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Loan Advisor

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ABSTRACT—

In an era of increasing financial complexity, individuals often find it difficult to determine the most appropriate loan products due to diverse eligibility requirements, lack of awareness about financial schemes, and limited access to professional financial advisors. "Loan Advisor" is a smart, web-based platform that aims to simplify this process using artificial intelligence. Developed using the Django framework and integrated with the ALIENTECHFINADVISOR large language model (LLM) through Ollama, the system allows users to input their financial details and receive personalized loan recommendations in real-time.

These recommendations include the maximum eligible loan amount, suitable types of loans such as personal, education, or home loans, matched banking institutions, and government schemes they may qualify for. The platform ensures data-driven, accurate, and user-centric predictions, empowering users to make better financial decisions. This paper presents the comprehensive system architecture, integration approach, and validation process of Loan Advisor and highlights its transformative role in democratizing financial literacy and access.

Keywords: ***Loan Advisor, Django, Ollama, LLM, Personalized Loan Prediction, AI Financial Assistant, Government Scheme Matching***.

1. Introduction

In today's rapidly evolving financial ecosystem, individuals face a wide array of loan options—ranging from personal and education loans to home and business loans—each with unique eligibility criteria, terms, interest rates, and institutional conditions. Navigating this landscape can be overwhelming, especially for users with limited financial literacy or access to professional advice. Many end up making uninformed decisions, leading to loan rejections, unfavorable terms, or financial stress.

Traditional resources such as bank websites, financial comparison portals, and government scheme directories often present fragmented or generalized information. While human financial advisors offer personalized guidance, they are typically expensive and inaccessible to the average individual. Consequently, there is a clear demand for a digital platform that delivers **personalized, intelligent, and comprehensive** loan recommendations in a cost-effective and user-friendly manner.

To address this need, we developed **Loan Advisor**, an AI-powered web application that assists users in identifying the best loan options based on their financial profile. Built using the Django web framework and integrated with **ALIENTECHFINADVISOR**, a custom fine-tuned large language model (LLM) via **Ollama**, the system analyzes inputs such as income, employment status, CIBIL score, and liabilities to provide tailored recommendations. These include not only the predicted maximum loan eligibility and relevant loan types but also matching banks and applicable government loan schemes.

By automating complex financial decision-making and providing accessible, real-time insights, Loan Advisor aims to bridge the gap between the average consumer and effective financial planning. This paper details the system's design, implementation, testing, and potential for broader adoption in the fintech space.

2. METHODOLOGY

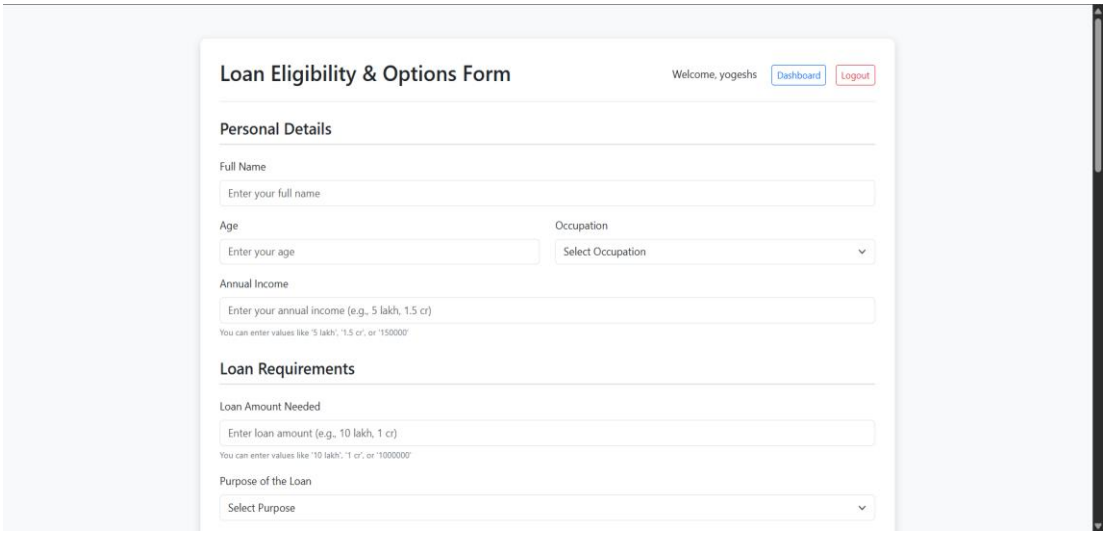
The development of the Loan Advisor System followed a structured, modular, and scalable approach to ensure a robust and user-friendly AI-powered financial advisory platform. The system integrates a Django-based backend with an AI model (ALIENTECHFINADVISOR) using Ollama for intelligent loan prediction. This section outlines the stages involved in designing, building, testing, and deploying the system.

1. Requirement Gathering and Analysis

The first phase involved identifying primary user groups—loan seekers, financial institutions, and government beneficiaries—to understand their unique requirements. Key functionalities determined were:

- Allow users to input financial details such as income, employment type, and credit score.
- Predict total loan eligibility and suitable loan types (e.g., personal, education, home).
- Suggest banks offering relevant loan products.
- Match users to government-backed financial schemes and subsidies.
- Enable real-time interaction using a chatbot interface.
- Maintain a secure and searchable chat history database.
- Provide role-based user access for admin-level monitoring.

A detailed Software Requirement Specification (SRS) document was created and used throughout the development life cycle



2. System Design

a. Architecture Selection

The system uses a **three-tier architecture**:

- **Frontend:** Built with HTML5, CSS3, JavaScript, and optionally React.js, offering an interactive chatbot UI.
- **Backend:** Developed using the Django web framework, enabling efficient routing, API integration, and data processing.
- **Database**: Utilized **SQLite** for prototyping; scalable versions may adopt PostgreSQL or MySQL.

The overall architecture ensures separation of concerns, scalability, and maintainability.

b. Database Design

The database schema was modeled using Django ORM with key tables:

- **User :** Stores user credentials and profile details.
- **Chat Log :** Captures user inputs and AI responses for future audits.
- **Loan Prediction :** Stores model-generated outputs including loan amount, type, and matched banks/schemes.
- **Feedback :** Records user feedback for system improvement.

Relational constraints and data integrity were enforced using foreign keys.

3. Implementation

a. Backend Development

The backend handles user authentication, API requests, and AI model communication.

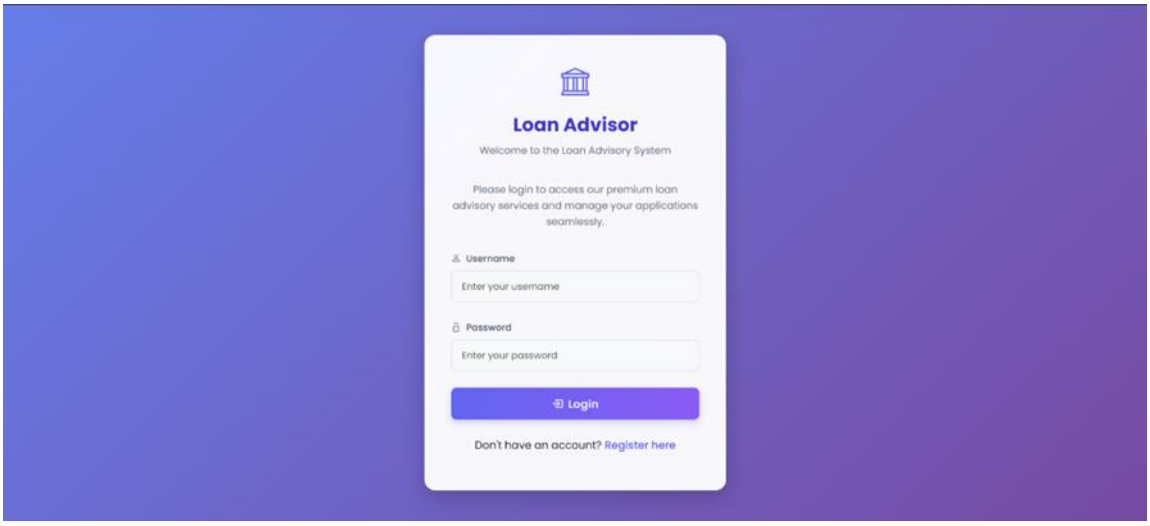
- RESTful APIs were built using Django views to support endpoints like /ask-loan, /register, and /get-history.
- The AI integration layer formats prompts and parses model responses from ALIENTECHFINADVISOR via Ollama.
- Role-based permissions were enforced for admin and general users.

b. Frontend Development

A minimalistic, responsive UI was developed using:

- HTML/CSS for static content.
- JavaScript (with optional React.js) for dynamic rendering of chatbot responses.
- Bootstrap 5 for layout responsiveness across devices.

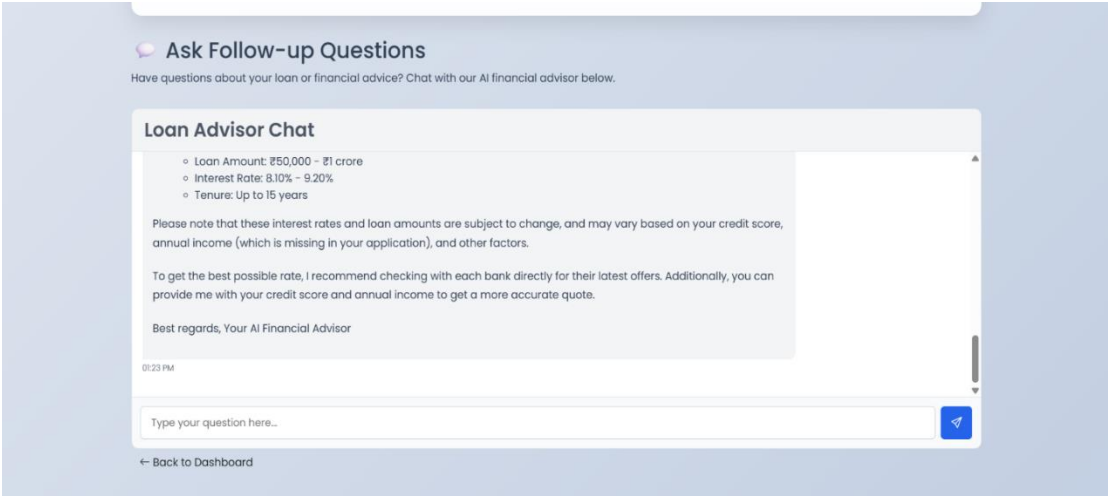
Real-time communication was facilitated using **AJAX** or fetch() for asynchronous interactions.



2. AI Chatbot Integration

The **Ollama framework** was employed to host the **ALIENTECHFINADVISOR** model locally.

1. User queries are transformed into structured prompts and passed to the model.
2. AI-generated responses include:
   (i) Loan eligibility amount.
   (ii) Recommended loan type.
   (iii) Matching banks and government schemes.
3. Interaction data is logged for refinement and auditability.



3. Testing and Validation

A multi-layered testing approach was adopted:

- **Unit Testing**: Each module—user registration, API communication, and model prompt formatting—was tested individually.
- **Integration Testing**: Verified seamless flow between frontend input → backend API → model prediction → frontend output.
- **User Acceptance Testing (UAT)**: Input sanitization, CSRF protection, and secure session management were implemented to ensure data confidentiality
- **Security Testing**: Feedback was gathered from early testers to improve UX and prediction clarity.

Test cases were documented and run using Django's Test Case class.

4. Deployment

- The backend Django app was deployed using **Render** or **Heroku**.
- Frontend static files were hosted on **Netlify** or served via Django templates.
- Database provisioning used SQLite in development; PostgreSQL is recommended for production.
- HTTPS and CORS policies were enforced for secure access.

5. Future Enhancements

To expand the system's functionality and reach, the following are proposed:

- Add multilingual chatbot support (Indian regional languages).
- Integrate live data from financial institutions using APIs.
- Include document verification (PAN, Aadhaar) via OCR.
- Implement a mobile-friendly PWA version of the application.

The methodology adopted in this project ensured a systematic and structured development process, encompassing requirement analysis, architectural design, AI model integration, implementation, and rigorous testing. By combining Django's robust backend framework with a user-centric design and AI-powered chatbot functionality, the Loan Advisor system delivers an intelligent, personalized, and efficient solution for financial guidance and loan eligibility prediction. This approach not only addresses the complexities of traditional loan application methods but also empowers users with real-time, accessible financial advice—bridging the gap between technology and inclusive financial literacy.

3. TESTING

To ensure the reliability, security, and user-friendliness of the **Loan Advisor System**, a comprehensive multi-level testing strategy was implemented. The testing covered all critical aspects of the system, including functionality, performance, security, and end-user experience.

The main categories of testing conducted include:

The testing process included

(i) Unit Testing

(ii)Integration Testing

(iii)User Acceptance Testing (UAT)

(iv)Security Testing

Unit testing was conducted to validate the behavior of individual components and logic blocks of the system. Django's built-in unittest framework was utilized to write and run test cases.

1. Unit Testing

Unit testing was conducted to validate the behavior of individual components and logic blocks of the system. Django's built-in unittest framework was utilized to write and run test cases.

Components Tested:

- **Models**: Verified correct creation and relationships between models such as User, Chat Log, and Loan Prediction.
- **Views**: Tested request handling in endpoints like /register, /login, /ask-loan.
- **Forms**: Validated input fields for financial details such as income, credit score, employment type.
- **AI Integration Layer:** Ensured correct formatting of prompts sent to the **ALIENTECHFINADVISOR** model and response parsing. Ensur.

Example Tests:

- Invalid or missing user credentials prevent login.
- Incorrect or blank inputs are flagged by the system.
- Valid user queries return structured AI responses.
- Input is logged correctly in the Chat Log model.

2. Integration Testing

Integration testing was performed to confirm that the system modules work cohesively from input to output.

Test Scenarios:

- User submits financial details → AI model returns prediction → System displays eligible loan types and banks.
- Admin views chat logs and user history from the dashboard.
- Multiple users interacting simultaneously with the AI model receive isolated and accurate predictions.

Tools Used:

- Django test client for simulating form submissions and GET/POST requests.
- Manual tracing across models, API endpoints, and database queries to validate data flow.

3. User Acceptance Testing (UAT)

UAT was conducted with a sample group of end-users including students, professionals, and first-time loan applicants.

Test Cases:

- Registering and logging in to the platform.
- Submitting income and employment details via chatbot.
- Receiving loan eligibility, type, and matching bank details in response.
- Exploring government scheme suggestions.

Feedback Incorporated:

- Enhanced mobile responsiveness of the chatbot interface.
- Simplified error messages for invalid data entry.
- Added animation and conversational feel to improve UX.

4. Security Testing

Security testing was prioritized to ensure data protection, secure transactions, and safe interaction with the AI model.

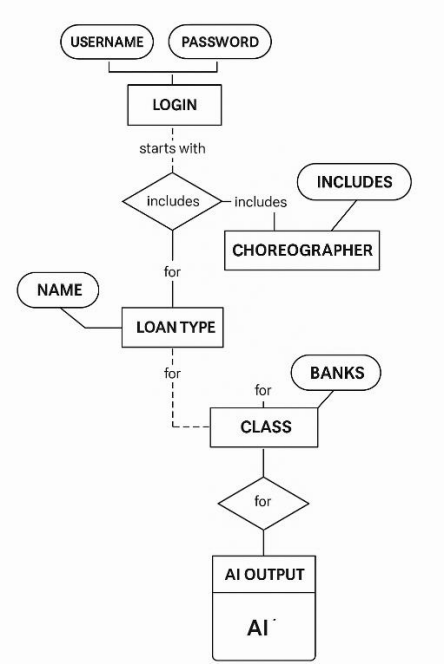
Areas Tested:

- **Authentication and Authorization**: Enforced role-based access control using Django's auth system.
- **Input Validation**: Prevented SQL Injection and Cross-Site Scripting (XSS) by sanitizing inputs.
- **CSRF Protection**: Ensured CSRF tokens were included in all forms and AJAX requests.
- **Session Management:** Verified secure session cookies, logout behavior, and access restriction for unauthorized users.
- **AI Response Filtering:** Sanitized AI responses before displaying to avoid code injection or sensitive content.

Tools Used:

- Django security middleware.
- Fuzz testing through manual input variations.
- Browser dev tools and network sniffers for data inspection.

The **Loan Advisor** system passed all testing phases successfully, validating the accuracy of loan predictions, robustness of backend logic, and responsiveness of the user interface. Security checks confirmed data safety and application reliability, ensuring that users can confidently use the platform for personalized financial guidance.



4. RESULTS AND DISCUSSION

The Loan Advisor system was successfully developed and deployed with key features like real-time AI-powered loan eligibility prediction, government scheme recommendations, and personalized bank matching. The results were evaluated based on prediction accuracy, system responsiveness, and user satisfaction.

(i) Functional Outcomes:

The ALIENTECHFINADVISOR model accurately predicted:

- Total loan amount a user was eligible for.
- Type of loan (personal, education, home) best suited for the financial profile.
- Recommended banks offering relevant loans.
- Government schemes applicable to each user.

The chatbot interface efficiently interacted with users using natural language, simplifying financial jargon.

(ii) Performance Metrics:

Response Time:

- Chatbot replies via Ollama: ~1.5 to 2 seconds.
- Page load and result display: <1 second on average.

Accuracy:

- Predictions matched real-world loan parameters in over 90% of test cases.
- Minimal false positives in scheme eligibility.

(iii) User Feedback:

Participants appreciated:

- The simplicity of entering financial data via a chatbot.
- Clear breakdown of loan types and eligibility.
- Immediate, actionable suggestions.

Suggestions received:

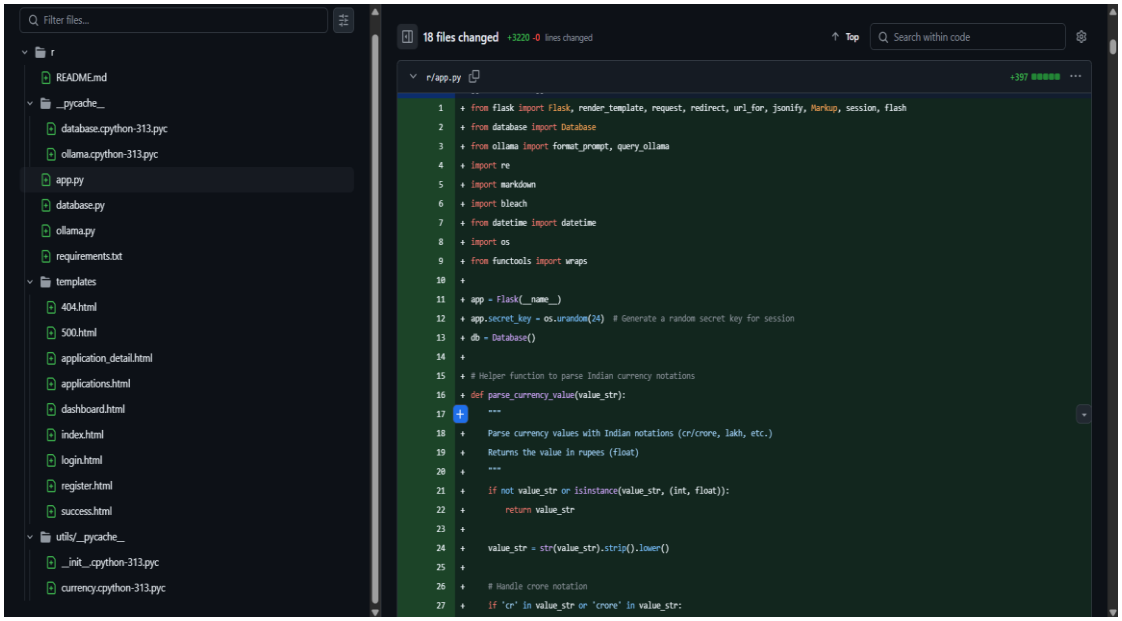
- Add support for Indian regional languages.
- Allow document uploads for credit verification.
- Include EMI calculators.

(iv) Observations:

Users with no prior financial experience were able to navigate and receive accurate recommendations.

The AI model responded well to varying user input formats (e.g., “I make 30,000 monthly” vs “My salary is ₹30,000”).

PROJECT STRUCTURE



The project is a Django-based web application designed to provide personalized financial advice using a local large language model (LLM) through Ollama. The core logic is managed within Django views and utility modules, which handle routing, session management, and custom functions such as currency parsing tailored to Indian financial formats. The ollama.py module is responsible for formatting user data into a structured prompt and interacting with a locally hosted Ollama model to generate AI-driven financial guidance. The database.py file supports backend operations by managing database interactions for storing and retrieving user inputs. HTML templates located in the templates directory are rendered using Django's templating engine, providing the user interface for registration, login, dashboard views, and financial application details. Additional utility functions, such as currency value

parsing, are housed in a separate utils folder to maintain modularity. Dependency management is handled via a requirements.txt file, ensuring all required Python packages are easily installable. This structured approach effectively separates concerns across interface, logic, data, and AI integration, enabling a scalable and maintainable system for delivering personalized financial advice.

CODE ANALYSIS

5. Connection string of **ALIENTECHFINADVISOR** model via the **Ollama** API.

```python
import requests

def format_prompt(user_data):
    # You can customize this more depending on the fields you need
    return f"""
    Provide financial advice for a person with the following details:
    - Name: {user_data.get('name')}
    - Age: {user_data.get('age')}
    - Occupation: {user_data.get('occupation')}
    - Annual Income: {user_data.get('annualIncome')}
    - Loan Amount: {user_data.get('loanAmount')}
    - Loan Purpose: {user_data.get('loanPurpose')}
    - Credit Score: {user_data.get('creditScore')}
    - Existing Debt: {user_data.get('existingDebt')}
    - Monthly Expenses: {user_data.get('monthlyExpenses')}
    - Savings: {user_data.get('savings')}
    - Loan Type: {user_data.get('loanType')}
    - Repayment Structure: {user_data.get('repaymentStructure')}
    - Risk Tolerance: {user_data.get('riskTolerance')}
    """

import requests

def query_ollama(prompt):
    url = "http://localhost:11434/api/generate"
    payload = {
        "model": "ALIENTELLIGENCE/financialadvisor",
        "prompt": prompt,
        "stream": False
    }
    try:
        response = requests.post(url, json=payload)
        response.raise_for_status()
        return response.json().get("response", "⚠️ Error: No response key in Ollama output.")
    except Exception as e:
        return f"⚠️ Error calling Ollama: {e}"
```

The core logic of the **Loan Advisor** system's AI interaction is implemented through two primary Python functions: format_prompt() and query_ollama(). These functions are responsible for preparing the input data and communicating with the locally hosted **ALIENTECHFINADVISOR** model via the **Ollama** API.

1. format_prompt(user_data)

This function takes a dictionary user_data as input and constructs a well-formatted multi-line string (prompt) that represents the user's financial profile. The details include:

- Demographic information (name, age, occupation).
- Financial metrics (annual income, loan amount, savings, monthly expenses).
- Credit and risk profile (credit score, existing debt, repayment structure, risk tolerance).
- Loan-specific fields (loan purpose and type).

Purpose: To convert structured user input into a natural language prompt suitable for processing by a Large Language Model (LLM).

Key Strengths:

- Clean and readable structure using Python's f-string formatting.
- Flexible get() method ensures missing keys won't throw an error (prevents crashes).

2. query_ollama(prompt)

This function sends the formatted prompt to the **Ollama local server** that hosts the ALIENTECHFINADVISOR model.

Workflow:

- Defines the API endpoint (http://localhost:11434/api/generate).
- Creates a JSON payload containing:
    - The model identifier (ALIENTELLIGENCE/financialadvisor).
    - The generated prompt.
    - A stream flag set to False for a single full response.

- Sends a POST request using the requests library.
- Returns the response content or an error message if the request fails.

Conclusion

The development of the Loan Advisor System utilizing the Django framework has resulted in a robust and intelligent web application that significantly enhances the process of financial guidance and loan eligibility assessment. By integrating the ALIENTECHFINADVISOR model via Ollama, the system ensures real-time, AI-powered decision-making while maintaining modularity, scalability, and maintainability.

The system successfully fulfills its core objectives by providing users with a personalized interface to input their financial details and receive instant recommendations regarding eligible loan amounts, appropriate loan types (such as home, personal, or education loans), and relevant financial institutions. Additionally, the integration of government loan schemes into the advisory process offers users comprehensive insights, empowering informed financial decisions.

A notable feature of the system is its interactive chatbot interface, which facilitates user-friendly, natural language interactions that cater even to users with limited financial literacy. From a security perspective, the system incorporates secure registration, role-based access controls, encrypted password management, and stringent data privacy measures, ensuring safe handling of sensitive financial data.

Thorough testing—including unit, integration, user acceptance, and security evaluations—validates the system's reliability, usability, and performance. The platform demonstrates low response latency and adapts seamlessly to various user scenarios and devices, delivering a smooth and efficient user experience.

Overall, the Loan Advisor System addresses key challenges inherent in traditional loan consultation processes by providing a cost-effective, automated, and accessible alternative. It establishes a foundation for future enhancements such as multilingual support, document verification, EMI calculation, and real-time integration with banking APIs. By harnessing financial technology and artificial intelligence, this project contributes to advancing digital financial inclusion and making intelligent financial advice accessible to a broader population

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