**Text-Based-Explanation**

**🔹 System Design**

The project follows a **modular architecture** with a **FastAPI backend** and **Next.js frontend**.

**📌 System Flow**

1. **User interacts with the Next.js dashboard.**
2. **Data Pre-processing is performed.**
3. **Frontend sends API requests to the FastAPI backend.**
4. **FastAPI processes the request**:

* **Time-series analysis** from processed\_data.json
* **Network visualization** from data.jsonl
* **AI Insights** using **Groq Llama3-8B**
* **Semantic search** using **TF-IDF & Cosine Similarity**
* **Next.js fetches data and displays** insights via **interactive charts & UI**

**📂 Codebase Overview**

**Backend (backend/)**

| **File** | **Description** |
| --- | --- |
| main.py | Main FastAPI application, handles API routes. |
| chatbot.py | Implements AI chatbot using **Groq API**. |
| network\_visualization.py | Uses **NetworkX & PyVis** to create network graphs. |
| requirements.txt | Lists all dependencies for FastAPI. |

**Core FastAPI API**

**Key Features:**  
✅ **Time-Series Analysis** – processed\_data.json used for tracking trends.  
✅ **Subreddit & Score Distribution** – Aggregates subreddit data.  
✅ **AI Analyzer** – Uses **Groq API (Llama3-8B)** for structured insights.  
✅ **CORS Middleware** – Ensures cross-origin API requests work with Next.js.  
✅ **Network Graph** – Generates **author-post relations** using **PyVis**.

**Conversational AI Chatbot**

✅ Uses **Llama AI (Groq API)** for **context-aware chat responses**  
✅ **Memory-enabled chat** – Stores conversation history for better responses

**How it Works:**

1. **User asks a question** → Next.js sends request to /chatbot API
2. **FastAPI finds relevant posts** using **TF-IDF & Cosine Similarity**
3. It **generates a structured AI response** using **Groq.**
4. Response **sent back to Next.js** for display

**Network Graph Analysis**

✅ **Uses data.jsonl to build network relations** between authors & subreddits  
✅ Generates **interactive graphs using PyVis & NetworkX**  
✅ Returns graph as **HTML file**, displayed in Next.js via iframe

**Frontend (frontend/)**

| **File/Folder** | **Description** |
| --- | --- |
| components/ | Stores reusable UI components (Charts, Chatbot, Sidebar, AI Analyzer). |
| app/ | Next.js **pages & routes**. |
| public/screenshots/ | **Project images** for README.md. |
| .env.local | Stores **backend API URLs**. |