MEDICAL PRESCRIPTION OCR

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INTRODUCTION

Medical Prescription Recognition refers to the process of automatically reading and interpreting handwritten or digital prescriptions using technologies like Optical Character Recognition (OCR) and Natural Language Processing (NLP). The goal is to reduce human errors, improve patient safety, and streamline healthcare workflows.

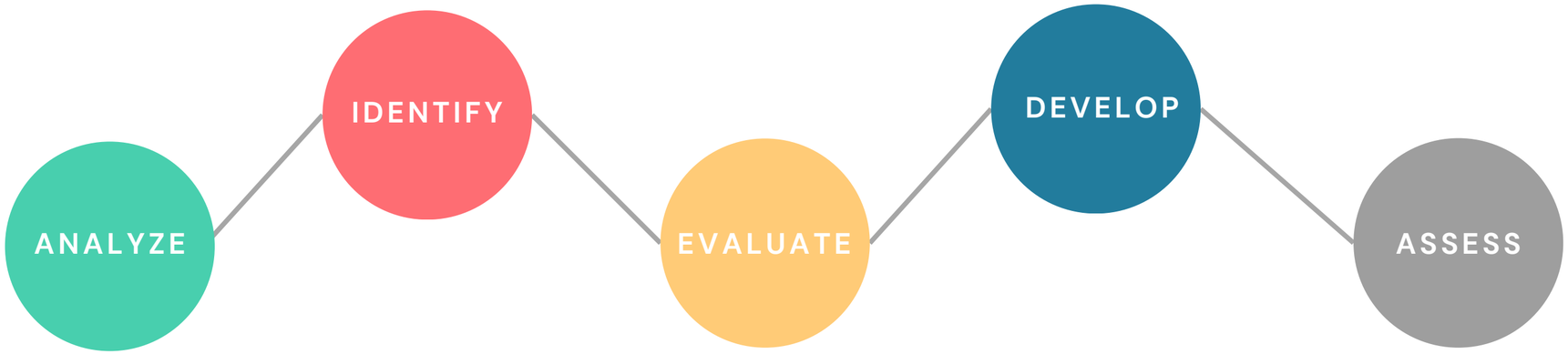
RESEARCH ON MEDICAL PRESCRIPTION RECOGNITION

- Medical prescription recognition focuses on extracting and interpreting handwritten or digital prescriptions.
- Research explores AI-driven OCR (Optical Character Recognition) and NLP (Natural Language Processing) techniques.
- Studies assess the impact of automation on reducing medication errors and improving patient safety.
- Investigates challenges such as handwriting inconsistencies, medical abbreviations, and multilingual prescriptions.
- Current research aims to enhance accuracy, efficiency, and integration with electronic health records (EHRs).

RESEARCH OBJECTIVE

Identify limitations in existing AI-based OCR and NLP models for prescription interpretation.

Develop AI-driven solutions to enhance prescription recognition accuracy.



Analyze the evolution of medical prescription recognition through diachronic and synchronic approaches.

Evaluate the role of electronic prescriptions in minimizing handwritten errors.

Assess the real-world impact of improved prescription recognition on healthcare efficiency and patient safety.

DIACHRONIC ANALYSIS

DEFINITION:

Diachronic analysis examines how medical prescription recognition has evolved over time.

HISTORICAL PERSPECTIVE:

Early reliance on handwritten prescriptions, leading to misinterpretations and errors.
Introduction of typewritten and printed prescriptions improved clarity but lacked automation.

EMERGENCE OF OCR:

Emergence of OCR (Optical Character Recognition) and digital prescription systems.
Advancements in AI and NLP for automated recognition over the past decade.

SIGNIFICANCE:

Helps understand past challenges and technological progress in prescription recognition.

SYNCHRONIC ANALYSIS

- Synchronic analysis focuses on present-day challenges and solutions in prescription recognition.
- Current Challenges:

1. Handwriting Variability: Different doctors have unique writing styles, making recognition difficult.
2. Medical Abbreviations & Terminology: Standardization issues across regions.
3. Multilingual Prescriptions: Difficulty in recognizing multiple languages and mixed-language content.
4. Accuracy Issues in AI-based OCR/NLP Models: Struggles with illegible handwriting and contextual understanding.

- Current Solutions:

AI-driven OCR and NLP models for real-time prescription recognition.
Integration with Electronic Health Records (EHRs) for better automation.
Blockchain & Cloud-Based Storage for secure prescription handling.

PROBLEM STATEMENT

The problem with medical prescription recognition lies in the high error rates caused by unreadable handwriting, inconsistent abbreviations, and varied medical terminology. These challenges lead to misinterpretation, which can result in dangerous medication errors and compromised patient safety. While AI-based OCR and have made strides in automating recognition, they still face limitations in accurately processing poor-quality handwriting and contextual understanding of medical terms. Additionally, the lack of large, diverse datasets for training these models hinders their effectiveness in real-world applications, necessitating further research and innovation to improve accuracy and reliability in medical prescription recognition.

SYSTEM ARCHITECTURE

IMAGE PREPROCESSING

Grayscale conversion, CLAHE-based contrast enhancement, thresholding for text isolation, and noise removal using blurring & morphology

CHARACTER SEGMENTATION

Detect contours using OpenCV, crop and align characters, and manage spacing irregularities for accurate text extraction.

CNN MODEL

Use a trained CNN model to classify 28×28 character images into 47 classes with high accuracy using convolution, pooling, and softmax layers.

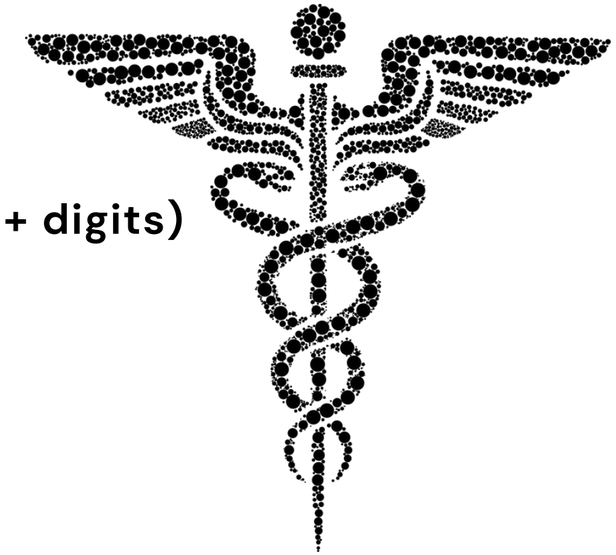
WORD RECONSTRUCTION

Arrange recognized characters based on bounding box positions and correct OCR errors using fuzzy matching or medical dictionary checks.

OUTPUT DISPLAY

Display the OCR result in a clear digital format, simulate OCR using dummy JS logic, and store results in localStorage for scan history tracking.

CNN MODEL OVERVIEW



- Dataset Used: EMNIST (47 classes: uppercase & lowercase letters + digits)
- CNN Architecture:
  - 2 2× Conv2D layers (3×3 kernel + ReLU)
  - MaxPooling layers to reduce dimensionality
  - Dropout layers for regularization
  - Dense layer + Softmax for classification
- Model Training:
  - Trained for 20 epochs using Adam optimizer and Categorical Crossentropy loss
  - Training Accuracy: ~92%, Validation Accuracy: ~86%
- Offline Testing Results:
  - High accuracy for isolated characters
  - Challenges with cursive or overlapping handwriting
  - Common confusions: O/0, I/l, g/q
- Key Strengths: Handles basic letter and digit recognition with high precision

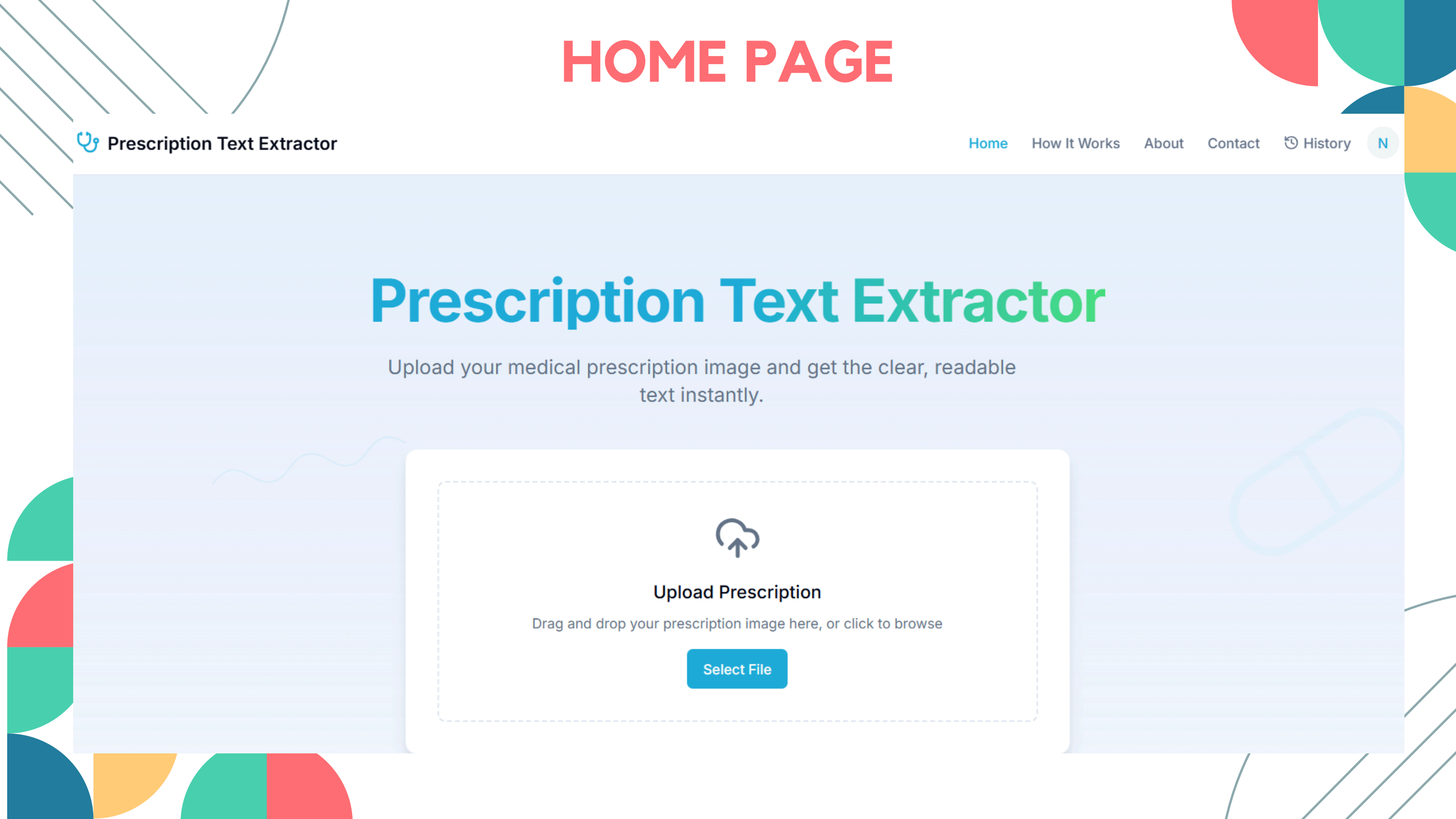
CNN MODEL ACCURACY

Aspect	Tesseract OCR	CNN OCR (This Project)
Handwriting Support	Limited	Strong (trained on EMNIST)
Character-Level Accuracy	~65% on handwriting	~85% on clean characters
Context-Aware	No	No (word-level prediction planned for future)
Speed	Real-time	Real-time (in prototype)

WEBSITE FEATURES

- **Image Upload:** Upload prescription images via file input.
- **Simulated OCR Processing:** Trigger OCR-like behavior with dummy JavaScript logic.
- **Clear Text Output:** Display neatly formatted results from simulated OCR.
- **History Management:** View and delete previous scan history stored via localStorage.
- **Responsive Design:** Fully optimized for mobile, tablet, and desktop devices.

HOME PAGE


Prescription Text Extractor
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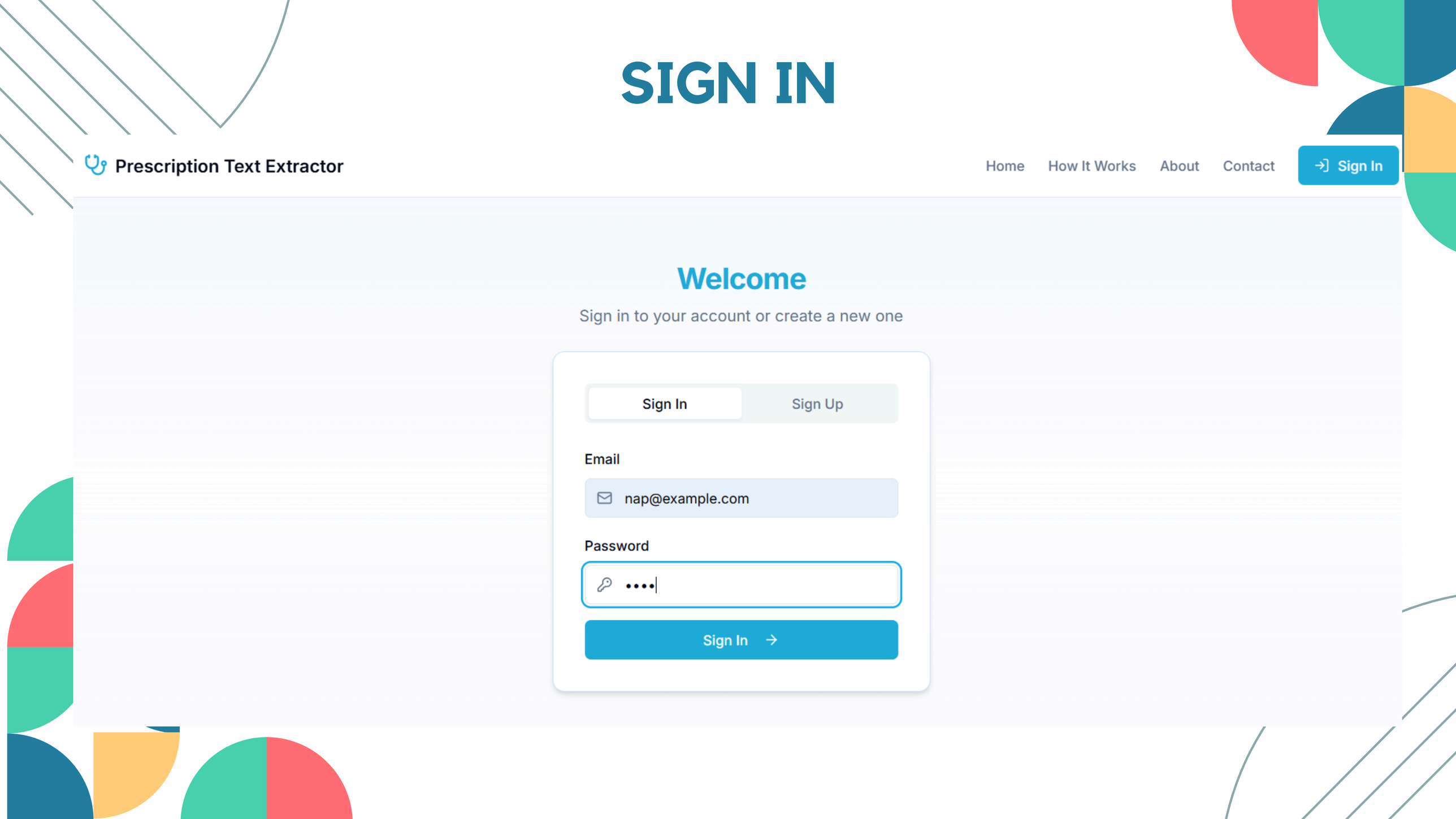
Prescription Text Extractor
Upload your medical prescription image and get the clear, readable text instantly.
Upload Prescription
Drag and drop your prescription image here, or click to browse
Select File

SIGN IN


Prescription Text Extractor
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Welcome
Sign in to your account or create a new one
Sign In
Sign Up
Email
nap@example.com
Password
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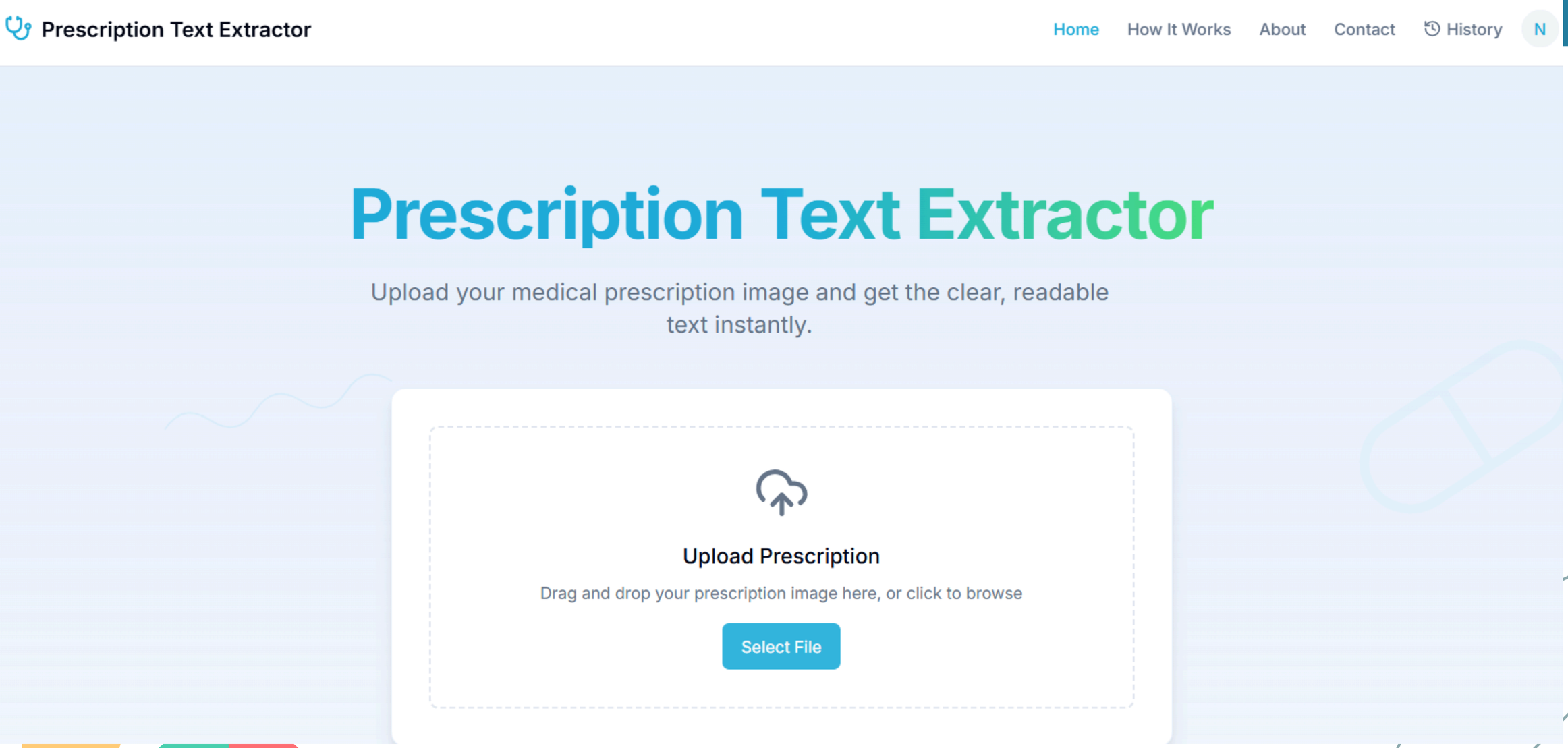
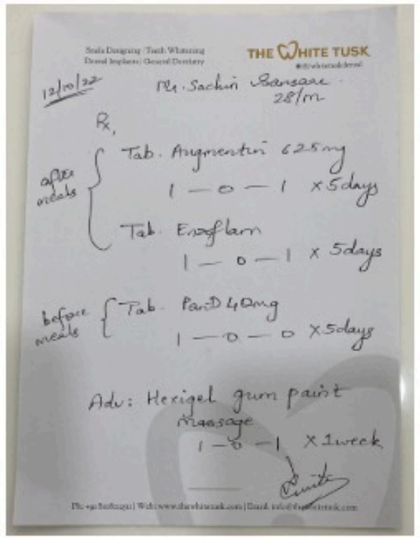
Sign In

IMAGE UPLOAD



TEXT OUTPUT

whitetusk.png.jpg



Extracted Text

Smile Designing | Teeth Whitening
Dental Implants | General Dentistry
THE WHITE TUSK
whitetuskdental
12/10/22 Mr. Sachin Sansare
28/M

Rx,
Tab . Augmentin 625 mg
1-0-1 × 5 days
Tab. Enzoflam
1-0-1 × 5 days
Tab. Pan-D 40mg
1-0-0 x 5 days
Adv: Hexigel gum paint

HISTORY

Prescription Text Extractor

Home | How It Works | About | Contact | History | N

Your Prescription History

Extract New Prescription

All Time | Past Week | Past Month

April 20th, 2025 1:38 PM

Amoxicillin 500mg, Take 1 tablet by mouth three times a day for 10 days. #30 tablets. No refills.

Extracted Prescription

Amoxicillin 500mg, Take 1 tablet by mouth three times a day for 10 days. #30 tablets. No refills.

Copy | Save | Delete

April 17th, 2025 1:38 PM

Lisinopril 10mg, Take 1 tablet by mouth once daily. #30 tablets. Refill: 3 times.

Extracted Prescription

Lisinopril 10mg, Take 1 tablet by mouth once daily. #30 tablets. Refill: 3 times.

Copy | Save | Delete

USER GUIDE

Prescription Text Extractor

Home | How It Works | About | Contact | History | N

How It Works

Our Prescription Text Extractor uses advanced Optical Character Recognition technology to transform hard-to-read prescriptions into clear digital text.

Step 1

Upload Prescription Image

Take a photo of your prescription or upload an existing image. Our system accepts common image formats like JPG and PNG.

- Secure and private image handling
- Simple drag-and-drop interface

Step 2

AI Extracts Text

Our advanced OCR technology processes the image, recognizing both typed and handwritten medical text, even identifying medical terminology and prescription

ABOUT US

About Our Tool

Prescription Text Extractor helps patients and healthcare providers by converting hard-to-read prescriptions into clear, digital text.

Our Mission

Our mission is to improve healthcare communication by making prescription information more accessible and easier to understand. We believe that clear communication is essential for proper medication adherence and patient safety.

By converting handwritten and printed prescriptions into digital text, we help reduce medication errors, improve patient understanding, and create better records for personal healthcare management.

Try It Now Contact Us

OBSERVATION & FINDINGS

- High Accuracy on clean, segmented characters
- Preprocessing crucial for segmentation success
- Stylized handwriting remains a challenge
- Interface usability rated high by test users
- Visual flow makes AI simulation engaging and educational

CHALLENGES & FUTURE SCOPE

- Overlapping and merged characters
- Ambiguous shapes like ‘O’ vs ‘0’, ‘I’ vs ‘l’
- Frontend-only limits real-time model testing
- Visual rendering issues on small screens

- Deploy real-time backend (Flask + TensorFlow Lite)
- Mobile App with offline OCR capability
- Support regional scripts (Hindi, Gujarati, etc.)
- Integrate drug lookup and interaction alert systems
- EHR + pharmacy software integration

THANK YOU