BANKBOT

AI CHATBOT FOR BANKING QUESTIONS

⚠ Problem Statement

- Customers face delays in getting banking support
- 💰 Manual customer service is costly and slow
- 24/7 availability is critical for customer satisfaction
- 📞 Repetitive queries consume significant resources

✨ Solution: Intelligent Chatbot

- □ AI-powered NLU for intent & entity recognition
- 🌐 Web interface built with Streamlit
- 💾 SQLite backend for account & knowledge base
- 🔄 Supports both rule-based & ML approaches

Module 1: Intent & Entity Recognition

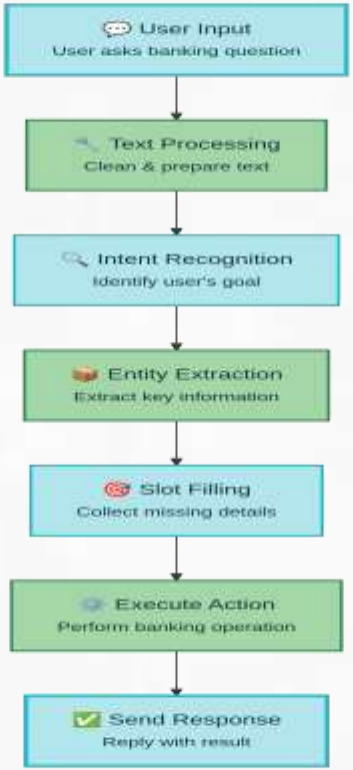
Define key intents: balance check, transfer money, card block , find atm, loan inquiry

Extract entities: amount , account number , location, account type, recipient

NLU model using spaCy or Rasa for classification

Slot filling for structured data collection

Natural Language Understanding Pipeline

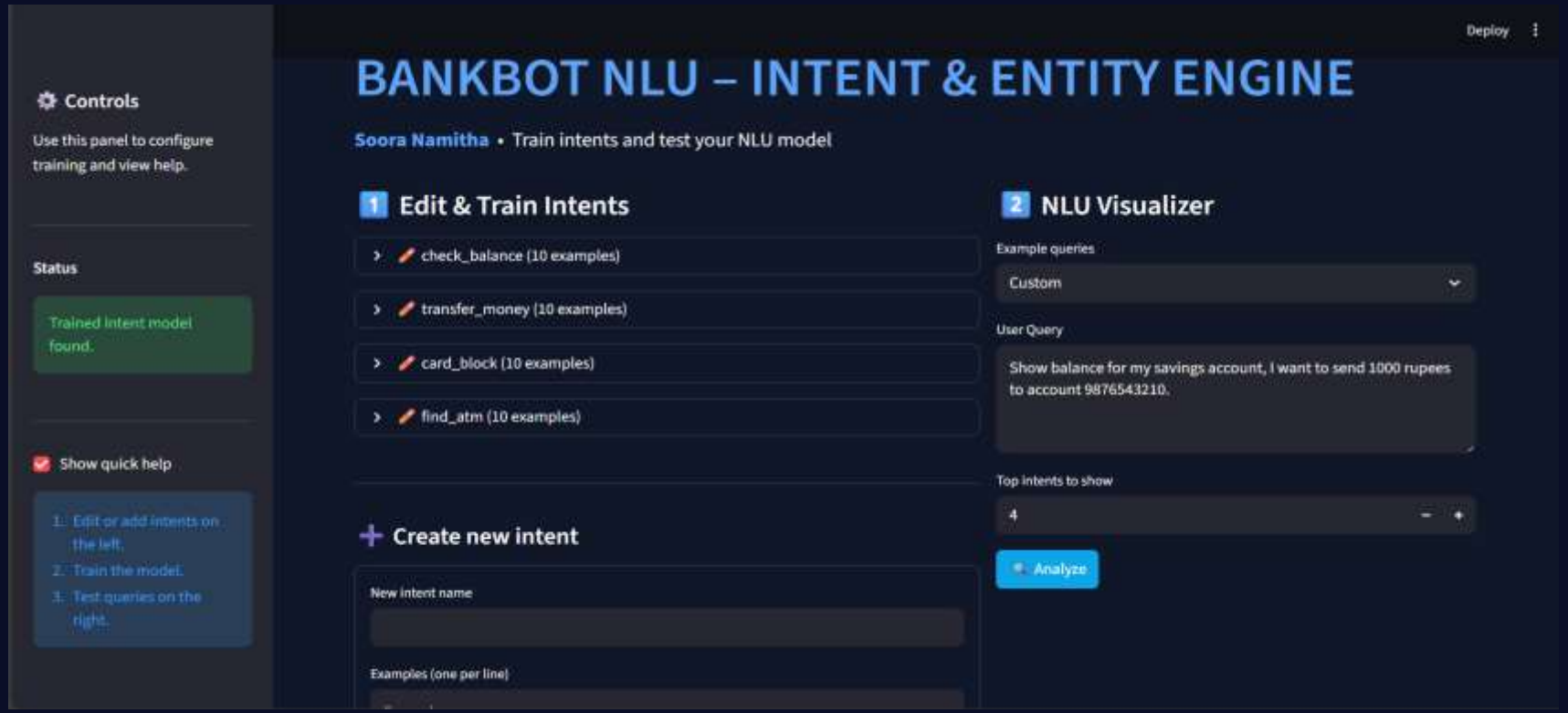


TECHNOLOGIES USED

Intent & Entity Engine:

- spaCy for NER, tokenization, POS tagging and basic intent/entity experiments.
- BERT Transformers (Hugging Face) for intent classification and sentence embeddings.
- Rasa NLU for combined intent and entity recognition with training data in YAML.
- Python 3.9+ with libraries like NumPy/Pandas for data prep and experimentation.

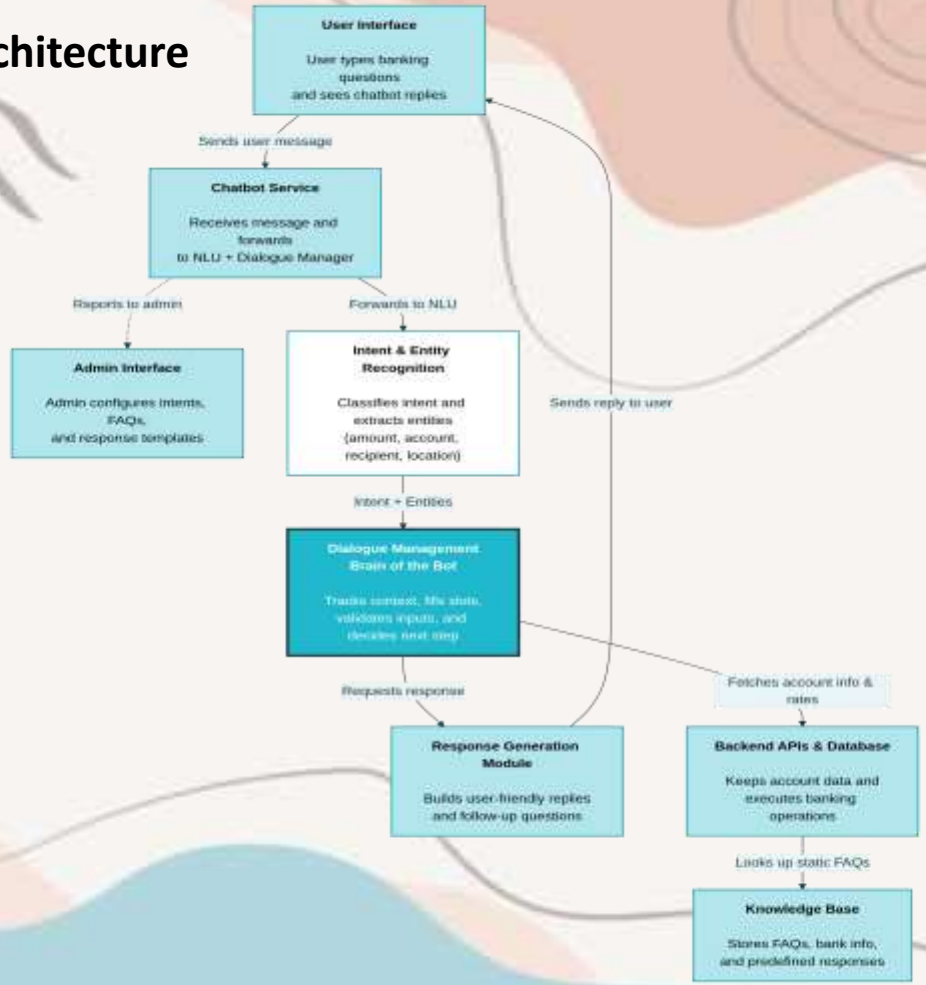
Outcome:


Deploy
BANKBOT NLU – INTENT & ENTITY ENGINE
Soora Namitha • Train intents and test your NLU model
Controls
Use this panel to configure training and view help.
Status
Trained intent model found.
Show quick help
1. Edit or add intents on the left.
2. Train the model.
3. Test queries on the right.
1 Edit & Train Intents
check_balance (10 examples)
transfer_money (10 examples)
card_block (10 examples)
find_atm (10 examples)
Create new intent
New intent name
Examples (one per line)
2 NLU Visualizer
Example queries
Custom
User Query
Show balance for my savings account, I want to send 1000 rupees to account 9876543210.
Top intents to show
4
Analyze

💬 Module 2: Dialogue Management

🔀 Manage conversation flow and context
❓ Handle clarifications and follow-up questions
📝 Maintain conversation history
⚡ Gracefully handle out-of-scope queries
🗄️ Query backend database for relevant information
📄 Generate context-aware natural language responses
✨ Format responses for clarity and accuracy
🎯 Support multiple response templates for variety

Dialogue Manager Architecture & Workflow

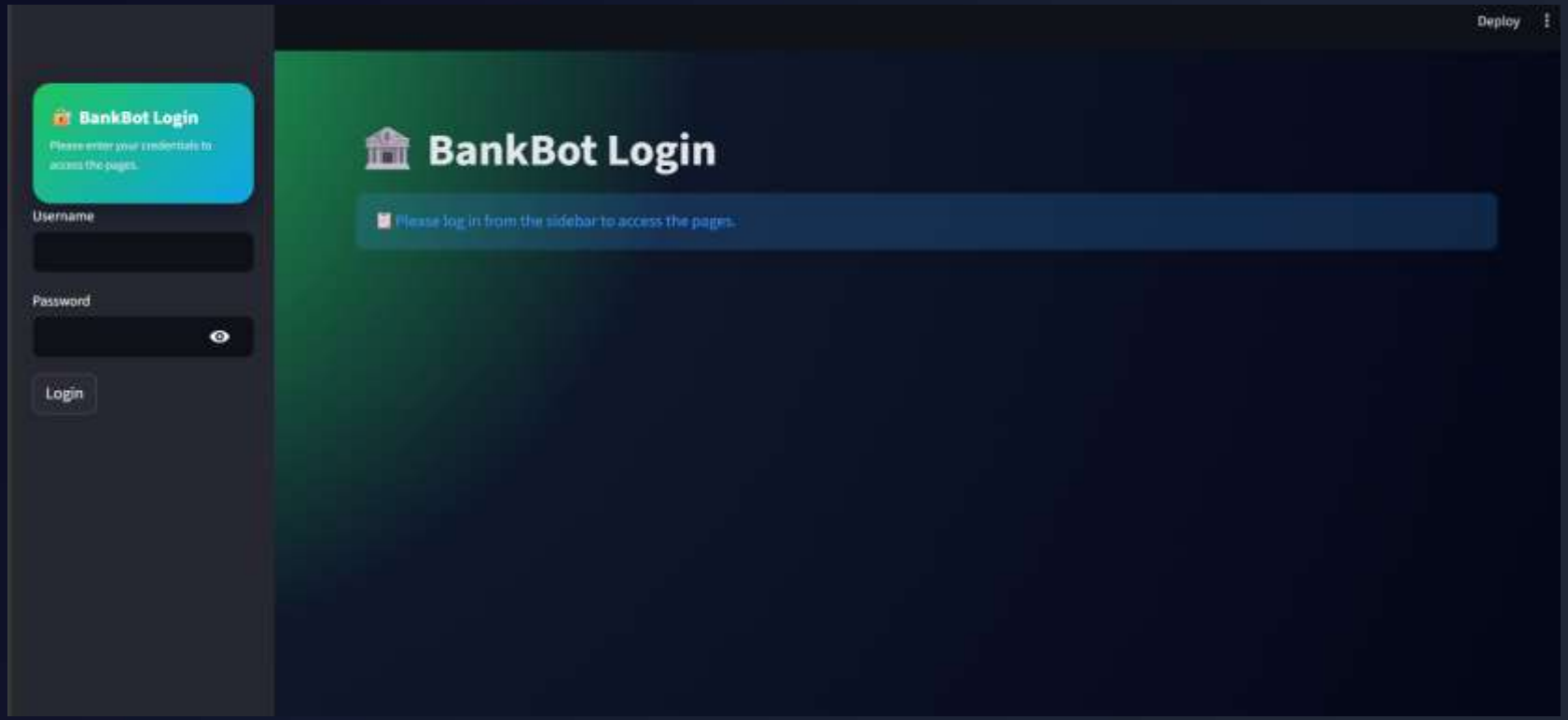


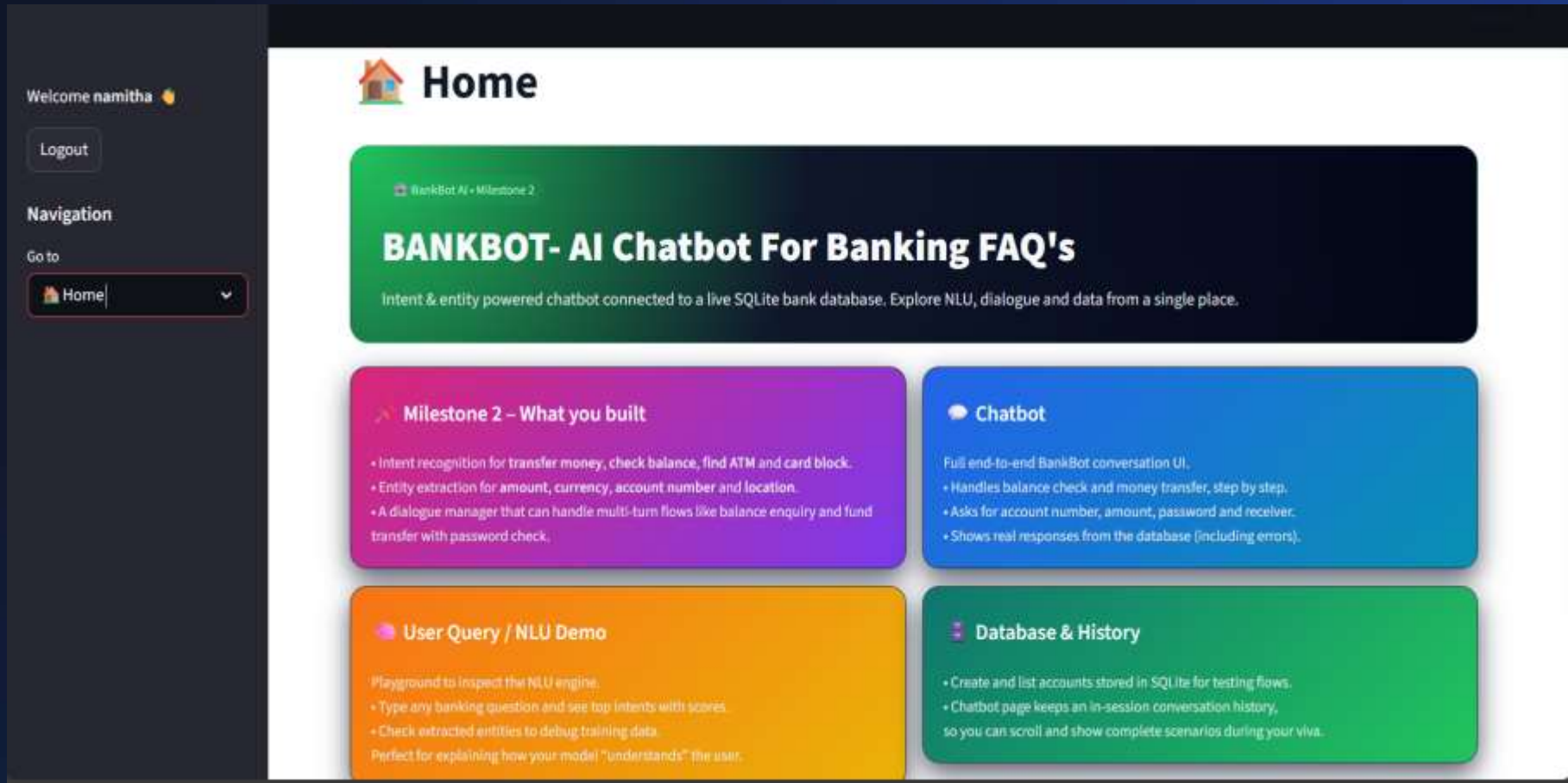
TECHNOLOGIES USED

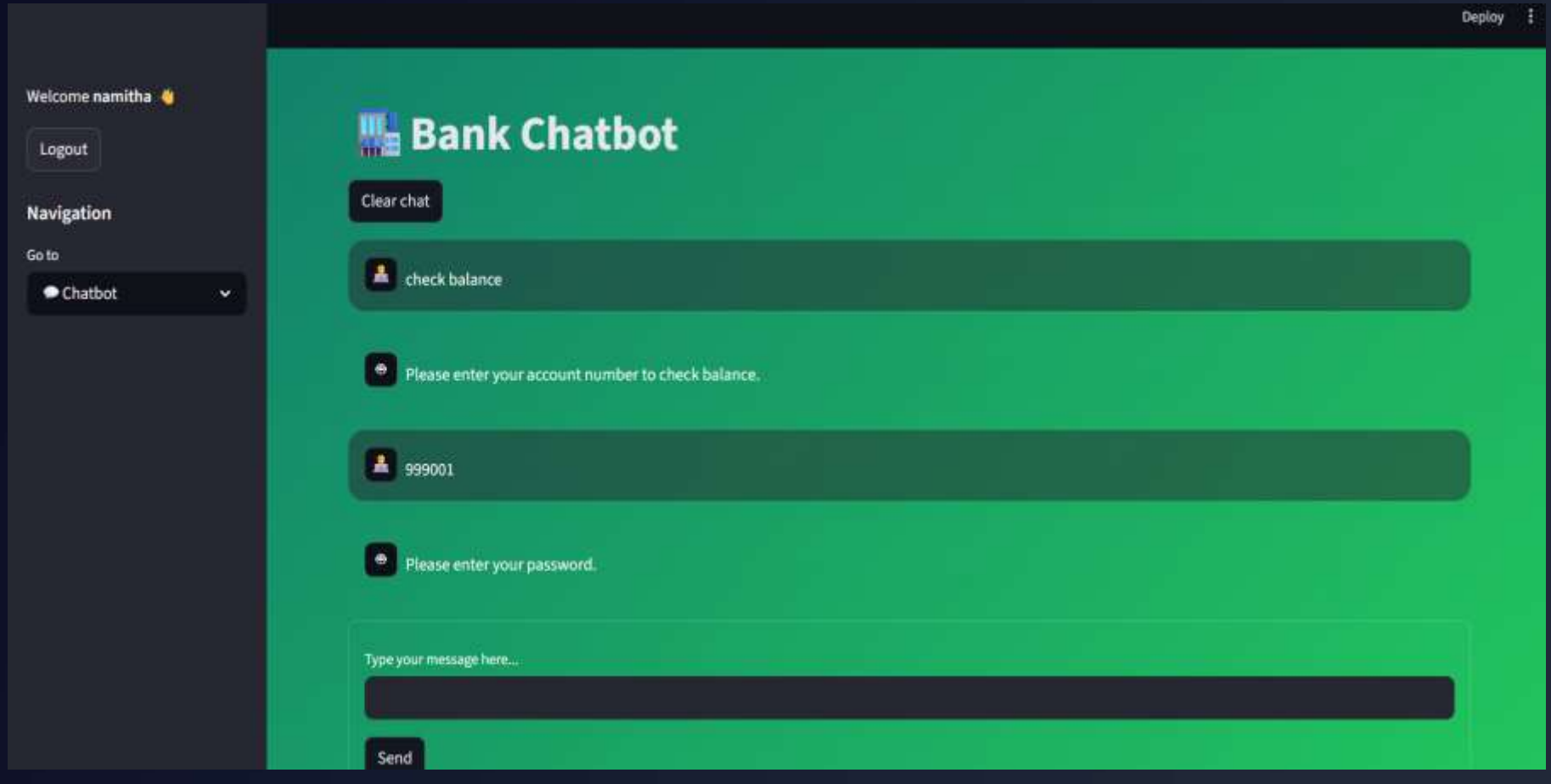
Dialogue & Responses

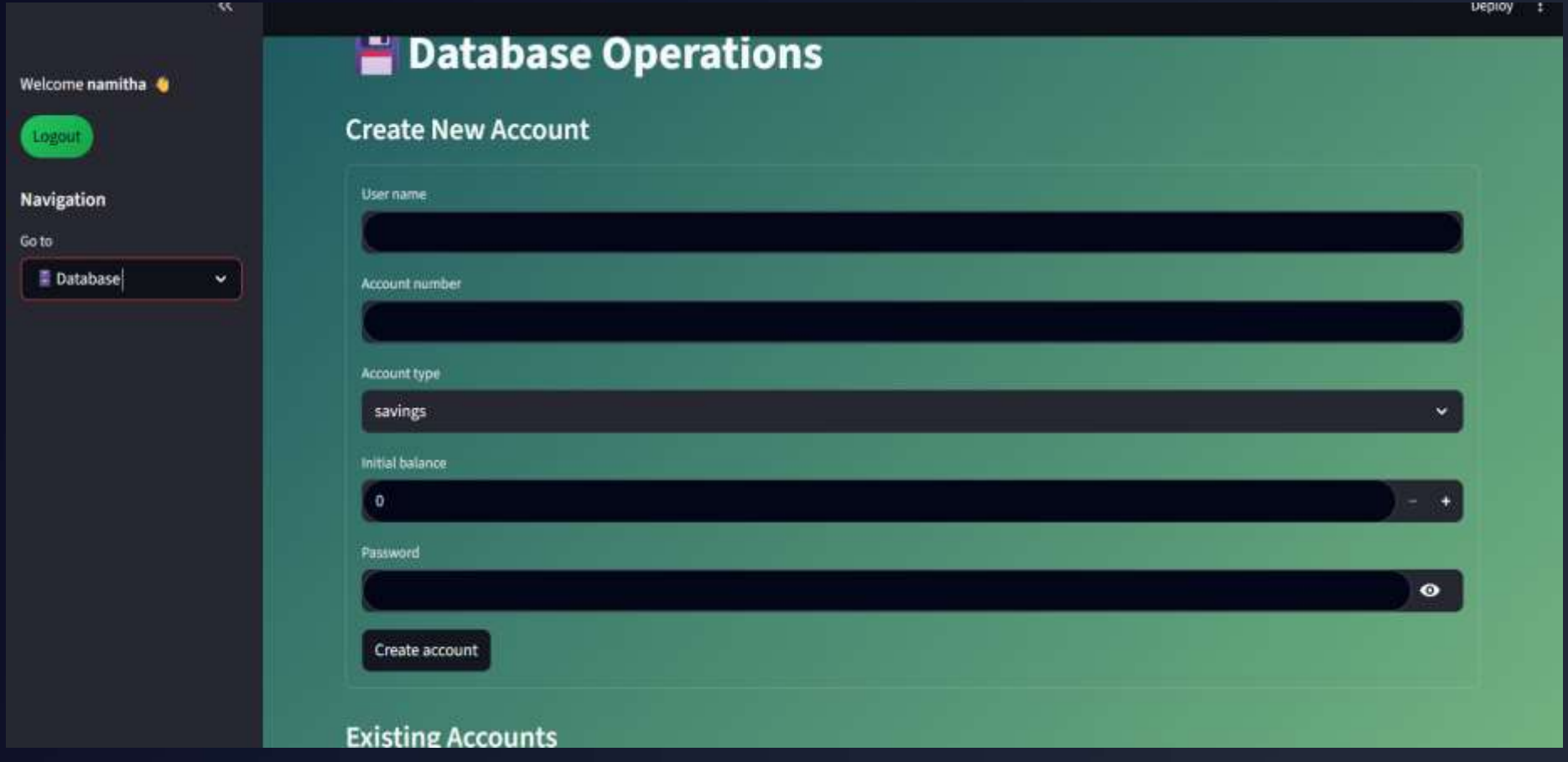
- Rasa (core/dialogue policies) or custom Python state machine for dialogue flow and slot filling.
- FastAPI for REST APIs to connect NLU engine with frontend and database.
- SQLite 3 for storing user accounts, session data, and FAQs/knowledge base.
- Template-based response generation in Python (Jinja-style or f-strings) for clear, context-aware replies.

Outcome:


Deploy
BankBot Login
Please enter your credentials to access the pages.
Username
Password
Login
BankBot Login
Please log in from the sidebar to access the pages.


Welcome namitha
Logout
Navigation
Go to
Home
Home
BankBot AI • Milestone 2
BANKBOT- AI Chatbot For Banking FAQ's
Intent & entity powered chatbot connected to a live SQLite bank database. Explore NLU, dialogue and data from a single place.
Milestone 2 – What you built
• Intent recognition for transfer money, check balance, find ATM and card block.
• Entity extraction for amount, currency, account number and location.
• A dialogue manager that can handle multi-turn flows like balance enquiry and fund transfer with password check.
Chatbot
Full end-to-end BankBot conversation UI.
• Handles balance check and money transfer, step by step.
• Asks for account number, amount, password and receiver.
• Shows real responses from the database (including errors).
User Query / NLU Demo
Playground to inspect the NLU engine.
• Type any banking question and see top intents with scores.
• Check extracted entities to debug training data.
Perfect for explaining how your model "understands" the user.
Database & History
• Create and list accounts stored in SQLite for testing flows.
• Chatbot page keeps an in-session conversation history,
so you can scroll and show complete scenarios during your viva.


Deploy
Welcome namitha
Logout
Navigation
Go to
Chatbot
Bank Chatbot
Clear chat
check balance
Please enter your account number to check balance.
999001
Please enter your password.
Type your message here...
Send


Deploy
Welcome namitha
Logout
Navigation
Go to
Database
Database Operations
Create New Account
User name
Account number
Account type
savings
Initial balance
0
Password
Create account
Existing Accounts

Module-3 : UI Integration & LLM Implementation

🎯 Overview

Build a production-ready banking chatbot by integrating a beautiful Streamlit web UI with an advanced LLM (Groq/Llama) to provide intelligent, conversational banking services.

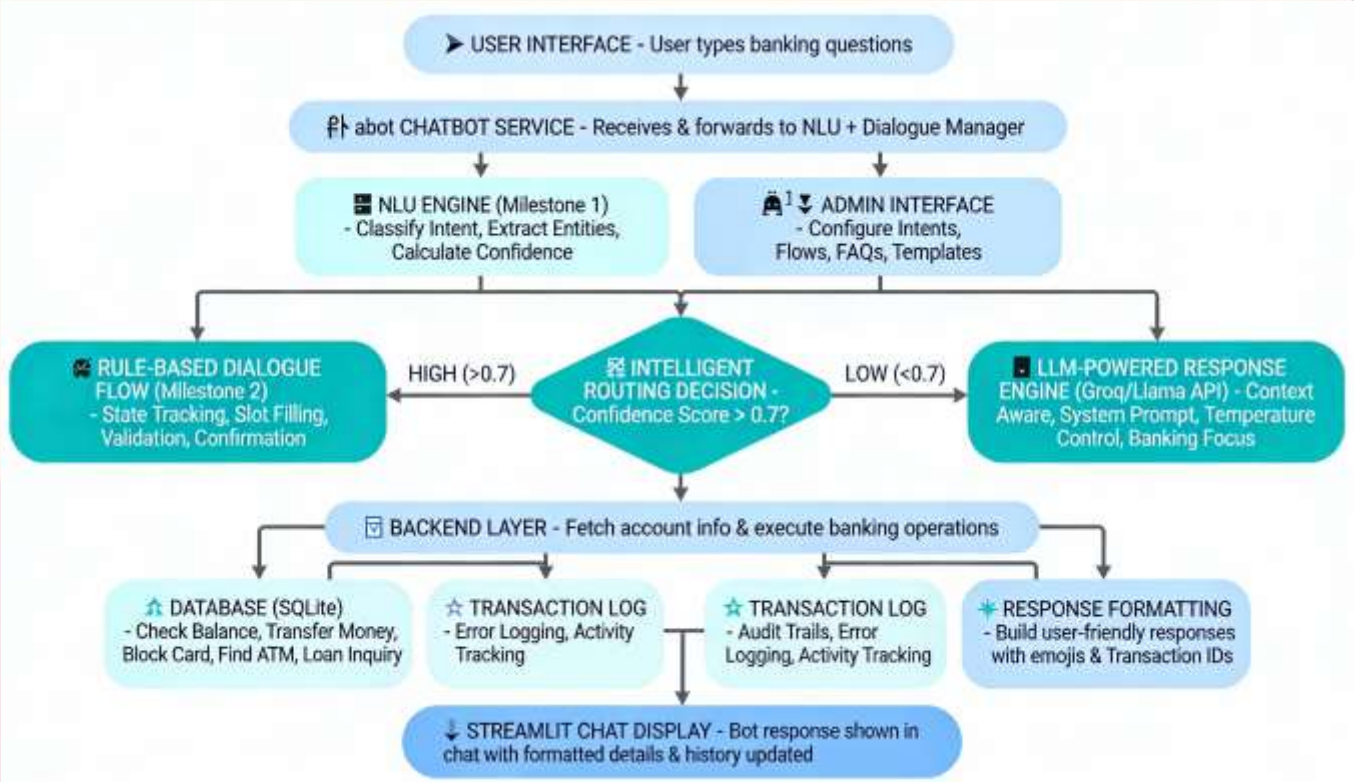
📋 Key Objectives

- ❑ Web UI Development → Interactive Streamlit chat interface with real-time messaging
- ❑ LLM Integration → Connect Groq API or Local Llama for enhanced responses
- ❑ Backend Wiring → Connect UI to Dialogue Manager (M2) & SQLite database
- ❑ Error Handling → Graceful failure handling and user-friendly messages
- ❑ Production Ready → User authentication, transaction logging, performance optimization

⚙️ Main Components

- Hybrid Dialogue Engine – Rule-based flows + LLM-powered responses
- LLM Integration Layer – Groq/Llama with fallback mechanisms
- Secure Database – SQLite with authentication & transaction logging
- Streamlit Chat UI – Multi-page app with chat, history, settings
- Error Management – Exception handling, logging, graceful degradation

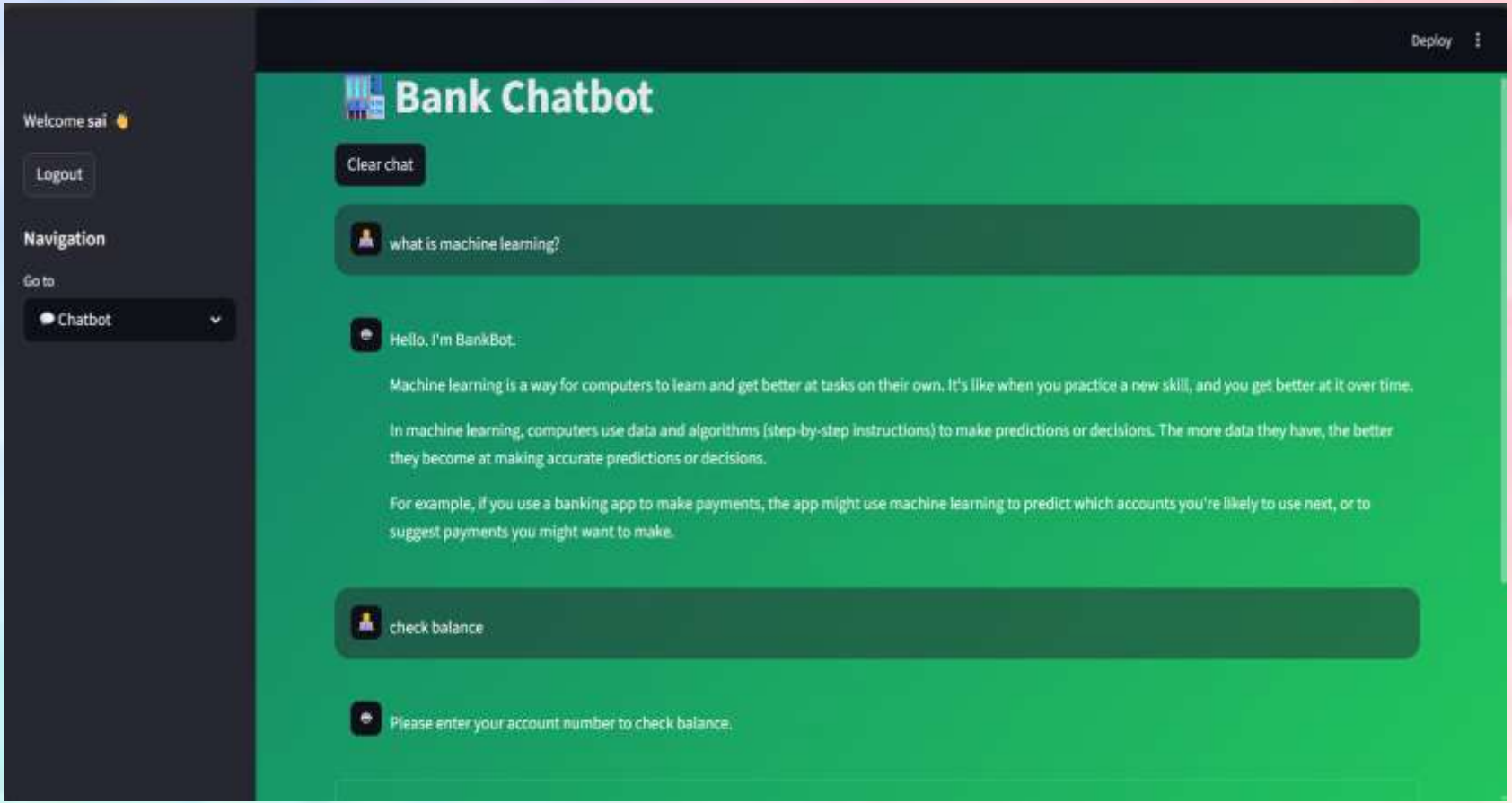
UI Integration & LLM-Powered Response Engine



TECHNOLOGIES USED

Component	Technology
Frontend	**Streamlit**
NLU	**spaCy / Transformers**
Dialogue Manager	**Custom DialogueManager**
LLM	**Groq API / Local Llama**
Database	**SQLite + Python sqlite3**
Language	**Python 3.8+**

OUTCOME


Deploy
Bank Chatbot
Welcome sai
Logout
Navigation
Go to
Chatbot
Clear chat
what is machine learning?
Hello. I'm BankBot.
Machine learning is a way for computers to learn and get better at tasks on their own. It's like when you practice a new skill, and you get better at it over time.
In machine learning, computers use data and algorithms (step-by-step instructions) to make predictions or decisions. The more data they have, the better they become at making accurate predictions or decisions.
For example, if you use a banking app to make payments, the app might use machine learning to predict which accounts you're likely to use next, or to suggest payments you might want to make.
check balance
Please enter your account number to check balance.

KEY CHALLENGES AND SOLUTIONS

🎯 Handling varied queries, slang, spelling mistakes
→ Robust NLU with spell-correction & synonym mapping
📊 Limited labelled banking data
→ Transfer learning + data augmentation techniques
🔒 Secure & privacy-compliant access
→ Encryption, role-based access, audit logging
💬 Multi-turn context management
→ DialogueManager with advanced state tracking
🔗 Integration with banking systems
→ Secure APIs, transaction logging, error handling
❓ Building user trust
→ Transparent responses, explicit confirmations, detailed receipts

Milestone-4: Admin Panel & Knowledge Base

🎯 Overview

Build a comprehensive admin control center with dashboard, training data management, and dynamic knowledge base for continuous chatbot improvement.

💼 Key Objectives

☑ Admin Dashboard → Real-time query monitoring, success rates, and performance metrics visualization

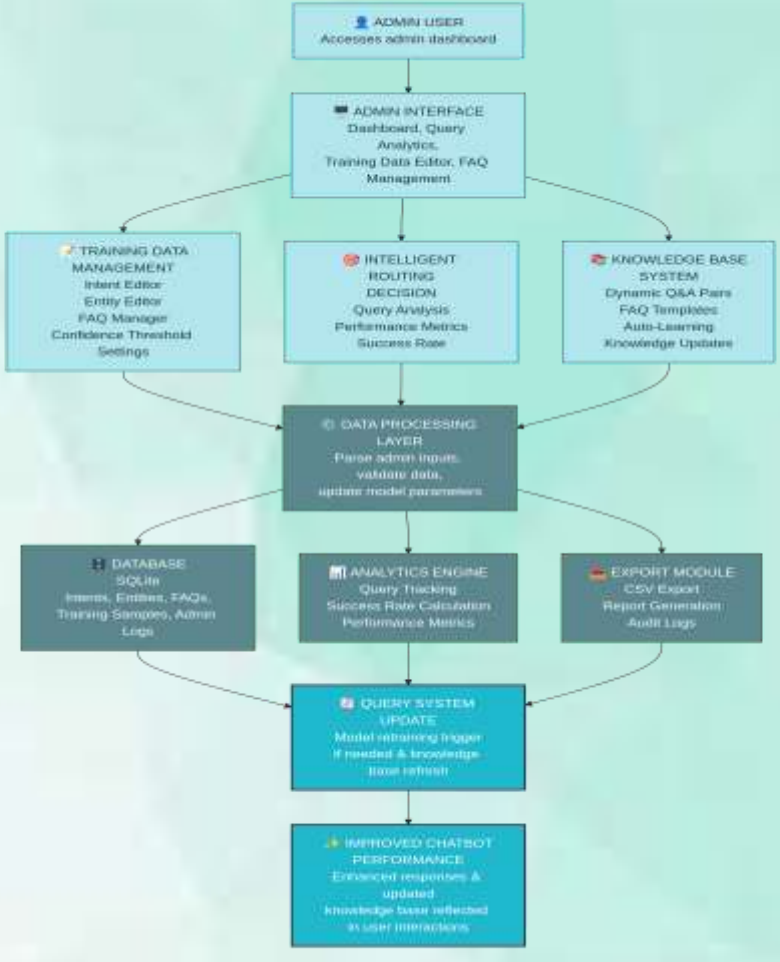
☑ Training Data Manager → Create and edit intents, entities, and training samples for model retraining

☑ Knowledge Base System → Dynamic FAQ management and knowledge base updates

☑ Query Analytics → Detailed logging with confidence scores and intent recognition accuracy tracking

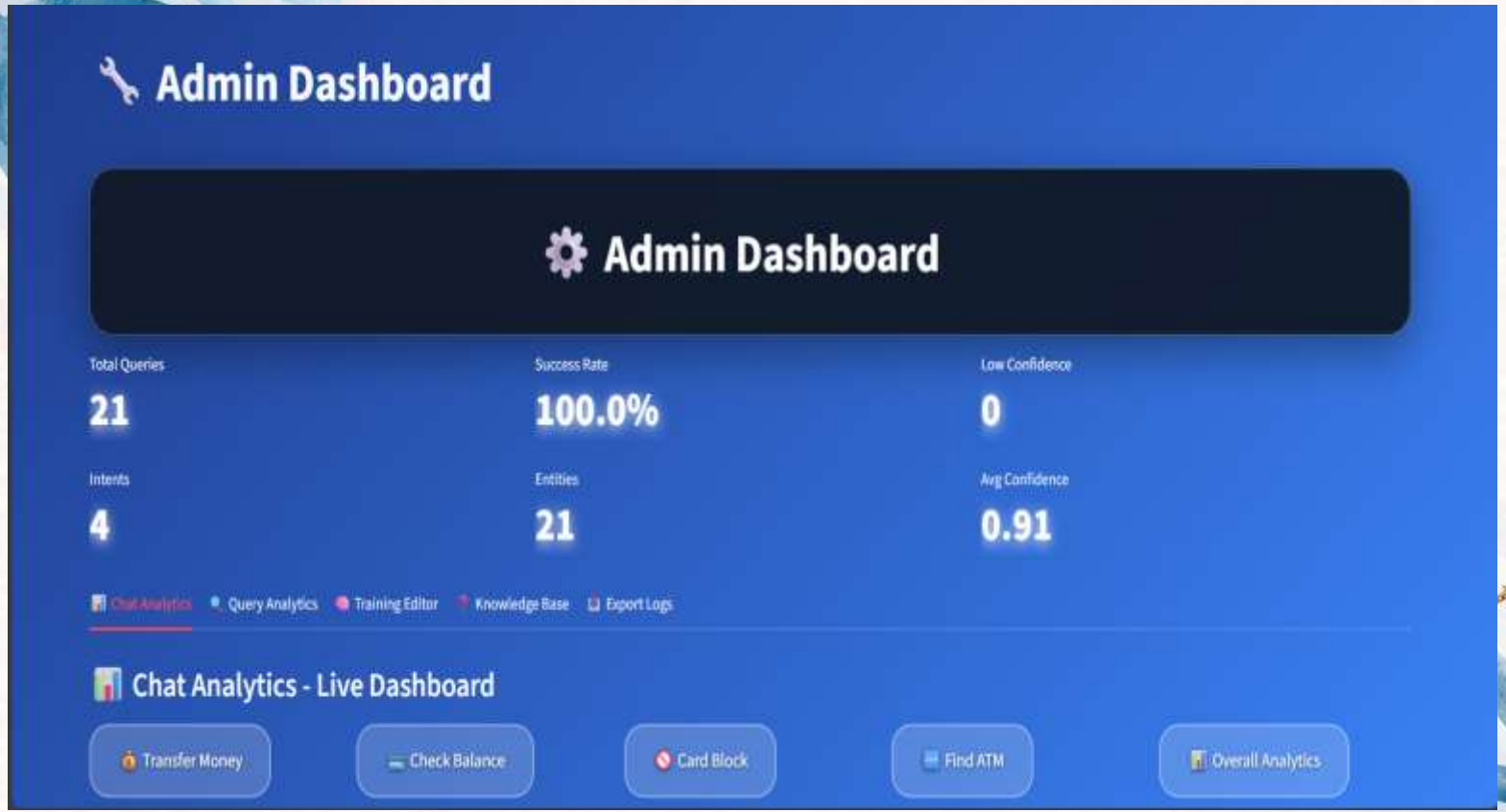
☑ Data Export → CSV export for logs, analytics, and compliance reporting

Flow:


ADMIN USER
Accesses admin dashboard
ADMIN INTERFACE
Dashboard, Query Analytics,
Training Data Editor, FAQ Management
TRAINING DATA MANAGEMENT
Intent Editor
Entity Editor
FAQ Manager
Confidence Threshold Settings
INTELLIGENT ROUTING DECISION
Query Analysis
Performance Metrics
Success Rate
KNOWLEDGE BASE SYSTEM
Dynamic Q&A Pairs
FAQ Templates
Auto-Learning
Knowledge Updates
DATA PROCESSING LAYER
Parse admin inputs,
validate data,
update model parameters
DATABASE
SQLite
Intents, Entities, FAQs,
Training Samples, Admin Logs
ANALYTICS ENGINE
Query Tracking
Success Rate Calculation
Performance Metrics
EXPORT MODULE
CSV Export
Report Generation
Audit Logs
QUERY SYSTEM UPDATE
Model retraining trigger
if needed & knowledge base refresh
IMPROVED CHATBOT PERFORMANCE
Enhanced responses & updated
knowledge base reflected
in user interactions

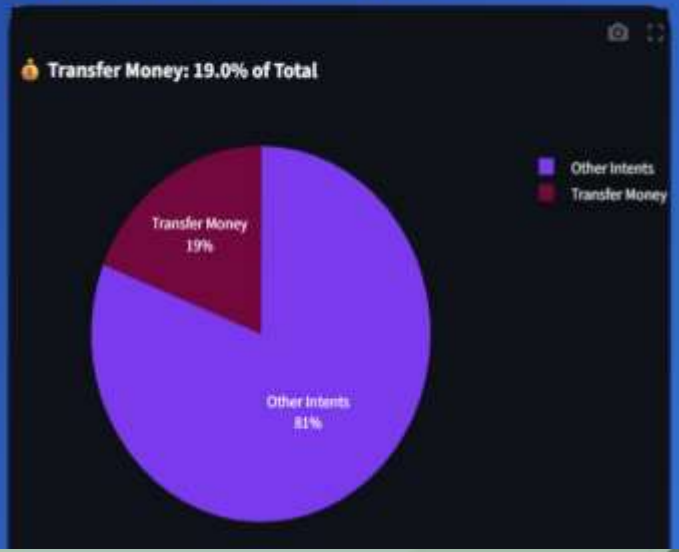
Technologies Used:

Frontend: Streamlit, Python, HTML/CSS
Backend: Python, SQLite, FastAPI/Flask
NLP & ML: spaCy, NLTK, scikit-learn
Analytics: Plotly, Pandas, Logging Module
Security: JWT, Bcrypt/Hashlib
Data Export: CSV, openpyxl
Tools: Git, VS Code


Admin Dashboard
Admin Dashboard
Total Queries
21
Success Rate
100.0%
Low Confidence
0
Intents
4
Entities
21
Avg Confidence
0.91
Chat Analytics
Query Analytics
Training Editor
Knowledge Base
Export Logs
Chat Analytics - Live Dashboard
Transfer Money
Check Balance
Card Block
Find ATM
Overall Analytics

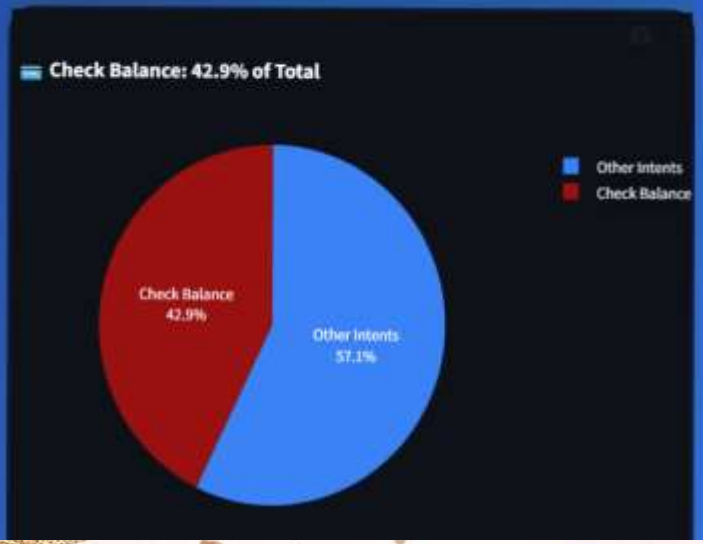
Transfer Money | Check Balance | Card Block | Find ATM | Overall Analytics

Transfer Money Analytics



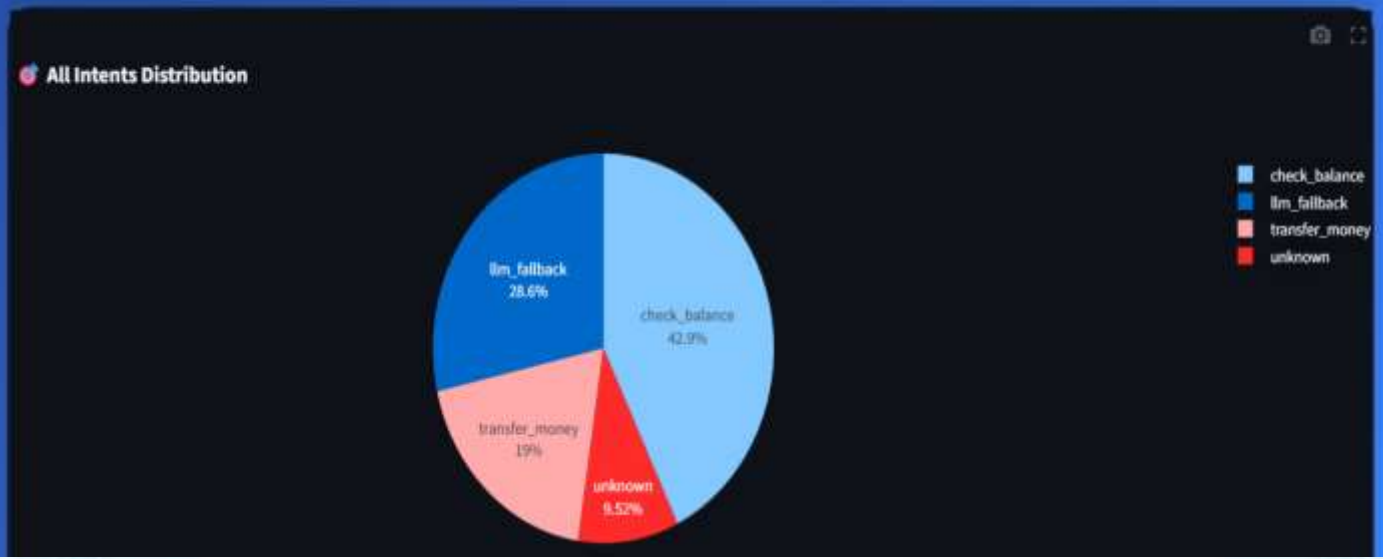
Transfer Money | Check Balance | Card Block | Find ATM | Overall Analytics

Check Balance Analytics



Transfer Money | Check Balance | Card Block | Find ATM | Overall Analytics

Overall Analytics



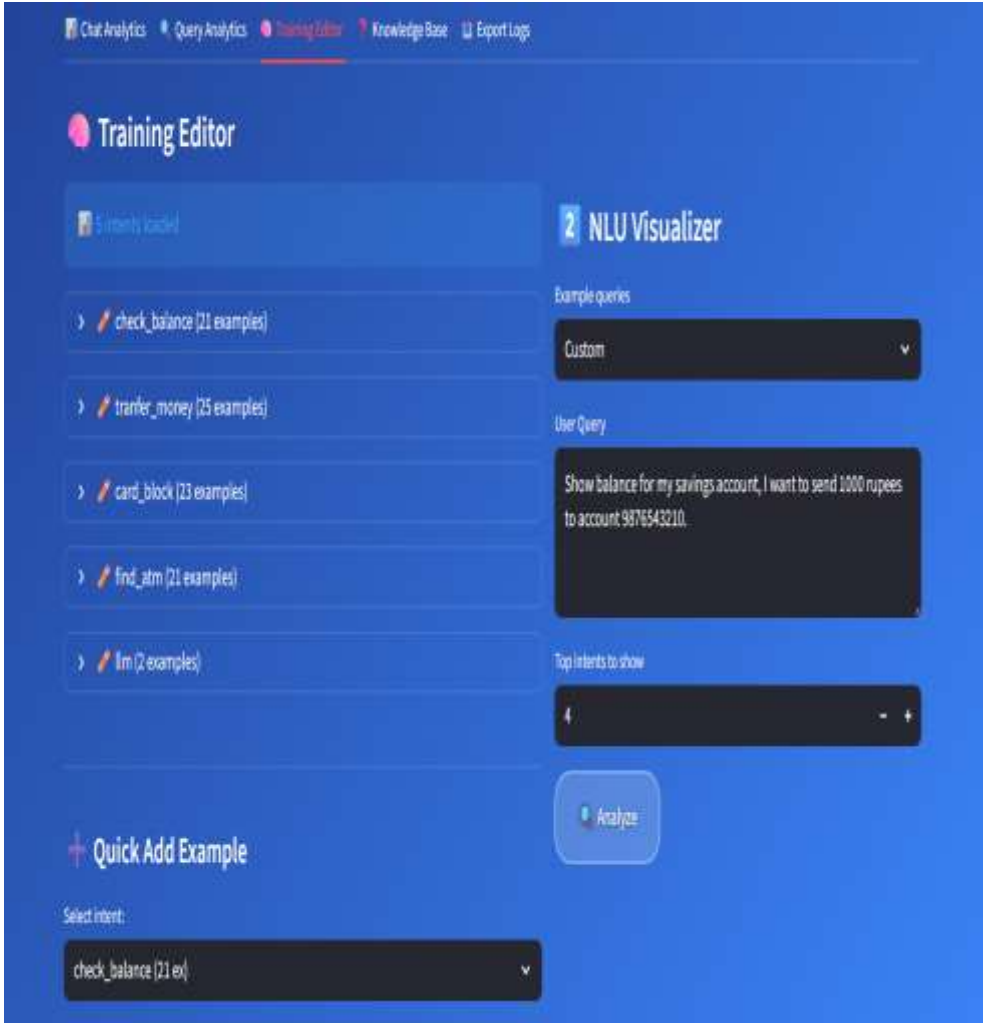
Chat Analytics | Query Analytics | Training Editor | Knowledge Base | Export Logs

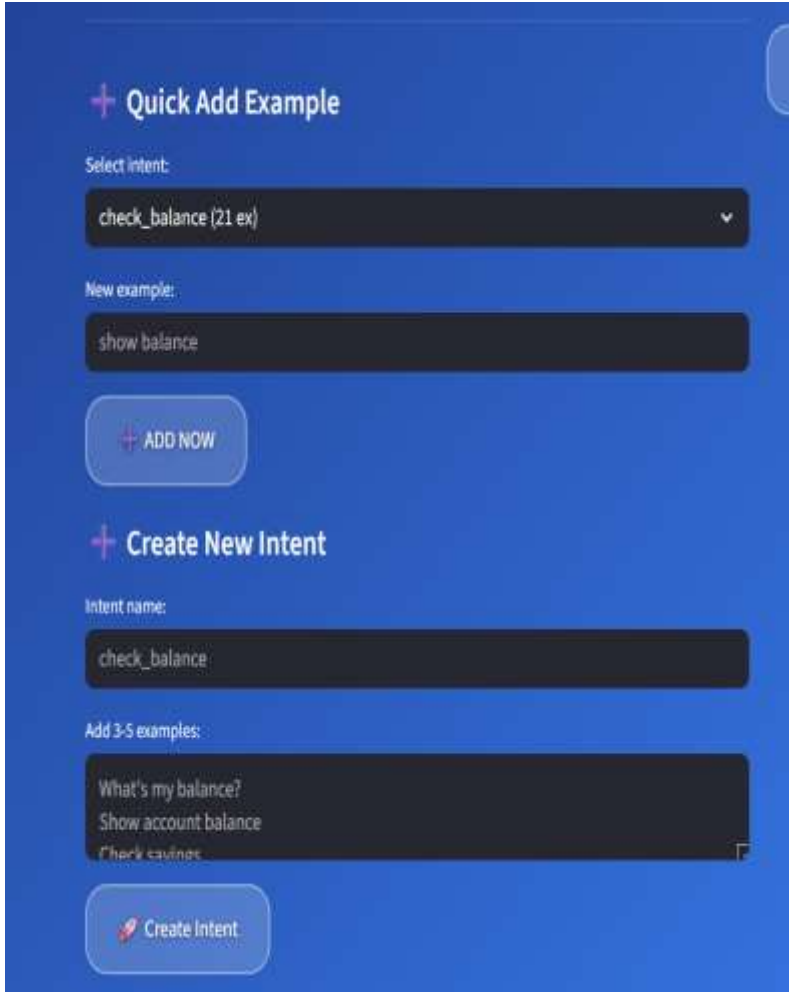
Query Analytics

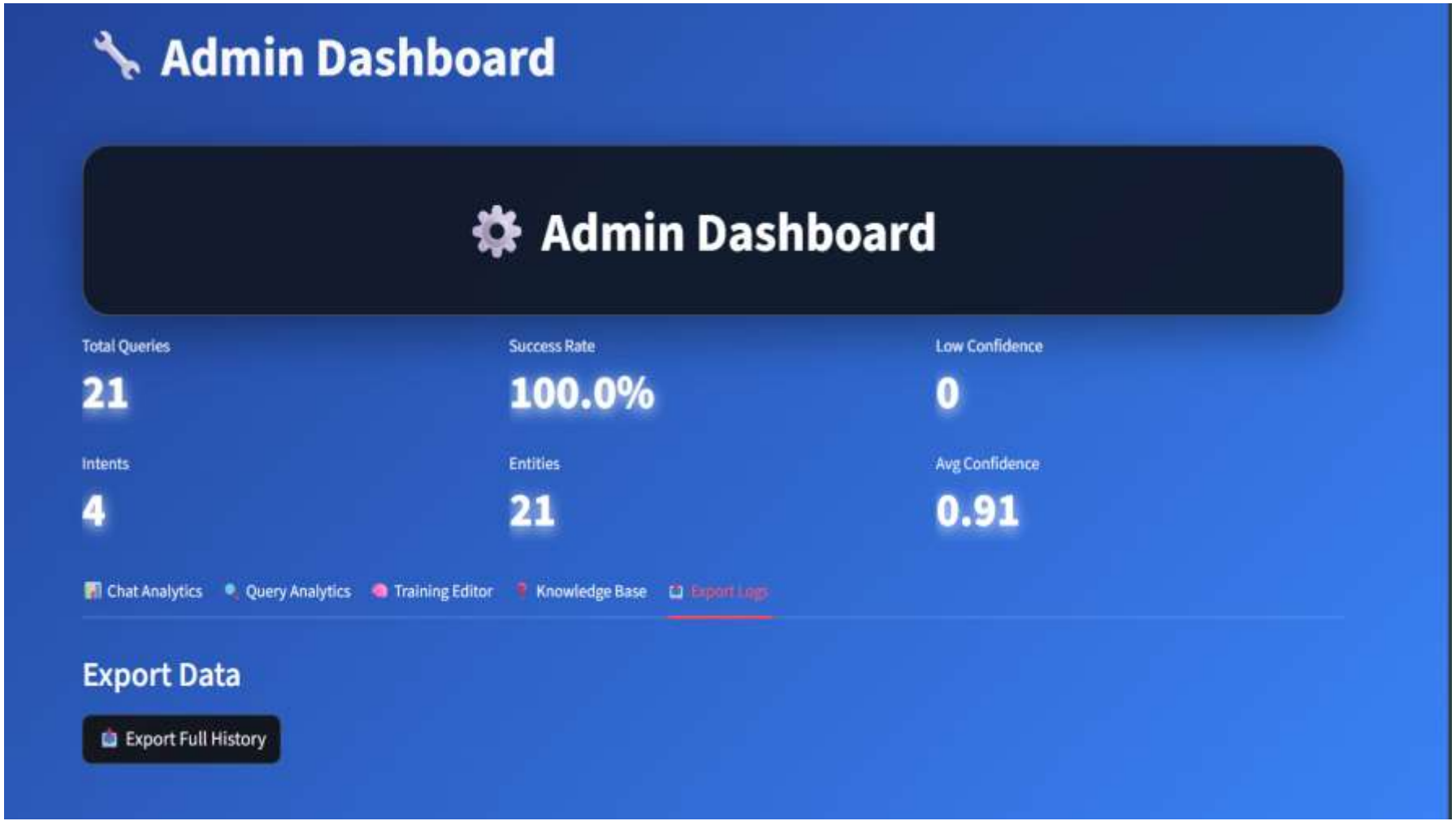
Total Queries	Intents	Low Confidence	Today
93	4	5	1

Intent Distribution

Confidence Distribution


Chat Analytics
Query Analytics
Training Editor
Knowledge Base
Export Logs
Training Editor
5 intents loaded
check_balance (21 examples)
tranfer_money (25 examples)
card_block (23 examples)
find_atm (21 examples)
llm (2 examples)
2 NLU Visualizer
Example queries
Custom
User Query
Show balance for my savings account, I want to send 1000 rupees to account 9876543210.
Top intents to show
4
Analyze
Quick Add Example
Select intent:
check_balance (21 ex)


Quick Add Example
Select intent:
check_balance (21 ex)
New example:
show balance
ADD NOW
Create New Intent
Intent name:
check_balance
Add 3-5 examples:
What's my balance?
Show account balance
Create Intent


Admin Dashboard
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Entities
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0.91
Chat Analytics
Query Analytics
Training Editor
Knowledge Base
Export Logs
Export Data
Export Full History


Thank
you