

CUSTOMER CHURN PREDICTION & AGENTIC RETENTION STRATEGY

From Predictive Analytics to Intelligent Intervention

PROJECT OVERVIEW

This project involves the design and implementation of an **AI-driven customer analytics system** that predicts customer churn and evolves into an agentic AI retention strategist.

In **Milestone 1**, the system applies classical machine learning techniques to historical customer behavior data to predict churn risk, identify key drivers of disengagement, and generate analytical insights.

In **Milestone 2**, the same system is extended into an agent-based AI application that autonomously reasons about churn risk, retrieves retention best practices, PLANS intervention strategies, and generates structured recommendations.

The project emphasizes progressive system design from predictive machine learning to agentic AI workflows using LLMs, tool orchestration, and state management.

CONSTRAINTS & REQUIREMENTS

TEAM SIZE	API BUDGET
3–4 Students	Free Tier Only
FRAMEWORK	HOSTING
LangGraph (Recommended)	Mandatory

APPROVED TECHNOLOGY STACK

LLMS (MILESTONE 2)

- Open-source models
- Free-tier APIs

AGENT FRAMEWORK

- LangGraph (Recommended)
- Chroma / FAISS (RAG)

ML MODELS (MILESTONE 1)

- Logistic Regression
- Decision Trees
- Scikit-Learn (Pipelines)

UI FRAMEWORK

- Streamlit
- Gradio

HOSTING PLATFORM (MANDATORY)

- Hugging Face Spaces
- Streamlit Community Cloud
- Render (Free Tier)

WARNING: Localhost-only demonstrations will not be accepted.

MILESTONE 1: ML-BASED CUSTOMER CHURN PREDICTION

MID-SEM SUBMISSION

Objective: Design and implement a machine learning-based customer churn prediction system that identifies customers at risk using historical behavioral and transactional data. Focus on classical ML pipelines *without LLMs*.

Functional Requirements:

- Accept customer behavior data as input.
- Perform data preprocessing and feature engineering.
- Predict churn probability.
- Display predictions and basic insights through UI.

TECHNICAL REQUIREMENTS (ML)

- **Preprocessing:** Missing values, Scaling, Categorical encoding.
- **Models:** Logistic Regression, Decision Trees (Supervised Learning).
- **Evaluation:** Accuracy, Precision, Recall, F1, Confusion Matrix.
- **Features:** Usage frequency, Tenure, Support interactions.

INPUTS & OUTPUTS

- **Input:** Customer data (CSV).
- **Output:** Churn Probability/Classification.
- **Metrics:** Key churn drivers explanation.

MID-SEM DELIVERABLES

- Problem understanding & Business context.
- Input-output specification.
- System architecture diagram.
- Working local application with UI.
- Model performance evaluation report.

MILESTONE 2: AGENTIC AI RETENTION STRATEGY ASSISTANT

END-SEM SUBMISSION

Objective: Extend the churn prediction system into an agentic AI retention strategy assistant that autonomously reasons about risk, retrieves best practices, plans interventions, and generates structured retention reports.

Functional Requirements:

- Accept customer data and retention queries.
- Analyze churn risk predictions autonomously.
- Retrieve relevant retention strategies.
- Generate structured retention recommendations.

TECHNICAL REQUIREMENTS (AGENTIC)

- **Framework:** LangGraph (Workflow & State).
- **RAG:** Retrieval of retention strategies (Chroma/FAISS).
- **State:** Explicit state management across steps.
- **Prompting:** Strategies to reduce hallucinations.

STRUCTURED OUTPUT

- **Risk Summary:** Customer churn profile.
- **Recommendations:** Retention actions.

- **Sources:** Best practices & References.
- **Disclaimer:** Business & Ethical disclosures.

END-SEM DELIVERABLES

- Publicly deployed application.
- Agent workflow documentation.
- Structured retention report generation.
- GitHub Repository & Complete Codebase.
- Demo Video (Functionality walkthrough).

Final Artifacts: Hosted Link, GitHub Repo, Demo Video.

EVALUATION CRITERIA

PHASE	WEIGHT	CRITERIA
Mid-Sem (Milestone 1)	25%	<ul style="list-style-type: none"> • Correct application of ML techniques • Quality of feature engineering & preprocessing • Appropriateness of evaluation metrics • UI Usability & Code modularity
End-Sem (Milestone 2)	30%	<ul style="list-style-type: none"> • Quality of Retention Strategy reasoning • Correct RAG implementation & State management • Structured Output Clarity • Ethical AI & Deployment Success
