

Lexivion

TEAM NAME : VectorVerse

THEME/TRACK : Artificial Intelligence / Machine Learning

Problem Statement

Organizations today—businesses, hospitals, universities, legal firms, and government offices—are drowning in unstructured documents such as PDFs, reports, manuals, policies, contracts, academic material, and scanned images. These documents contain critical information, but retrieving the correct answer at the right time is slow, frustrating, and error-prone.

Why This Problem is Important?

- ✓ It directly affects productivity Studies show 20-30% of employee time is wasted searching for information.
- ✓ It affects accuracy Misinterpreting or missing critical documents can lead to operational, legal, or medical errors.
- ✓ It enables faster decisions Rapid access to the right information empowers smarter choices in daily operations.
- ✓ It supports digital transformation A smart document assistant is a key requirement in the AI-enabled era.
- ✓ It democratizes knowledge Even non-technical users should be able to ask questions naturally and get reliable answers instantly.

Proposed Solution

Our idea is to build Lexivion – an intelligent, AI-powered document assistant that can understand, process, and answer questions from complex PDFs using both text and images.

It transforms unstructured documents into a searchable knowledge engine using:

- Text embedding
- Image embedding
- Vector similarity search
- A multi-modal RAG pipeline
- Gemini for structured, accurate answers

This means a user can upload any PDF—reports, manuals, legal paperwork, academic content—and ask natural-language questions like:

- “Summarize page 10,”
- “What is the procedure for patient discharge?”
- “Show me the diagram for the electrical circuit,”
- “Explain the financial summary of the report.”

And the system returns clear, accurate, evidence-linked answers supported by both text and images extracted from the document.

Tech Stack

Frontend (User Interface)

- React + Vite – Fast, modern UI framework and bundler
- Tailwind CSS – Lightweight styling for a responsive interface
- Axios – For API communication
- PDF Modal Viewer – Displays PDF pages dynamically
- LocalStorage Auth Tokens – Stores user login session

Backend (API + Core Logic)

- Flask (Python) – REST API framework
- Blueprints – Modular route separation
- itsdangerous – Token-based authentication
- Pydantic-like validations (manual)
- Python Services Architecture

Database + Storage

- PostgreSQL – Main data store
- pgvector – Similarity search for embeddings
- JSONB + GIN Indexing – For metadata and fast filtering
- Base64 Image Storage – Stores extracted PDF images
- Migrations (SQL scripts) – Version-controlled DB schema

AI + ML Components

Text Embeddings

- BGE (BAI General Embedding)

Image Embeddings

- CLIP ViT-H-14

LLM

- Google Gemini

Expected Outcome / Impact

Lexivion provides a smart framework capable of comprehending, processing and answering questions in difficult PDFs in real time, both in the form of text and in the form of images.

After the project is done, it will enable the users to:

Upload any PDF (reports, manuals, policies, academic content, legal papers, etc.)

- Ask natural-language questions
- Receive accurate, structured answers with referenced text and images
- Preview the exact pages and sections where the answer came from
- Navigate documents faster and more intelligently than traditional search tools

This creates a powerful, user-friendly document intelligence platform that works across industries.

Impact of the Project

- Significantly reduces time spent searching through long documents - Users find answers in seconds instead of hours.
- Improves accuracy and reduces human errors - Answers come directly from document sources, lowering the risk of misinterpretation.
- Enables natural language querying of complex PDFs - Anyone can extract insights without technical knowledge or manual reading.
- Makes documents with images, charts, and diagrams searchable - Multimodal intelligence handles content traditional keyword search cannot.
- Boosts productivity across industries - Useful for education, healthcare, legal, business, HR, operations, and research.

Team Details



TEAM LEAD: JODERICK SHERWIN J

COLLEGE NAME: RAJALAKSHMI ENGINEERING COLLEGE

EMAIL: 220701109@RAJALAKSHMI.EDU.IN

PHONE: +91 70949 44667

MEMBER 2: KARTHIGA R

COLLEGE NAME: RAJALAKSHMI ENGINEERING COLLEGE

EMAIL: 220701119@RAJALAKSHMI.EDU.IN

PHONE: +91 93448 20905