# AI Health Risk and Safety Analyzer

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***Abstract*—AI Health Risk & Safety Analyser is an intelligent healthcare system designed to analyse medical prescriptions using Optical Character Recognition (OCR), Natural Language Processing (NLP), and rule-based Artificial Intelligence. It extracts medicines, dosages, and symptoms from prescription images and predicts health risks and drug interactions. The system improves medication safety, reduces human error, and provides real-time decision support. Experimental evaluation shows high accuracy in entity extraction and reliable detection of drug interactions.**

***Index Terms*—OCR, NLP, Healthcare AI, Drug Interaction, Prescription Analysis, Tesseract, Flask.**

## I. INTRODUCTION

Medical prescription errors are a significant concern in healthcare systems worldwide. Illegible handwriting, ambiguous dosage instructions, and lack of automated safety checks can lead to severe consequences, including incorrect medication and adverse drug reactions. Traditional prescription analysis relies heavily on pharmacists and healthcare professionals, making it prone to human error and time constraints. With the rapid growth of digital healthcare, there is a need for automated systems that can assist in interpreting prescriptions and ensuring patient safety. PrescriptoAI addresses these challenges by providing an AI-powered system that automates prescription interpretation and risk analysis. The system integrates Optical Character Recognition (OCR) to extract text from prescription images, Natural Language Processing (NLP) to identify medical entities, and rule-based inference mechanisms to detect health risks and drug interactions. The proposed solution enhances accuracy, reduces manual workload, and ensures faster and safer healthcare decision-making.

## II. LITERATURE SURVEY

Previous studies have demonstrated the effectiveness of Optical Character Recognition (OCR) in extracting text from medical documents and Natural Language Processing (NLP) in identifying structured medical entities. OCR tools such as Tesseract have been widely used for recognizing printed and handwritten text, although challenges remain in handling complex handwriting styles. NLP techniques have been successfully applied in clinical text mining for extracting entities such as medicines, dosages, and symptoms. Systems such as cTAKES and SpaCy-based models have shown promising results in biomedical data processing. Drug interaction detection systems have also been developed to improve patient safety by identifying harmful combinations of medications. However, most existing systems operate independently and lack integration with OCR and NLP pipelines. The proposed system, PrescriptoAI, integrates OCR, NLP, and rule-based safety analysis into a unified platform, providing an efficient and automated solution for prescription analysis and healthcare risk prediction.

## III. PROBLEM STATEMENT

Current healthcare systems face significant challenges in accurately interpreting medical prescriptions, especially handwritten ones. Most of the existing solutions rely heavily on manual interpretation by pharmacists or healthcare professionals, which increases the chances of human error. Illegible handwriting, incorrect dosage understanding, and lack of automated safety verification can lead to severe consequences such as adverse drug reactions and incorrect treatments.

Traditional systems do not provide an integrated solution that combines text extraction, entity recognition, and safety analysis. Moreover, existing drug interaction tools are often standalone and do not process prescription images directly. This creates a gap in ensuring patient safety and efficient healthcare delivery. Therefore, there is a need for a system that

can automatically analyze prescriptions and provide reliable insights.

## IV. PROPOSED SYSTEM

PrescriptoAI is a web-based healthcare system designed to provide automated prescription analysis using advanced technologies such as Optical Character Recognition (OCR), Natural Language Processing (NLP), and rule-based Artificial Intelligence. The system is developed to enhance medication safety by accurately extracting and analyzing prescription data.

The proposed system processes prescription images by first converting them into machine-readable text using OCR techniques. The extracted text is then analyzed using NLP methods to identify key medical entities such as medicine names, dosages, and symptoms. A rule-based inference engine evaluates the extracted information to detect potential drug interactions and predict possible health risks. The system ensures secure and efficient processing, providing accurate and reliable results. The integration of these technologies into a single platform improves efficiency, reduces manual effort, and enhances decision-making in healthcare systems.

## V. SYSTEM ARCHITECTURE

The system architecture of PrescriptoAI follows a layered approach to ensure efficient data processing and secure communication. The overall workflow begins with the user uploading a prescription image through the user interface. The image is then processed using OCR to extract textual information. The extracted data is passed to the NLP module, where important medical entities are identified and structured.

The processed data is further analysed by the rule-based engine to detect drug interactions and predict health risks. The final results are stored in the database and displayed to the user in a structured format. This layered architecture ensures scalability, reliability, and efficient handling of prescription data throughout the system lifecycle.

## VI. METHODOLOGY

The development of the system is carried out in multiple phases to ensure accuracy and efficiency. Initially, requirement analysis is performed to identify system objectives and user needs. This is followed by system design, where the architecture and individual modules are defined. During the implementation phase, OCR, NLP, and rule-based analysis techniques are integrated into the system.

Testing is conducted at various stages, including unit testing, integration testing, and system testing, to validate the functionality and performance of the system. Finally, the system is deployed and evaluated under real-world conditions. This structured methodology ensures the development of a reliable and efficient healthcare application.

## VII. IMPLEMENTATION

The system is implemented as a web-based application using modern technologies. The frontend is developed using HTML, CSS, and Bootstrap to provide a user-friendly interface. The backend is implemented using Python Flask, which handles data processing and server-side operations. Tesseract OCR is used for extracting text from prescription images, while OpenCV is utilized for image preprocessing tasks.

Natural Language Processing is implemented using libraries such as SpaCy and NLTK to extract meaningful medical entities from the text. SQLite is used as the database for storing user data and analysis results. The system also incorporates rule-based logic for detecting drug interactions and predicting health risks. The implementation ensures efficient processing and accurate output generation.

## VIII. MODULES

The system is divided into multiple functional modules to ensure efficient operation and maintainability. The user authentication module manages user registration and login processes. The OCR module is responsible for extracting text from prescription images. The NLP module identifies and classifies medical entities such as medicines, dosages, and symptoms.

The drug interaction module detects potentially harmful combinations of medications, while the risk prediction module analyzes the extracted data to identify possible health risks. The output module presents the analysis results in a structured and user-friendly format. Each module works collaboratively to ensure accurate and reliable system performance.

## IX. TESTING

The system is tested using various testing techniques to ensure reliability and performance. Unit testing is performed to verify the functionality of individual modules, while integration testing ensures proper interaction between different components. OCR accuracy is tested using different types of prescription images, including handwritten and printed formats.

NLP performance is evaluated based on the accuracy of entity extraction, and the rule-based system is tested for correct detection of drug interactions. System testing is conducted to evaluate the overall performance, usability, and efficiency of the application. The testing process confirms that the system meets the required standards for healthcare applications.

## X. RESULTS

The developed system successfully demonstrates the ability to analyze medical prescriptions and provide accurate results. It effectively extracts medical entities, identifies drug interactions, and predicts potential health risks. The system achieves high accuracy in processing prescription images and reduces the time required for analysis compared to manual methods.

The results indicate that the integration of OCR and NLP significantly improves the efficiency and reliability of prescription analysis. The system provides clear and structured output, making it easy for users to understand and interpret the results.

## XI. APPLICATIONS

The proposed system has wide applications in the healthcare sector. It can be used in hospitals and clinics to assist doctors and pharmacists in analyzing prescriptions. It is also beneficial for patients to verify medication safety and avoid harmful drug interactions. The system can be integrated into telemedicine platforms and electronic health record systems to enhance digital healthcare services. Additionally, it can be used in pharmaceutical industries for monitoring drug usage and safety.

## XII. LIMITATIONS

Despite its advantages, the system has certain limitations. It may face challenges in accurately recognizing highly illegible handwritten prescriptions. The rule-based approach may not cover all possible drug interaction scenarios. The system currently relies on predefined datasets and requires continuous updates for improved accuracy.

Additionally, the system depends on internet connectivity for operation and may have limited scalability without cloud integration.

## XIII. FUTURE WORK

Future enhancements of the system include integrating machine learning and deep learning techniques to improve prediction accuracy. The system can be extended to support multiple languages and handwriting styles. Integration with cloud-based databases will enhance scalability and performance.

Advanced features such as voice input, mobile application support, and real-time healthcare integration can also be incorporated to improve usability and functionality.

## XIV. CONCLUSION

PrescriptoAI successfully demonstrates the application of Artificial Intelligence in healthcare for automated prescription analysis. The system improves medication safety by accurately extracting prescription data and identifying potential risks and drug interactions.

The integration of OCR, NLP, and rule-based analysis provides an efficient and reliable solution for modern healthcare systems. The proposed system reduces human error, enhances decision-making, and contributes to improved patient safety.