

Project Report: Customer Churn Intelligence Engine

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Objective: Leveraging Artificial Intelligence to reduce customer attrition and maximize revenue retention.

1. The Business Problem (The "Why")

In the telecom and service sectors, customer churn (attrition) is a silent revenue killer. Companies often fail to identify dissatisfied customers until they have already canceled.

- **The Financial Reality:** Acquiring a new customer costs **5 to 25 times more** than retaining an existing one. Preventing churn is the most effective way to boost profitability.

2. The AI Solution (The "How")

I developed an **End-to-End Predictive Pipeline** using Machine Learning algorithms (**Random Forest Classifier**) to analyze historical behavioral data. The system goes beyond simple reporting; it provides a **Real-Time Interactive Dashboard** that acts as an "Early Warning System" for decision-makers.

3. Key Data Insights

After analyzing 2,000 customer profiles, the model revealed critical risk patterns:

- **Price Sensitivity:** Monthly bills exceeding **\$90** significantly increase the probability of churn.
- **Contract Risk:** Customers on **Month-to-month** contracts are the highest flight risk, whereas 1-year and 2-year contracts ensure stability.
- **The "Loyalty Valley":** The first **12 months** are the most volatile. Once a customer stays past one year, their loyalty stabilizes.

4. Decision Support Scenario (The "Power Move")

(This section demonstrates the strategic value of the project)

Using the Dashboard, we simulated a real-world retention scenario for a high-risk customer:

- **Customer Profile:** Monthly Bill: \$100 | Contract: Month-to-month.
- **AI Prediction:** Churn Risk = **85% (High Risk)** .

Scenario A: The Traditional Approach (Discounting) We simulated offering a discount, lowering the bill to **\$70**.

- **Result:** Risk dropped to **60%**. (Still unsafe. The customer might still leave).

Scenario B: The Data-Driven Approach (Prescriptive Action) Instead of losing revenue with a discount, we simulated switching the customer to a **"Two-Year Contract"** while keeping the price at **\$100**.

- **Result:** Risk collapsed to **0.0% (Safe)** .

Conclusion: The AI proved that the solution isn't always "losing money on discounts." The most effective retention strategy for this segment is **contractual commitment**, not price reduction.

5. Technical Stack

- **Python & Pandas:** For robust data engineering and scenario generation.
 - **Scikit-Learn:** To build and train the Random Forest classification model.
 - **Streamlit:** To deploy the model as a user-friendly Web Application.
 - **Plotly/Seaborn:** For advanced data visualization and reporting.
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Final Verdict

This project transforms data analysis from **Descriptive** (What happened?) to **Prescriptive** (What should we do?). It empowers the management team to make proactive, data-backed decisions that directly protect the company's bottom line.