Project: Personal Spending Insights Web Application

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1. Stakeholders

Role	Name / Description	Responsibility
Product Owner & Developer	Ahmad Naween Samandar	Defines vision, manages requirements, develops core features
End User	Individual users who want to analyze and manage their spending	Upload transaction data, view insights, receive savings suggestions
(Future) Data Scientist / ML Engineer		Improve spending categorization accuracy, enhance insights
(Future) UI/UX Designer		Ensure intuitive dashboard and visualization of data

2. High-Level Goals

1. Automatically categorize uploaded bank transactions.
2. Provide detailed and visualized **spending insights** (e.g., spending by category, trend over time).
3. Generate **summaries and monthly savings suggestions** based on income and expenses.
4. Offer **goal-based financial recommendations** (e.g., “save $100/month to reach your travel goal”).
5. Allow secure user authentication and profile management.
6. Enable users to **export and import** data via CSV or PDF.

3. Requirements

3.1 Functional Requirements

ID	Requirement	Description
F1	File Upload	User can upload bank transaction data in **CSV** or **PDF** format.
F2	Data Parsing	System extracts structured data (date, description, amount, category) from the uploaded file.
F3	Categorization	Transactions are automatically categorized (e.g., food, rent, shopping) using rules or AI model.
F4	Database Storage	All user data and processed transactions are securely stored in the database.
F5	Dashboard Insights	Display data visualization such as total monthly spend, category breakdown, trends, etc.
F6	Summary Generation	System generates a written summary of the user’s spending habits.
F7	Savings & Goal Suggestions	Suggests how much to save and provides tailored financial tips.
F8	Export Functionality	Users can export their spending reports in **CSV or PDF**.
F9	Account Creation	User can create, update, and delete an account.
F10	Authentication	Secure login/logout with password encryption.

3.2 Non-Functional Requirements

ID	Requirement	Description
N1	Performance	Dashboard insights should load within **2 seconds** after data upload.
N2	Scalability	The backend should support up to **10,000 users** concurrently in the future.
N3	Security	User credentials must be encrypted (e.g., using bcrypt or JWT).
N4	Reliability	System uptime target: **99.5%**.
N5	Usability	The dashboard must be mobile and desktop responsive.
N6	Maintainability	Code should follow modular and documented architecture for easy updates.

4. Use Cases

ID	Use Case	Actor	Description	Precondition	Postcondition
UC1	Upload Transaction File	User	User uploads a CSV/PDF file containing transaction history.	User logged in	File processed and data extracted.
UC2	View Spending Dashboard	User	User views categorized spending insights.	Data available in DB	Dashboard displays charts and tables.
UC3	Receive Savings Suggestions	User	User sees personalized saving goals and insights.	Categorized data ready	Savings summary generated.
UC4	Export Data	User	User downloads spending report in CSV/PDF.	Dashboard generated	File downloaded to user's device.

UC5	Create Account	User	User registers with email/password.	None	Account created and stored securely.
UC6	Login	User	User logs into account to view dashboard.	Account exists	Session established.

5. User Stories

ID	User Story	Acceptance Criteria
US1	As a user, I want to upload my bank statement in CSV or PDF format so that I can analyze my spending.	✅ System accepts CSV/PDF ✅ Displays confirmation after upload
US2	As a user, I want the system to categorize my transactions automatically so that I don't have to do it manually.	✅ Categories generated within 2s ✅ >85% classification accuracy
US3	As a user, I want to see a dashboard of my monthly spending by category so that I can understand where my money goes.	✅ Dashboard loads successfully with charts ✅ Displays total per category
US4	As a user, I want to download my report as PDF or CSV so that I can keep a record of my spending.	✅ Downloadable PDF/CSV generated
US5	As a user, I want to receive savings and goal suggestions so that I can manage my finances better.	✅ Suggestions shown on dashboard ✅ Personalized based on spending pattern
US6	As a user, I want to create and log in to my account so that I can save and revisit my insights.	✅ Secure signup/login ✅ Session persisted

6. Machine Learning Plan and Tools

6.1 Objectives

- Automatically categorize transactions into categories such as *Food, Rent, Transportation, Shopping, Utilities, Entertainment, and Others*.
- Learn from user corrections (e.g., if a user reclassifies a category) to improve accuracy over time.
- Generate intelligent, data-driven spending summaries and suggestions.

6.2 Approach

ML Task	Method	Description
Transaction Categorization	Supervised Classification	Use model (e.g., Logistic Regression, Random Forest, or fine-tuned BERT/NLP) trained on transaction descriptions.
Insight Generation	Rule-based + Data Analytics	Combine aggregation logic with learned spending behavior.
Goal-based Suggestions	Predictive + Heuristic	Recommend saving goals based on past patterns, income, and expense ratio.

6.3 Data

- Input: Transaction descriptions, merchant names, amounts, and dates.
- Output: Categorized transactions, monthly summary, goal suggestions.
- Dataset Sources: Public datasets (e.g., Kaggle spending data) and user-uploaded files.

6.4 ML Tools & Frameworks

Purpose	Tools	Reason
Model Training	Python (Pandas, scikit-learn, PyTorch or TensorFlow)	For building and training models.

Feature Engineering	Pandas, NumPy	For cleaning and transforming transaction data.
Model Storage	Pickle or ONNX	For saving trained models.
API Integration	FastAPI or Flask	To expose ML model as API endpoint for the frontend/backend.
Monitoring	MLflow (optional)	Track experiments and model performance.

6.5 Performance Metrics

Metric	Target
Model Accuracy	≥ 85%
Precision / Recall	≥ 80%
Model Inference Time	< 1 second per request

7. KPIs (Key Performance Indicators)

KPI	Target
Transaction categorization accuracy	≥ 85%
Average dashboard load time	< 2 seconds
Uptime	≥ 99.5%
User satisfaction (survey)	≥ 4/5
Conversion rate from signup to first upload	≥ 70%

8. Tools

Category	Common Tools Used by Companies	Possible Tools for You
Task Management	Jira, Trello	**Jira or Notion**
Documentation	Confluence, Notion	**Notion or Google Docs**
Design	Figma	**Figma**
Version Control	GitHub, GitLab	**GitHub**
Database	PostgreSQL, MySQL, MongoDB	**Pos** **tgreSQL / SQLite (initially)**
Deployment	AWS, Netlify, Vercel	**Netlify (frontend), Render / Supabase (backend)**