SmartDoc AI

Sudhalkar Yash Jivan

Department of Computer Engineering

Vishweshwarayya Collage of Engineering & Technology, Almala, Latur, Maharashtra, India

Abstract: *In today's digital era, a large amount of information is stored in the form of documents such as PDFs, Word files, and images. Analyzing and understanding these documents manually is time-consuming and inefficient. SmartDoc AI is a web-based application designed to simplify document analysis using Artificial Intelligence.*

The system allows users to upload documents and automatically extracts text using advanced parsing and Optical Character Recognition (OCR) techniques. The extracted text is processed using AI models to generate summaries, key points, and answers to user queries. The system also includes a SmartWriter feature that enables users to generate structured documents based on given prompts.

SmartDoc AI is developed using modern technologies such as Node.js for backend processing and JavaScript-based frameworks for frontend interaction. It integrates AI services such as Google Generative AI to provide intelligent and accurate outputs.

Keywords: Artificial Intelligence, Document Analysis, Natural Language Processing, OCR, SmartDoc AI, Web Application

I. INTRODUCTION

With the increasing use of digital technology, a vast amount of information is generated and stored in digital documents. These documents may include research papers, reports, business files, and academic materials. However, manually reading and analyzing such large documents is time-consuming and often inefficient.

Traditional document management systems mainly focus on storing and retrieving documents but lack the ability to provide intelligent insights. Users still need to read the entire document to extract useful information. This creates a need for an intelligent system that can analyze and summarize documents automatically.

SmartDoc AI is developed to address this problem by using Artificial Intelligence and Natural Language Processing techniques. The system allows users to upload documents and automatically processes them to extract meaningful information. It generates summaries, highlights key points, and answers questions based on the document content.

The system also supports multiple document formats such as PDF, DOCX, and images. It uses OCR technology to extract text from images and scanned documents. The integration of AI models enables the system to understand the context and provide accurate responses.

SmartDoc AI aims to make document analysis simple, fast, and efficient. It helps users save time and effort while improving productivity and decision-making.

II. SYSTEM ARCHITECTURE

SmartDoc AI follows a client-server architecture, which ensures efficient communication between the user interface and the processing system. The architecture is designed to handle document processing, AI computation, and data management effectively.

The system consists of the following main components:

1. Frontend Layer

The frontend is developed using a JavaScript-based framework. It provides a user-friendly interface where users can upload documents, enter queries, and view results. It handles user interactions and sends requests to the backend server.

2. Backend Layer
The backend is developed using Node.js and Express.js. It handles API requests, processes user inputs, and communicates with AI services. It also manages file uploads and data processing.
3. AI Processing Module
This is the core component of the system. It uses AI models such as Google Generative AI to analyze document content. It performs tasks such as summarization, question answering, and text generation.
4. Database System
MongoDB is used to store user data, document information, and system logs. It ensures efficient data management and retrieval.
5. File Processing Module
This module extracts text from uploaded documents using tools like pdf-parse, Mammoth, and Tesseract OCR.
The architecture ensures smooth data flow from user input to AI processing and output generation.

III. WORKING OF SYSTEM

The working of SmartDoc AI involves multiple steps that ensure efficient document processing and analysis.
User Authentication
The user logs into the system using login credentials. This ensures secure access to the application.
Document Upload
The user uploads a document in formats such as PDF, DOCX, or image. The system stores the file temporarily.
Text Extraction
The system extracts text from the uploaded document. For images, OCR technology is used to convert image content into text.
Data Processing
The extracted text is cleaned and prepared for analysis. Unnecessary characters and formatting are removed.
AI Processing
The processed text is sent to the AI model. The model analyzes the content and generates outputs such as summaries, key points, and answers.
Result Display
The results are displayed on the frontend in a structured format. Users can view or copy the generated output.
This step-by-step process ensures that users receive accurate and useful information quickly.

IV. IMPLEMENTATION

The SmartDoc AI system is implemented using modern technologies and follows a modular approach.
A. Backend Implementation
The backend server is responsible for handling requests and managing system operations. It is developed using Node.js and Express.js.
app.use("/api/summarize", summarizeRoutes);
app.use("/api/ai-qna", qnaRoutes);
These routes handle different functionalities such as summarization and question answering.

B. AI Processing Implementation
const result = await model.generateContent(prompt);
const response = await result.response;
This code sends document data to the AI model and retrieves the generated output.

C. Frontend Implementation

const response = await generateReport(selectedFileType, prompt, pageLimit); setReport(response.content);

This function handles user input and displays the generated document.

The implementation ensures smooth interaction between frontend, backend, and AI components.

V. FEATURES OF SYSTEM

SmartDoc AI includes several powerful features that enhance document analysis:

- Document Upload: Supports multiple file formats
- Text Extraction: Automatically extracts content
- Summarization: Generates concise summaries
- Key Points: Highlights important information
- Question Answering: Answers user queries
- SmartWriter: Generates custom documents
- User-Friendly Interface: Easy to use

These features make the system efficient and user-friendly.

VI. ADVANTAGES

The SmartDoc AI system offers several advantages:

- Reduces manual effort in reading documents
- Saves time by providing quick results
- Improves productivity and efficiency
- Provides accurate and meaningful insights
- Supports multiple document formats
- Easy to use and accessible

VII. FUTURE SCOPE

The system can be further improved with additional features:

- Multi-language document support
- Voice-based interaction system
- Cloud storage integration
- Advanced AI models for better accuracy
- Mobile application development

These enhancements will make the system more powerful and widely usable.

VIII. CONCLUSION

SmartDoc AI is an intelligent document processing system that uses Artificial Intelligence to simplify document analysis. It enables users to quickly understand large documents by providing summaries, key points, and answers.

The system reduces manual effort and improves productivity. It demonstrates how AI can be effectively used in real-world applications to solve practical problems. SmartDoc AI is a valuable tool for students, professionals, and researchers.