Multi-Modal Financial Advisor Chatbot

A Hyper-Personalized AI Financial Advisory System
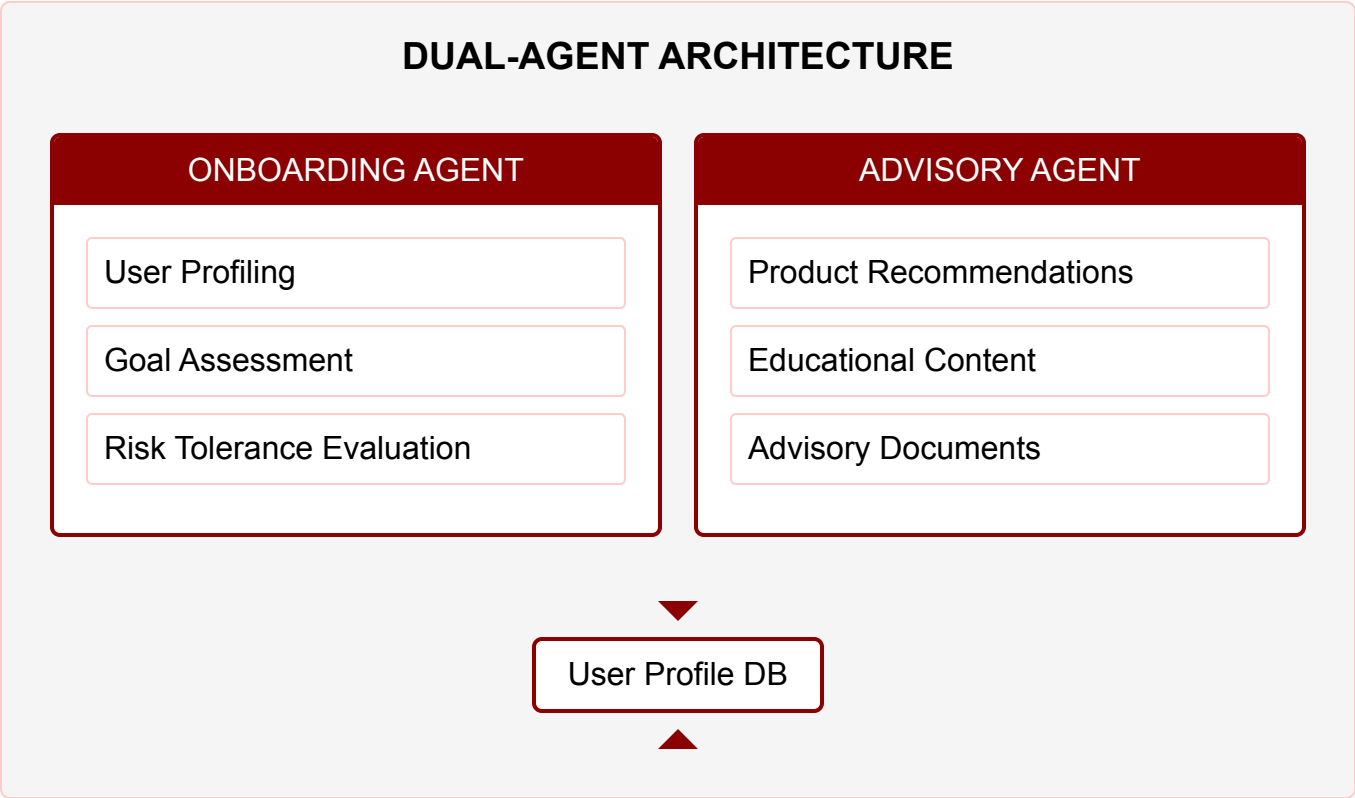
Lakshay Sharma & Apurva Singh

Agenda

- Project Overview

- Key Features

- System Architecture

- Technology Stack

- Challenges Overcome

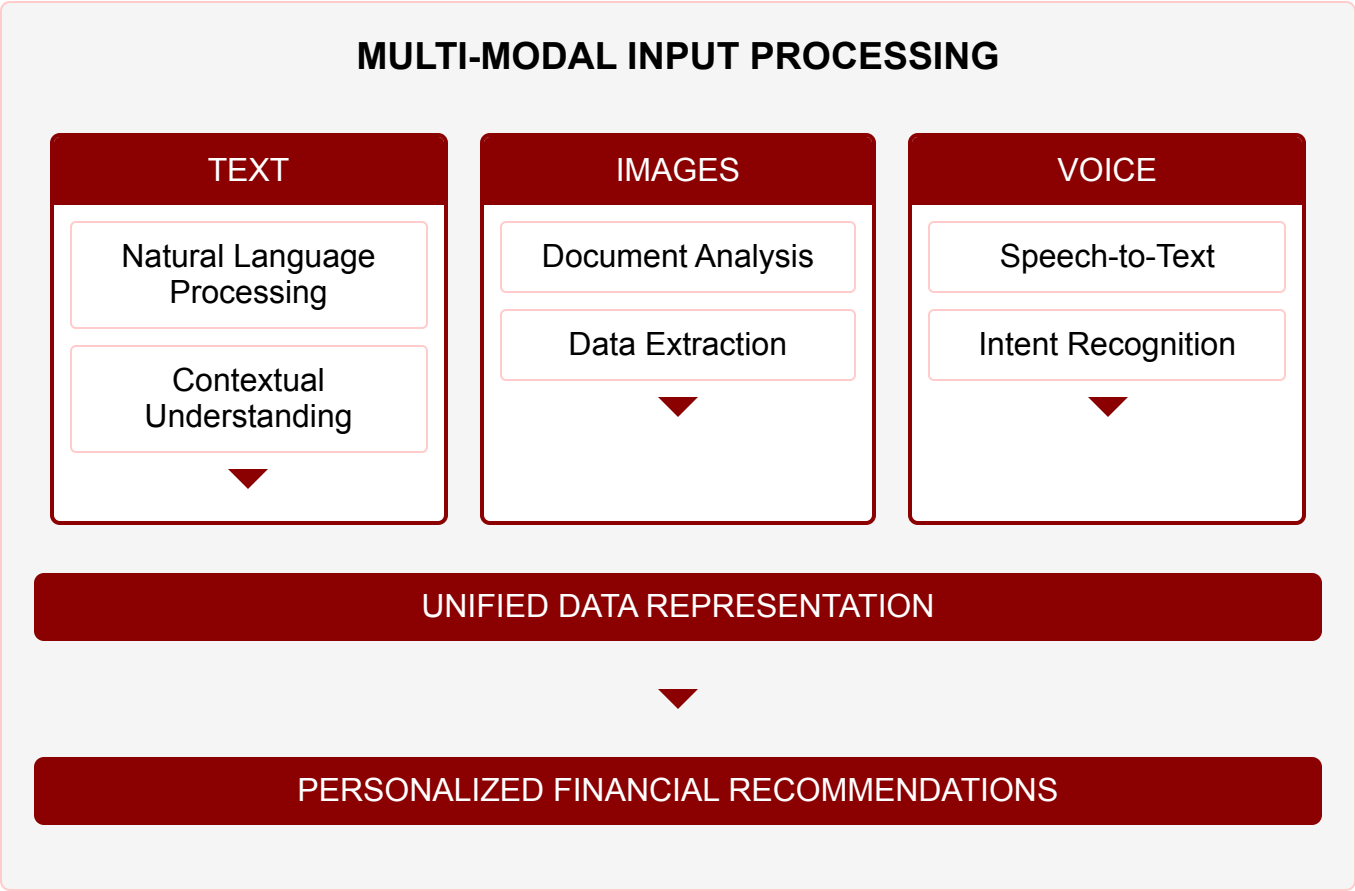- Testing & Quality Assurance

- Future Enhancements

Project Overview

- AI-driven digital financial advisor with hyper-personalized recommendations

- Leverages multi-modal data processing (text, images, voice)

- Adapts dynamically to users' evolving financial needs

- Enhances user engagement, financial literacy, and decision-making

Key Features: Dual-Agent Architecture
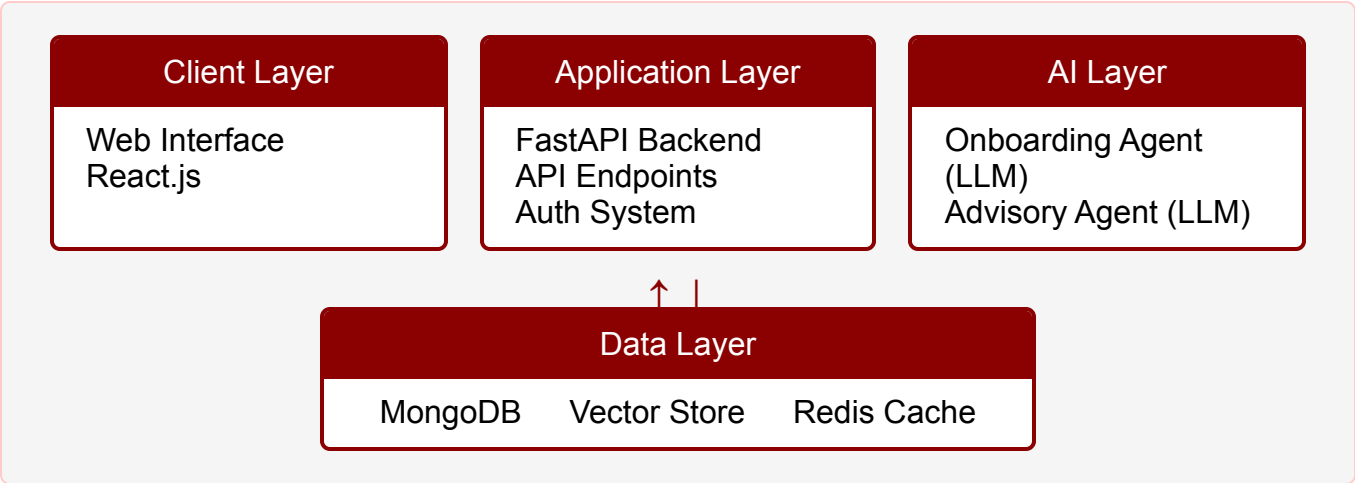
DUAL-AGENT ARCHITECTURE

ONBOARDING AGENT	ADVISORY AGENT
User Profiling	Product Recommendations
Goal Assessment	Educational Content
Risk Tolerance Evaluation	Advisory Documents

User Profile DB

Key Features: Multi-Modal Input Processing

MULTI-MODAL INPUT PROCESSING

TEXT	IMAGES	VOICE
Natural Language Processing	Document Analysis	Speech-to-Text
Contextual Understanding	Data Extraction	Intent Recognition
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UNIFIED DATA REPRESENTATION

▼

PERSONALIZED FINANCIAL RECOMMENDATIONS

Key Features: Personalization & Transparency

- **Personalized Advisory Documents:** Curated educational content

- **Product-Specific Chatbots:** Detailed product information

- **Explainable Recommendations:** Clear rationales for suggestions

- **Dynamic Adaptation:** Real-time learning from user interactions

System Architecture

Client Layer	Application Layer	AI Layer
Web Interface React.js	FastAPI Backend API Endpoints Auth System	Onboarding Agent (LLM) Advisory Agent (LLM)

Data Layer

MongoDB   Vector Store   Redis Cache

Technology Stack: Frontend & Backend

Frontend:

- React.js for interactive user interface

- Material-UI for consistent, professional elements

- React Markdown for formatted advisory documents

Backend:

- FastAPI (Python) for API management

- JWT-based authentication system

- Multi-modal input processors

Technology Stack: AI & Data

AI Services:

- Multiple LLM integrations (OpenAI, Mistral, Hugging Face)

- Retrieval-Augmented Generation (RAG) system

- Meta-prompt generation for personalization

Data Storage:

- MongoDB for user profiles and transactions

- Vector store for embeddings

- Redis for performance caching

Challenges Overcome

- **Integrating Multi-Modal Inputs:** Processing diverse data types

- **Ensuring Data Privacy:** Secure handling of financial information

- **Real-Time Performance:** Efficient data processing and low latency

- **Transparent AI:** Explainable recommendations

- **Orchestrating Dual Agents:** Seamless transitions with context

- **Addressing AI Bias:** Regular auditing and diverse training data

Testing & Quality Assurance

API TESTING	MODEL TESTING	SERVICE TESTING
• Authentication • Onboarding • Recommendations • Chat Endpoints • Document APIs	• User Models • Conversation Models • Document Models • Financial Models • Image Analysis Models	• LLM Services • Document Processing • Recommendation Engine • Authentication Service • Multi-Modal Processing

QUALITY METRICS: > 80% CODE COVERAGE

82%

CI/CD PIPELINE

Build → Test → Code Analysis → Deploy → Monitor

Future Enhancements

1. **Voice Interface Integration**
   - Hands-free interactions and improved accessibility

2. **Mobile Applications**
   - Native iOS and Android experiences

3. **Graph Neural Networks (GNNs)**
   - Analysis of social and financial network influence

   - Pattern recognition in financial behaviors

   - Network-aware recommendations

Future Enhancements (continued)

4. **Advanced Document Understanding**
   - Enhanced processing of complex financial documents

   - Contract and investment statement analysis

5. **Behavioral Finance Integration**
   - Identification of cognitive biases

   - Guidance to overcome financial decision-making biases

Thank You!

Questions?

Contact Information

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Project Repository: GitHub Repo