

# Banking System with Advanced Fraud Detection

peedaluk

June 30, 2025

## 1 Introduction

This project, **Banking System with Advanced Fraud Detection**, is a secure web-based banking application developed using Python (Flask) that integrates machine learning-based fraud detection. The system provides essential banking functionalities such as user registration, authentication, account management, and transaction processing, while monitoring for suspicious activities in real time.

## 2 Features

- User registration and login
- Account management and transaction processing
- Real-time fraud detection using machine learning models
- Secure password handling
- Responsive web interface using HTML, CSS, and JavaScript
- Logging of user actions and suspicious activities

## 3 System Architecture

The application follows a modular structure:

- **Backend:** Python (Flask)
- **Frontend:** HTML, CSS, JavaScript
- **Fraud Detection:** Machine learning models (Python)
- **Database:** (as per your implementation)
- **Password Security:** Custom Python module

## 4 Project Structure

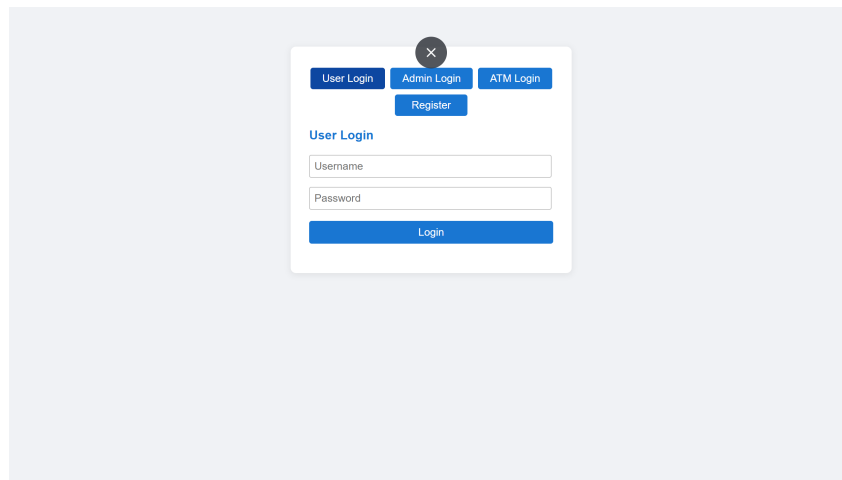
- `app.py`: Main Flask application
- `models/`: Machine learning models for fraud detection
- `routes/`: Flask route handlers
- `templates/`: HTML templates
- `static/`: Static assets (CSS, JS, images)
- `screenshots/`: Application screenshots
- `password.py`: Password management utilities
- `requirements.txt`: Python dependencies

## 5 Implementation Details

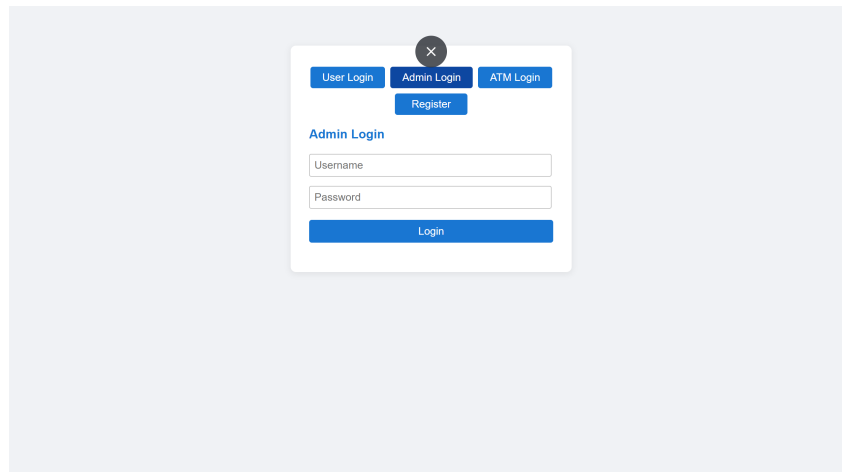
- **Fraud Detection:** Machine learning models are trained on transaction data to distinguish between legitimate and fraudulent activities. Each transaction is evaluated before processing; if flagged as suspicious, the user is alerted.
- **User Interface:** Designed with HTML, CSS, and Bootstrap for a responsive experience.

## 6 Screenshots

### Login Page



### Admin Login



# ATM Login

User LoginAdmin LoginATM LoginRegister

ATM Login

Card Number

PIN

Login

# User Dashboard

Welcome, kuladeep\_dasari

Referral count: 0

Your Accounts

Account ID	Type	Balance	Card_Number	Account_Number	Delete
3	savings	10000.00	4880375762557965	1103857911	Delete
4	savings	0.00	4207815886357145	7168840515	Delete
5	savings	89100.00	4554381131909300	1204671806	Delete

Create New Account

Account Type: Savings Create Account

Recent Transactions

Type	Amount	Description	Timestamp	Account ID
withdrawal	900	withdrawal from 5	2025-06-29 14:35:54	5
transfer_out	10000	ATM transfer to 1103857911	2025-06-29 14:35:34	5
transfer_in	10000	Transfer from account 5	2025-06-29 14:35:34	3

# Admin Dashboard

Admin Panel

Dashboard

User Management

Transactions

Analytics

Fraud Detection

Settings

Logout

Admin Dashboard

TOTAL USERS2

TOTAL BALANCE\$99100.00

TRANSACTIONS4

FRAUD ALERTS0

Recent Transactions

ID	Type	Amount	Account	User	Time	Actions
5	WITHDRAWAL	\$900.00	5	4	2025-06-29 14:35:54	<div></div> <div>P</div>
3	TRANSFER OUT	\$10000.00	5	4	2025-06-29 14:35:34	<div></div> <div>P</div>
4	TRANSFER IN	\$10000.00	3	4	2025-06-29 14:35:34	<div></div> <div>P</div>
2	DEPOSIT	\$100000.00	5	4	2025-06-29 14:32:37	<div></div> <div>P</div>

User Management

# Admin Dashboard (Alternate View)

User Management

Search users...

ID	Username	Email	Joined	Status	Actions
1	admin1	admin1@example.com	2025-06-29	<div>Admin</div>	<div></div>
4	kuladeep_dasari	kuladeepdasari2005@gmail.com	2025-06-29	<div>Active</div>	<div>Block</div> <div></div>

# Registration Page

User Login

Admin Login

ATM Login

Register

User Registration

Username

Email

Password

referral\_code

Register

# Database Schema

Windows PowerShell

Tables in bank\_db

accounts

transactions

users

rows in set (6.689 sec)

mysql> DESCRIBE users;

Field	Type	Null	Key	Default	Extra
user_id	int	NO	PK	NONE	auto_increment
username	varchar(100)	NO	UNI	NONE	
email	varchar(100)	NO	UNI	NONE	
password_hash	varchar(255)	NO		NONE	
is_admin	tinyint(1)	YES		0	
is_blocked	tinyint(1)	YES		0	
created_at	timestamp	YES		CURRENT_TIMESTAMP	DEFAULT_GENERATED
referral_code	varchar(255)	YES		NONE	
parent_id	int	YES		NONE	

rows in set (6.687 sec)

mysql> DESCRIBE accounts;

Field	Type	Null	Key	Default	Extra
account_id	int	NO	PK	NONE	auto_increment
user_id	int	NO	FK	NONE	
account_type	enum('savings','checking')	NO		NONE	
account_number	varchar(255)	NO	UNI	NONE	
balance	decimal(12,2)	NO		0.00	
card_number	varchar(16)	YES	UNI	NONE	
pin_code	varchar(4)	YES		NONE	
created_at	timestamp	YES		CURRENT_TIMESTAMP	DEFAULT_GENERATED

rows in set (6.686 sec)

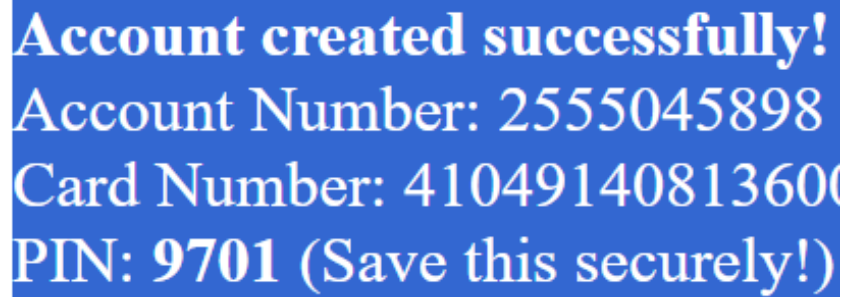
mysql> DESCRIBE transactions;

Field	Type	Null	Key	Default	Extra
transaction_id	int	NO	PK	NONE	auto_increment
account_id	int	NO	FK	NONE	
type	enum('deposit','withdrawal','transfer_in','transfer_out')	NO		NONE	
amount	decimal(12,2)	NO		0.00	
description	varchar(255)	YES		NONE	
related_account_id	int	YES		NONE	
timestamp	timestamp	YES		CURRENT_TIMESTAMP	DEFAULT_GENERATED

rows in set (6.629 sec)

mysql>

## Additional Screenshot



**Account created successfully!**  
**Account Number: 2555045898**  
**Card Number: 41049140813600**  
**PIN: 9701 (Save this securely!)**



**Recent Transactions**

## 7 Conclusion and Future Work

This project demonstrates a secure, user-friendly banking system with integrated fraud detection. Future enhancements may include advanced ML models, multi-factor authentication, transaction visualization dashboards, and integration with real banking APIs.

## 8 References

- Project GitHub Repository: <https://github.com/peedaluk/Banking-system-with-Advanced->
- Flask Documentation: <https://flask.palletsprojects.com/>
- scikit-learn Documentation: <https://scikit-learn.org/>
- Hajdu, L., & Krész, M. (2020). Temporal Network Analytics for Fraud Detection in the Banking Sector. In L. Bellatreche et al. (Eds.), ADBIS/TPDL/EDA 2020 Workshops and Doctoral Consortium, CCIS 1260, pp. 145–157. Springer Nature Switzerland AG. [https://www.researchgate.net/publication/343701757\\_Temporal\\_Network\\_Analytics\\_for\\_Fraud\\_Detection\\_in\\_the\\_Banking\\_Sector](https://www.researchgate.net/publication/343701757_Temporal_Network_Analytics_for_Fraud_Detection_in_the_Banking_Sector)