TELECOM CHURN ANALYSIS: PREDICTING FUTURE TRENDS WITH EARLY DATA

Domain-oriented Case Study

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Problem Statement

◦ Analyze customer-level data of a leading telecom firm, build predictive models to identify customers at high risk of churn, and identify the main indicators of churn.

◦ In the competitive telecom industry, customer churn presents a significant challenge. This case study aims to address this issue by:

◦ **Analyzing Customer-Level Data:** Examine detailed customer data from a leading telecom firm to understand usage patterns and behaviors.

◦ **Building Predictive Models:** Develop models to predict which customers are at high risk of churning.

◦ **Identifying Churn Indicators:** Determine the key factors that indicate a customer is likely to churn.

Objective

◦ By leveraging advanced data analysis and predictive modelling, we aim to provide actionable insights to help telecom companies reduce customer churn, retain high-value customers, and enhance overall customer satisfaction. Our approach includes:

◦ **Early Data Utilization:** Utilizing data from the first three months (June, July, and August) to predict churn in the ninth month (September).

◦ **Customer Behavior Phases:** Analyzing customer behavior through three phases - 'Good' (happy with the service), 'Action' (considering leaving due to dissatisfaction), and 'Churn' (no longer using the service).

◦ **Feature Engineering:** Extracting and creating relevant features to build robust predictive models.

◦ **Model Development and Evaluation:** Training multiple models, handling class imbalance, and fine-tuning hyperparameters. Evaluating models using metrics such as accuracy, precision, recall, F1-score, and AUC-ROC.

◦ **Business Recommendations:** Providing strategic recommendations based on the identified churn indicators to help telecom companies improve their retention strategies.

Churn rate based on whether the customer decreased her/his MOU in the action month
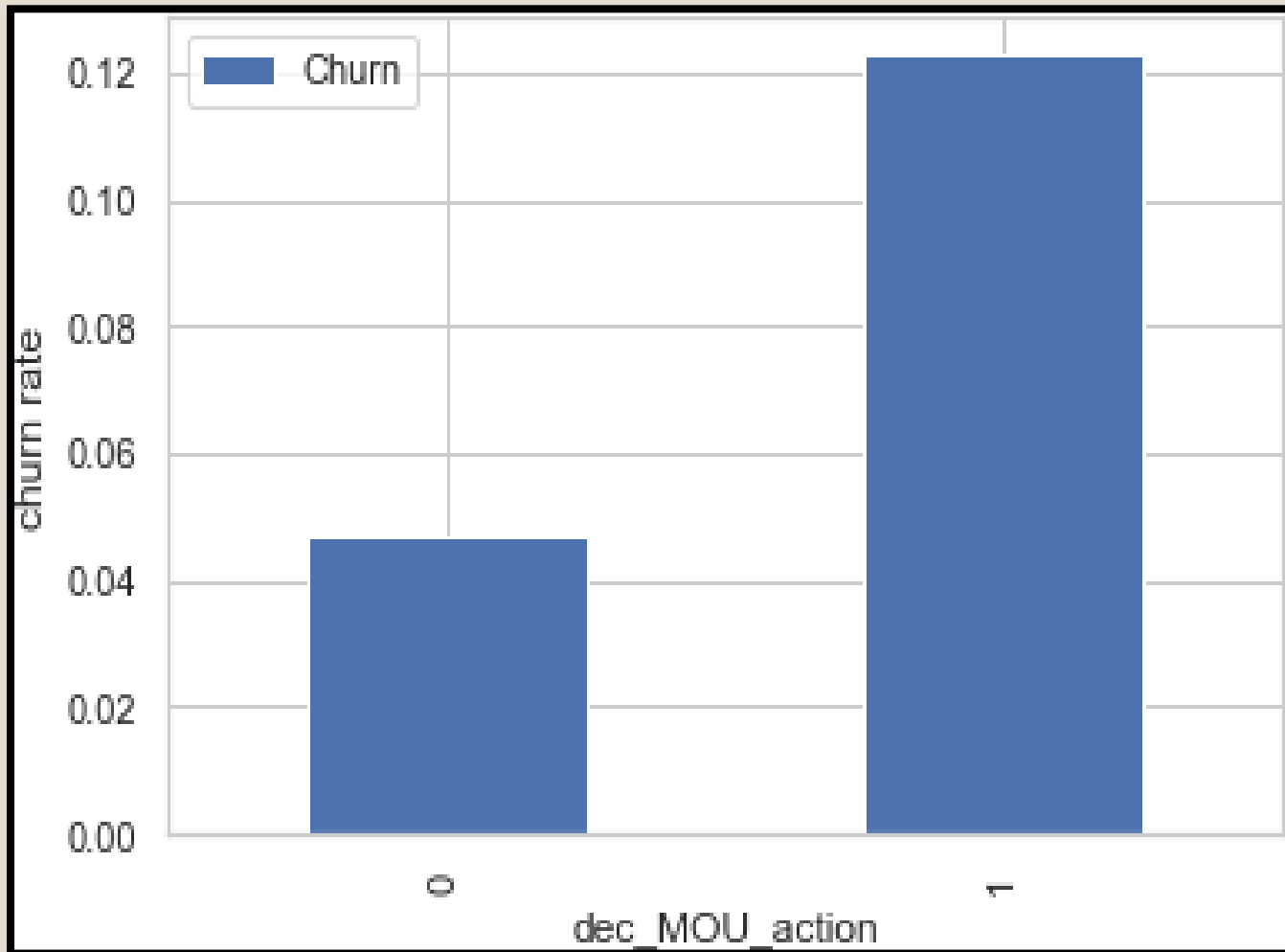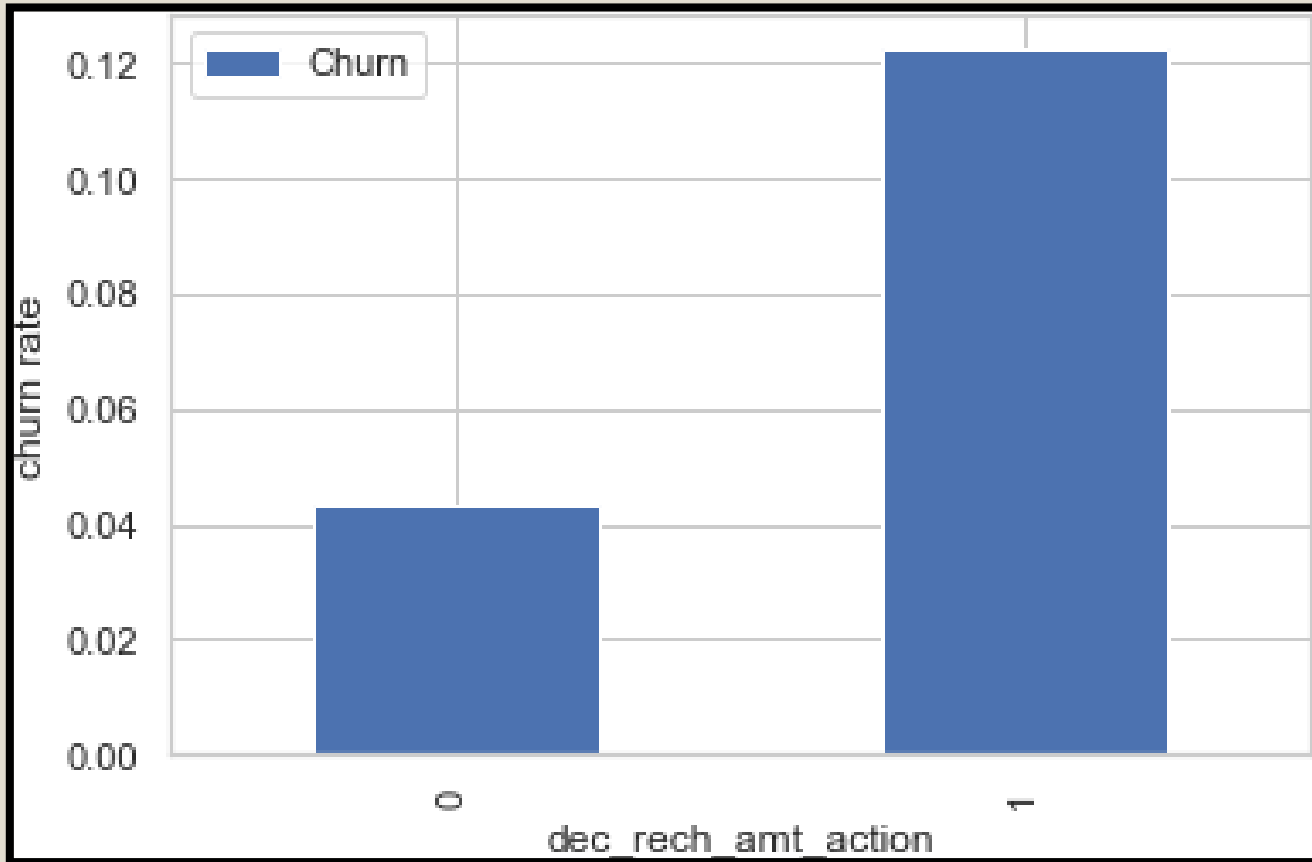

Insight: MoU Decrease in Action Phase Increases Churn Rate

Decreased MoU in Action Phase: Customers experiencing a decrease in Minutes of Usage (MoU) during the action phase (month eight) are more likely to churn.

Increased MoU in Good Phase: Conversely, customers who observe an increase in MoU during the good phase (months six and seven) tend to exhibit lower churn rates.

# Churn rate on the basis of whether the customer decreased the amount of recharge in the action month

Insight: Recharge Amount and Churn Rate

Decreased Recharge Amount in Action Phase: Customers who experience a decrease in recharge amount during the action phase (month eight) have a higher churn rate compared to those whose recharge amount remained consistent or increased from the good phase (months six and seven).

Churn Rate Correlation: There is a direct correlation between the decrease in recharge amount during the action phase and an increase in churn rate among customers.

Analysis of the minutes of usage MOU (churn and not churn) in the action phase
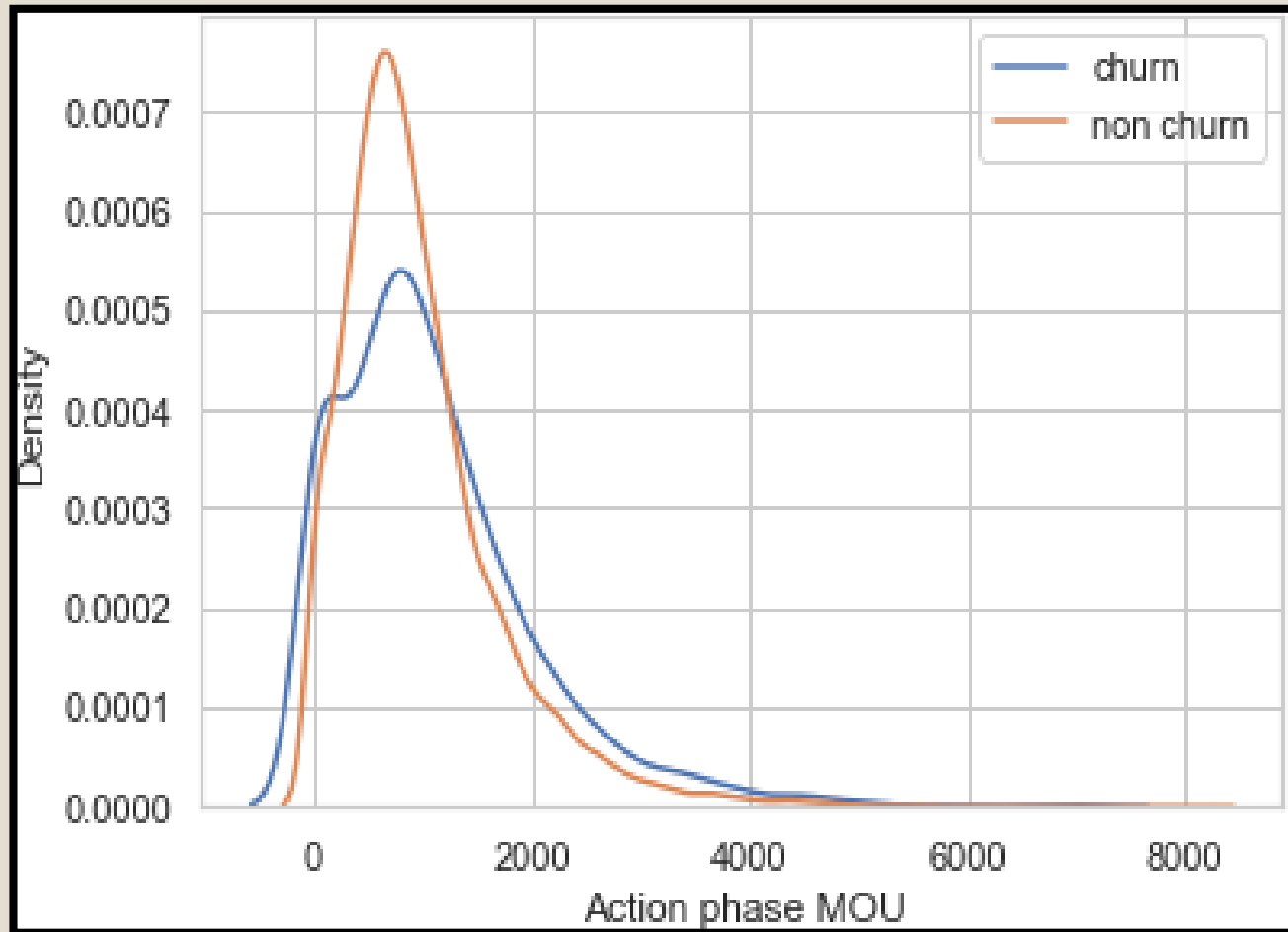
Insight: MoU and Churn Probability

MoU Range for Churned Customers:
Customers who churn tend to have a Minutes of Usage (MoU) ranging from 0 to 2500.

Inverse Relationship: There exists an inverse relationship between MoU and churn probability. As the MoU increases, the likelihood of churn decreases.

Implications

Behavioral Analysis: This insight underscores the importance of analyzing customer behavior patterns over time.

Proactive Measures: Telecom companies can proactively identify customers with decreasing MoU during the action phase and implement targeted retention strategies to prevent churn.

Service Enhancement: Focusing on enhancing service quality and customer experience during the action phase can help mitigate churn risk.

Financial Behavior Analysis: Understanding the financial behavior of customers, especially regarding recharge patterns, can provide valuable insights into their likelihood of churning.

Retention Strategies: Telecom companies can tailor retention strategies based on customers' recharge behavior, focusing on incentivizing higher recharge amounts and maintaining consistency in recharge patterns.

Customer Segmentation: Segmenting customers based on their recharge behavior allows for targeted interventions, enabling companies to prioritize resources and efforts towards at-risk segments.

Recharge Amount Vs Number of Recharge in action month
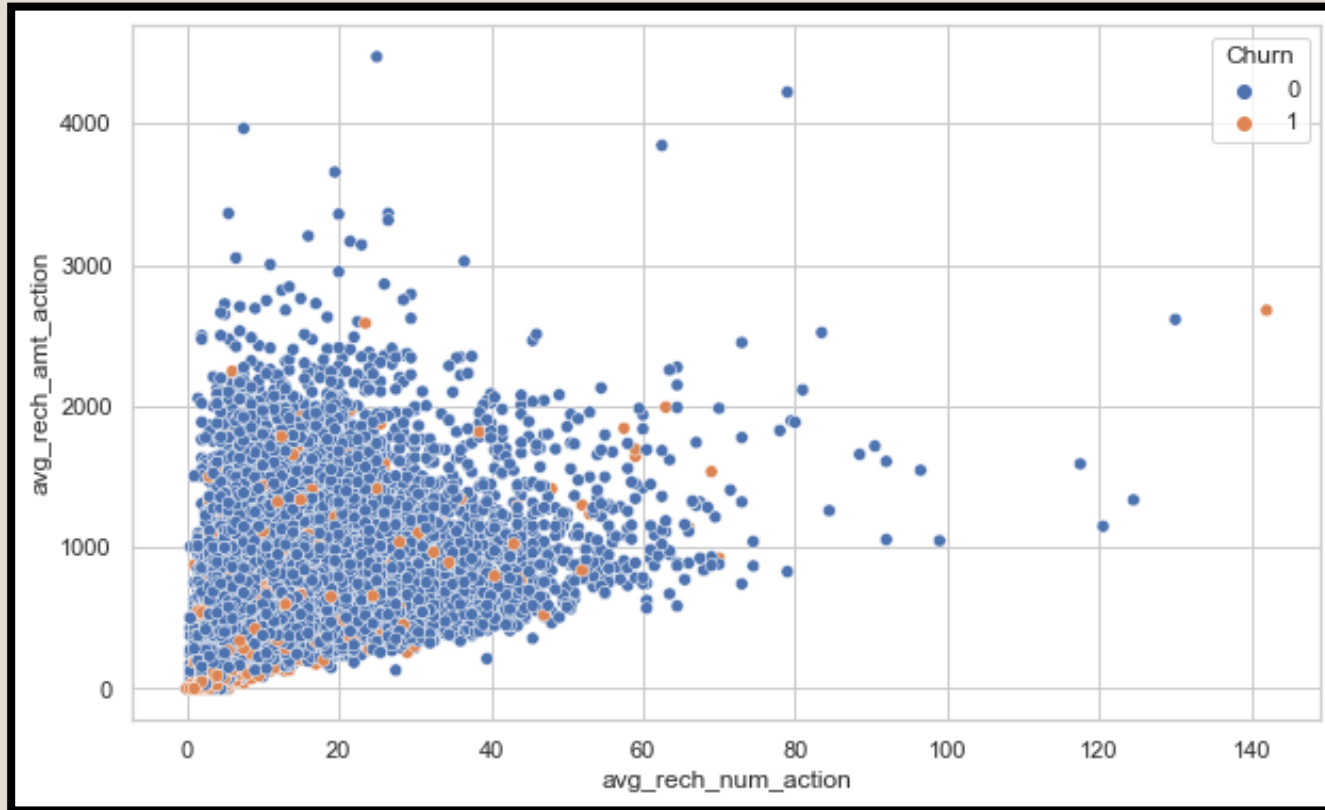
There is a clear trend showing that the recharge frequency and the total recharge amount are closely linked. Essentially, the more often recharges occur, the greater the total amount recharged. This strong correlation highlights a direct relationship: frequent recharges lead to higher cumulative recharge amounts. It's like watching a snowball effect in action—the more you recharge, the bigger the impact on your total balance!

Churn rate vs decreasing recharge amount
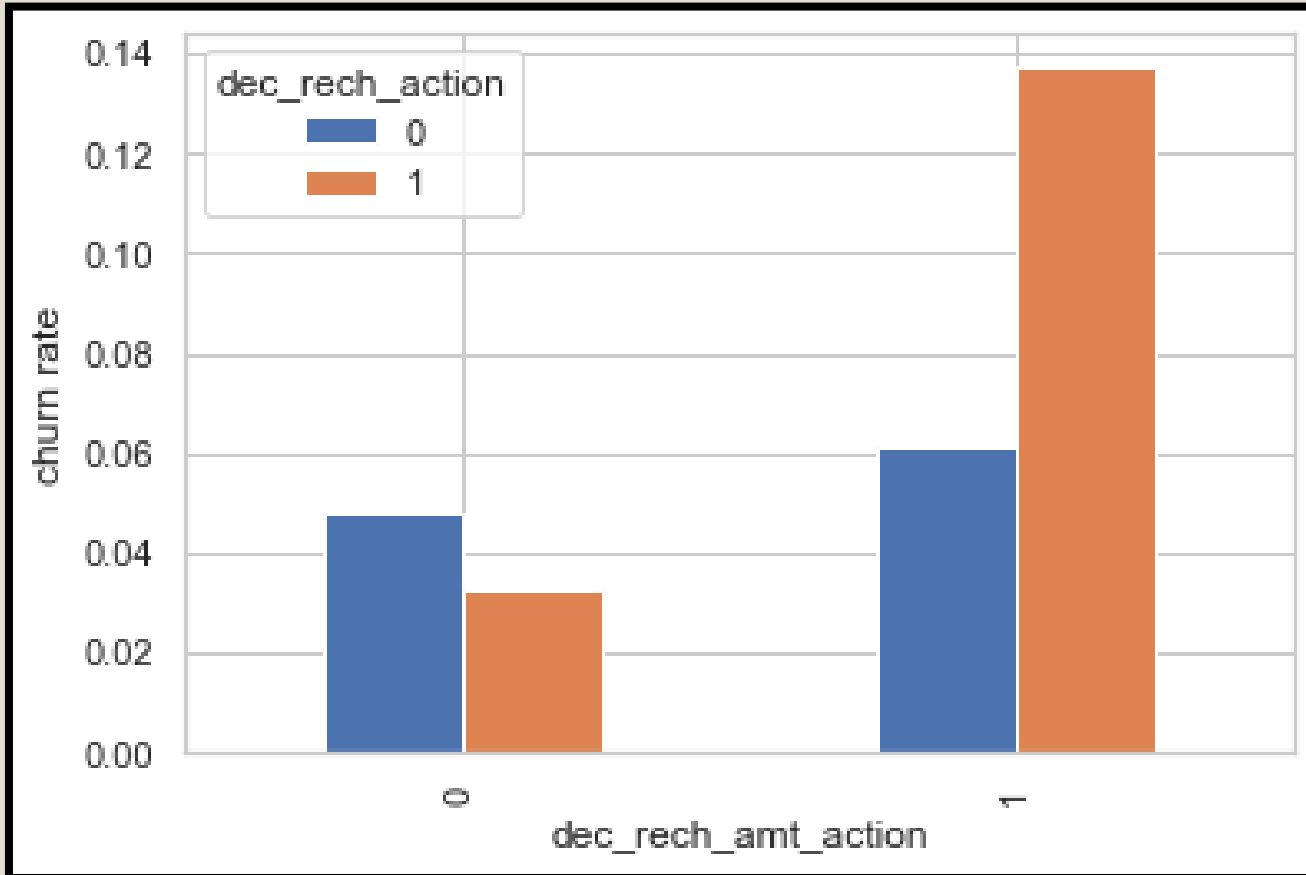
◦ Customers experiencing a drop in both recharge amount and frequency during the action phase are more likely to churn compared to those in the good phase. Simply put, when recharges dwindle, customers tend to leave. This insight underscores the importance of maintaining consistent recharge activity to retain customers. The data paints a clear picture—keeping those recharges up is key to reducing churn!

Model statistics

Model	Recall	Test Accuracy	roc_auc_curve
Decision Tree with PCA	0.87	0.87	0.77
Logistic Regression with PCA	0.86	0.82	0.89
Logistic regression without PCA	0.82	0.79	0.76
Random Forest with PCA	0.71	0.87	0.88

Analysis from model statistics

- Decision Tree with PCA: High recall (0.87) and good accuracy (0.87), but moderate ROC AUC (0.77).

- Logistic Regression with PCA: Balanced performance with good recall (0.86), accuracy (0.82), and excellent ROC AUC (0.89).

- Logistic Regression without PCA: Lower recall (0.82) and accuracy (0.79), with moderate ROC AUC (0.76).

- Random Forest with PCA: Lower recall (0.71), but highest accuracy (0.87) and excellent ROC AUC (0.88).

- This summary highlights the trade-offs between recall, accuracy, and ROC AUC across different models, indicating that Logistic Regression with PCA provides the most balanced performance.

<mark>Conclusion</mark> from Case study

◦ Our exploratory data analysis (EDA) indicates a significant decline in recharge, call usage, and data usage during the 8th month, known as the 'Action Phase.' Key features influencing this trend include: loc_og_t2m_mou_7, total_og_mou_6, loc_og_t2t_mou_7, roam_ic_mou_7, onnet_mou_7, arpu_7, loc_og_t2c_mou_7, onnet_mou_8, roam_og_mou_8, and arpu_6.

◦ The average revenue per user (ARPU) in the 7th month is crucial for predicting churn. A sudden drop in ARPU can signal potential churn, indicating the need for timely intervention.

◦ Roaming minutes of usage, both incoming and outgoing, also have a notable impact on churn rates.

◦ Total outgoing minutes of usage is another critical factor influencing customer churn.

◦ Local outgoing minutes of usage are among the most significant predictors of customer churn.

◦ By closely monitoring these indicators, we can better understand and address the factors leading to customer churn, ensuring more proactive retention strategies.

<mark>Strategies</mark> which can reduce churn

◦ The decline in local minutes of usage could be attributed to bad customer experience, such as poor network quality or unsuitable plans. To address this, improving network reliability and enhancing customer satisfaction should be prioritized.

◦ Routine feedback calls based on usage patterns, last recharge, and net usage are essential for understanding customer grievances and expectations. Taking timely action on this feedback can help prevent churn.

◦ Introducing attractive offers for customers who show a sudden decrease in their spending on calls and data during the action phase can entice them to stay.

◦ Providing customized plans tailored to the specific needs of these customers can be an effective strategy to reduce churn.

◦ Promotional offers can also play a significant role in retaining customers and preventing churn.

Reducing Customer Churn: ==Summary==

◦ Enhance Service Quality:
  ◦ Improve network reliability and address customer service issues.
  ◦ Offer plans that better suit customer needs.

◦ Proactive Customer Engagement:
  ◦ Conduct routine feedback calls based on usage data to understand and address grievances.
  ◦ Implement timely interventions to prevent potential churn.

◦ Attractive Offers:
  ◦ Introduce special offers for customers showing decreased spending during the action phase.
  ◦ Provide customized plans to meet specific customer requirements.

◦ Promotional Campaigns:
  ◦ Utilize promotional offers to retain customers and enhance satisfaction.