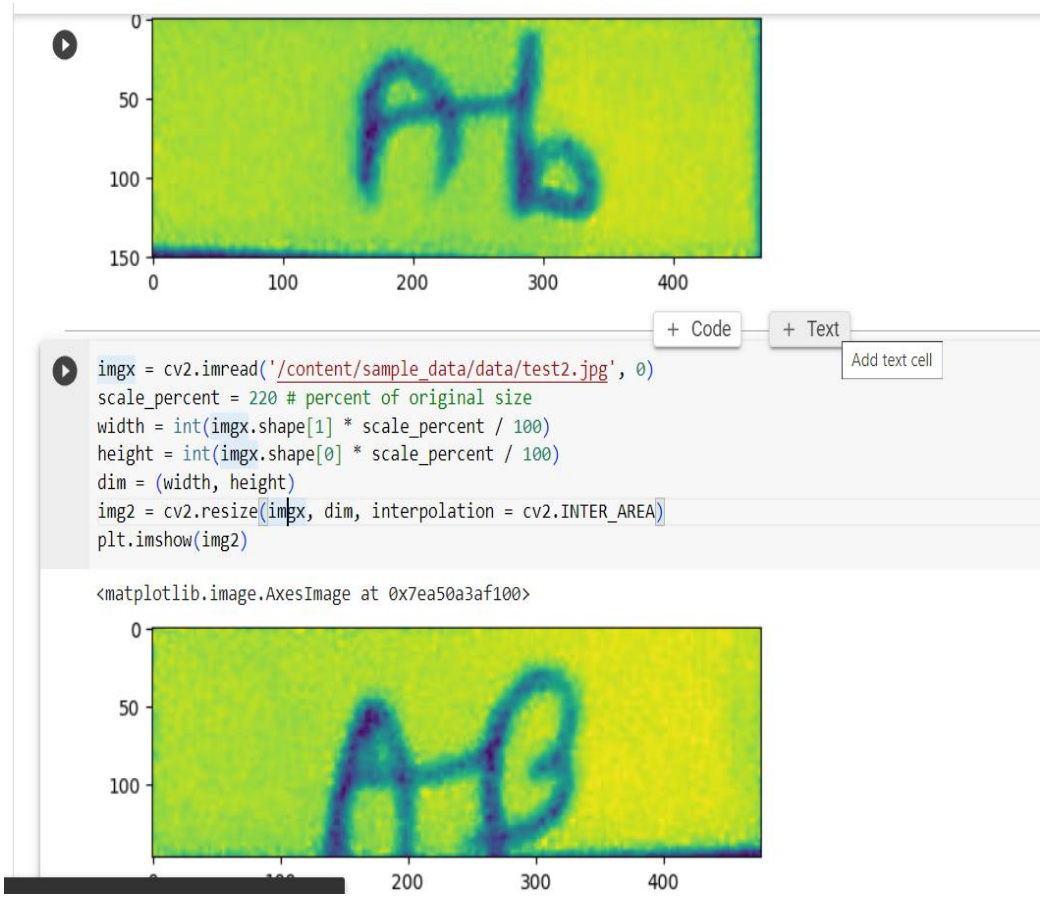

Fig.5.3.8

5.4 Advantages/Application

Precise Form Data Recording: Our OCR-powered system offers unrivaled accuracy in recognizing and recording attendance data, virtually eliminating errors associated with traditional manual methods.

Automated Data Integration: By integrating with existing form management platforms, our OCR solution automates data entry processes, reducing administrative burden and improving data integrity.

Customizable Reporting: Generate comprehensive form reports with ease, providing valuable insights for educators, administrators, and HR personnel to make informed decisions.

Real-time Data Processing: Harnessing the speed of OCR technology, our system enables real-time form data extraction, facilitating immediate availability of form records for stakeholders.

CHAPTER 6

Conclusion

4.Conclusion

The main conclusion of the Form Automation System is to keep present/absent details of employees or students by avoiding proxy system. The benefit of implementing such a system is that the efficiency and accuracy of the data entered is easy to maintain. This system saves valuable time and the resources by converting the data entered into excel sheet which makes it easy for calculating data category percentage. The system that we are developing is used to ease the task carried out by the staff. It reduces work-load and saves extra efforts for maintenance and it also reduces the room for error. Forms are an important criterion in schools and colleges as well as work places since marks and the salaries also depend on the forms in schools and colleges respectively. In conclusion, it helps to calculate the attendance which is also a higher priority task in institutions. Taking student attendance in the class and then posting it in online attendance system is a quite time-consuming process for the teachers. In this paper, we have presented a novel approach for posting the attendance in the form automation system without user intervention.

References

Research paper

[1] Chirag Patel, Maitri Chokshi, Dr. Atul Patel, "IAS- Intelligent Attendance System based on Windows Image Acquisition (WIA), Optical Character Recognition (OCR) and Windows Communication Foundation (WCF) Service", International Journal of Scientific & Engineering Research, ISSN 2229-5518, Volume 4, Issue 5, May-2013.

[2] D P Kaur, A Mantri, "Vision Tracking and Optical Character Recognition for Augmented Reality based Attendance System", IOP Conference Series: Materials Science and Engineering, Volume 993, International Conference on Mechanical, Electronics and Computer Engineering, April 2020.

[3] Peeta Basa Pati, A G Ramakrishnan, "OCR in Indian Scripts: A Survey", IETE Technical Review, Volume 22, 2005 - Issue 3, November-2015.

[4] Amitha S, Mithun M, PC Chandana, Mayurjit Borkakoty, Adithya U, "CONVERSION OF IMAGE TO EXCELUSING OCR TECHNIQUE", International Research Journal of Modernization in Engineering Technology and Science, e-ISSN: 2582-5208, Volume:04, Issue:07, July 2022.

[5] Aditi Dankar, Poornima Panduranga Kundapur, "Automated Mobile Attendance System (AMAS)", International Conference on Advances in Computing, Communication and Control (ICAC3), IEEE Xplore, March 2020.

Useful Links:

[6] https://youtu.be/dMaNiabqVdo?si=n-b62uOvtpxoxz6F

[7] https://youtu.be/PY_N1XdFp4w?si=mSHsvR5sbb16Ck9V

[8] https://youtu.be/rHux0gMZ3Eg?si=L6mwAZiJi7wRnwc3