Jivko Jeff Uzoff

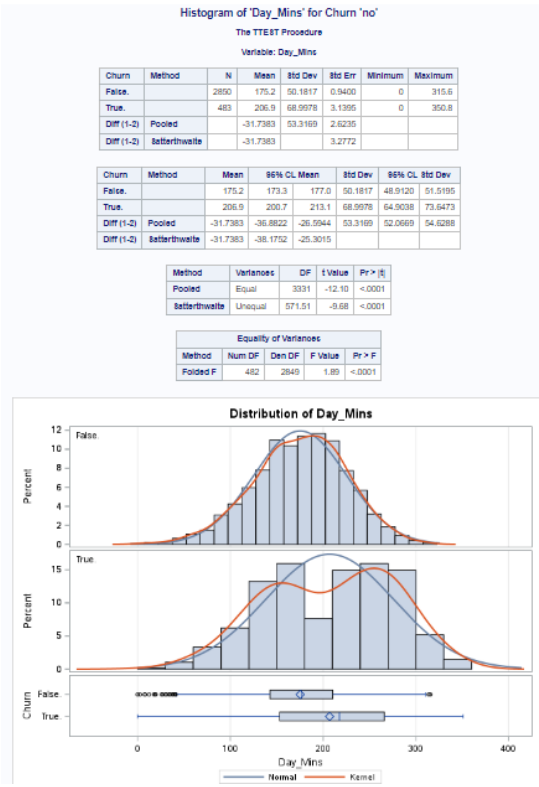
Conclusions and Recommednations

In this section, we focus on the insights and recommendations derived from the selected attributes model, which has demonstrated superior performance in predicting customer churn. The selected attributes model has yielded significantly improved results compared to the all-attributes model, showing better accuracy in predicting whether a customer will churn (class attribute). By analyzing key factors such as the number of calls to customer support service, charges for interational calls, customer's state, and number of minutes the customer used the service during night time, we aim to provide actionable recommendations that leverage these insights to enhance retention strategies and reduce churn rates.

Major Findings:

Day_Mins and Churn

- Significant Association: The p-value (< 0.0001) indicates a strong association between the number of daytime minutes used and customer churn. Clients who churned tend to have significantly higher daytime minutes (206.9) compared to those who did not churn (175.2). This suggests that higher daytime usage may be linked to a higher likelihood of churn, highlighting Day_Mins as a potential predictor of customer churn.



Day_Calls and Churn

- No Significant Association: The p-values from the t-tests (0.2867 and 0.3165) indicate no statistically significant difference in the number of daytime calls between clients who churned

and those who did not. Although clients who churned had a slightly higher mean number of Day_Calls (101.3) compared to those who did not (100.3), this difference is not significant, suggesting that Day_Calls may not be an influential factor in predicting churn.

Histogram of 'Day_Calls' for Churn 'no'

The TTEST Procedure

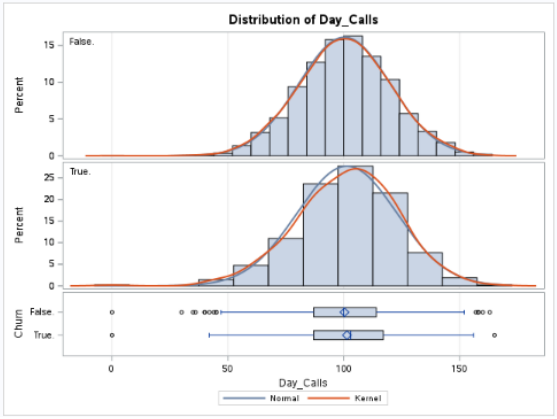
Variable: Day_Calls

Churn	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
False.		2850	100.3	19.8012	0.3709	0	163.0
True.		483	101.3	21.5823	0.9820	0	165.0
Diff (1-2)	Pooled		-1.0522	20.0687	0.9675		
Diff (1-2)	Satterthwaite		-1.0522		1.0497		

Churn	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
False.		100.3	99.5559	101.0	19.8012	19.3001	20.3291
True.		101.3	99.4058	103.3	21.5823	20.3017	23.0366
Diff (1-2)	Pooled	-1.0522	-2.9684	0.8639	20.0687	19.5962	20.5625
Diff (1-2)	Satterthwaite	-1.0522	-3.1137	1.0092			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	3331	-1.07	0.2867
Satterthwaite	Unequal	627.17	-1.00	0.3165

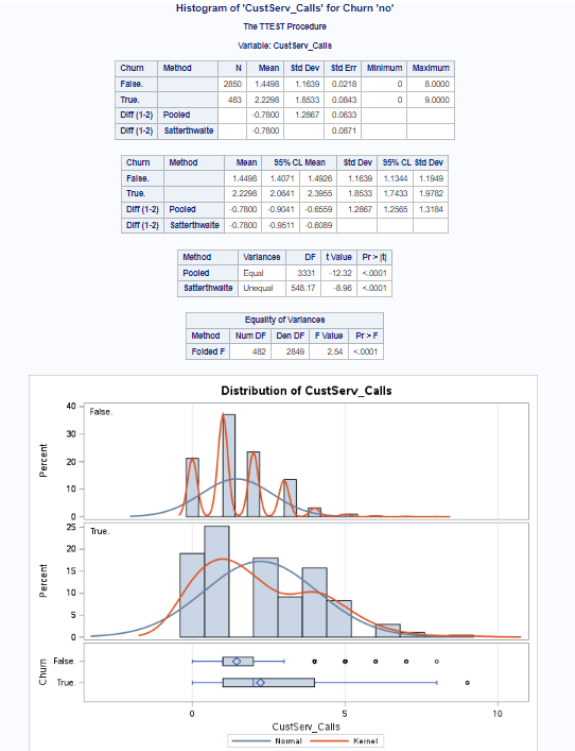
Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	482	2849	1.19	0.0111



Jivko Jeff Uzoff

CustServ_Calls and Churn

- Significant Association: The p-value (< 0.0001) suggests a strong association between customer service calls and churn. Clients who churned made significantly more customer service calls (mean = 2.2298) than those who did not churn (mean = 1.4498). This highlights that frequent interactions with customer service are a strong indicator of potential churn.



Histogram of 'CustServ_Calls' for Churn 'no'

The TTEST Procedure

Variable: CustServ_Calls

Churn	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
False.		2850	1.4498	1.1639	0.0218	0	8.0000
True.		483	2.2298	1.8533	0.0843	0	9.0000
Diff (1-2)	Pooled		-0.7800	1.2867	0.0633		
Diff (1-2)	Satterthwaite		-0.7800		0.0671		

Churn	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
False.		1.4498	1.4071	1.4926	1.1639	1.1344	1.1949
True.		2.2298	2.0841	2.3955	1.8533	1.7433	1.9782
Diff (1-2)	Pooled	-0.7800	-0.9041	-0.6559	1.2867	1.2565	1.3184
Diff (1-2)	Satterthwaite	-0.7800	-0.9511	-0.6089			

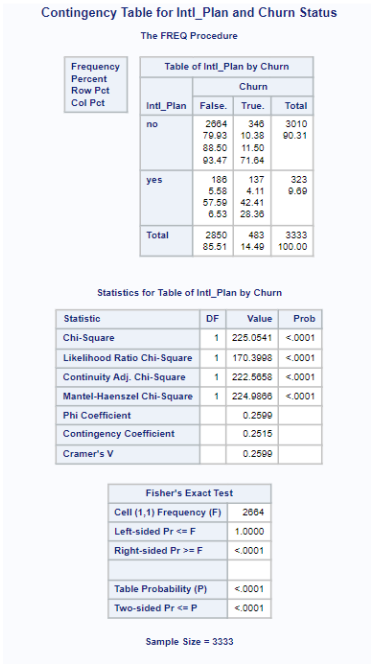
Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	3331	-12.32	<.0001
Satterthwaite	Unequal	548.17	-8.96	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	482	2849	2.54	<.0001

Intl_Plan and Churn

- Moderate Association: The p-value (< 0.0001) and Cramer's V (0.2599) indicate a moderate association between having an international plan and customer churn. Clients with an international plan have a higher churn rate, with 137 out of 323 clients with the plan churning, compared to a lower churn rate for those without an international plan (346 out of 3010). This suggests that having an international plan is moderately associated with a higher likelihood of churn.

Jivko Jeff Uzoff



Contingency Table for Intl_Plan and Churn Status

The FREQ Procedure

Frequency Percent Row Pct Col Pct	Table of Intl_Plan by Churn		
	Churn		
Intl_Plan	False.	True.	Total
no	2664 79.93 88.50 93.47	346 10.38 11.50 71.64	3010 90.31
yes	186 5.58 57.59 6.53	137 4.11 42.41 28.36	323 9.69
Total	2850 85.51	483 14.49	3333 100.00

Statistics for Table of Intl_Plan by Churn

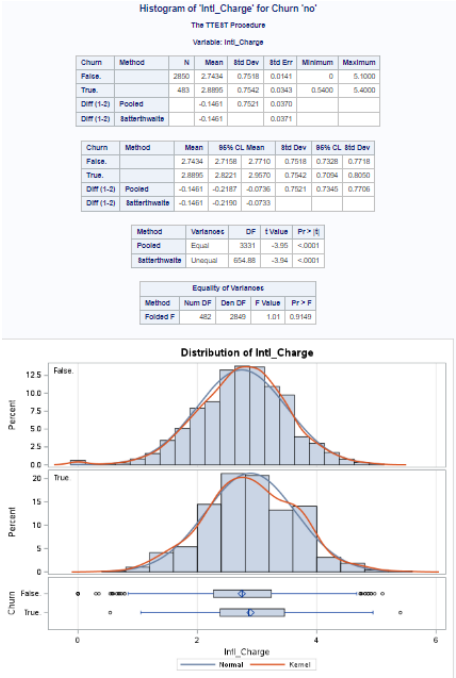
Statistic	DF	Value	Prob
Chi-Square	1	225.0541	<.0001
Likelihood Ratio Chi-Square	1	170.3998	<.0001
Continuity Adj. Chi-Square	1	222.5658	<.0001
Mantel-Haenszel Chi-Square	1	224.9866	<.0001
Phi Coefficient		0.2599	
Contingency Coefficient		0.2515	
Cramer's V		0.2599	

Fisher's Exact Test	
Cell (1,1) Frequency (F)	2664
Left-sided Pr <= F	1.0000
Right-sided Pr >= F	<.0001
Table Probability (P)	<.0001
Two-sided Pr <= P	<.0001

Sample Size = 3333

Intl_Charge and Churn

- Significant Association: The p-value (0.0001) indicates a significant difference in international charges between churned and non-churned clients. Clients who churned had slightly higher mean international charges (2.8895) compared to non-churned clients (2.7434), suggesting that higher international charges could be a contributing factor to churn.



Histogram of 'Intl_Charge' for Churn 'no'

The TTEST Procedure

Variable: Intl_Charge

Churn	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
False.		2850	2.7434	0.7518	0.0141	0	5.1000
True.		483	2.8895	0.7542	0.0343	0.5400	5.4000
Diff (1-2)	Pooled		-0.1461	0.7521	0.0370		
Diff (1-2)	Satterthwaite		-0.1461		0.0371		

Churn	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
False.		2.7434	2.7158	2.7710	0.7518	0.7328	0.7718
True.		2.8895	2.8221	2.9570	0.7542	0.7094	0.8050
Diff (1-2)	Pooled	-0.1461	-0.2187	-0.0736	0.7521	0.7345	0.7706
Diff (1-2)	Satterthwaite	-0.1461	-0.2190	-0.0733			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	3331	-3.95	<.0001
Satterthwaite	Unequal	654.88	-3.94	<.0001

Equality of Variances

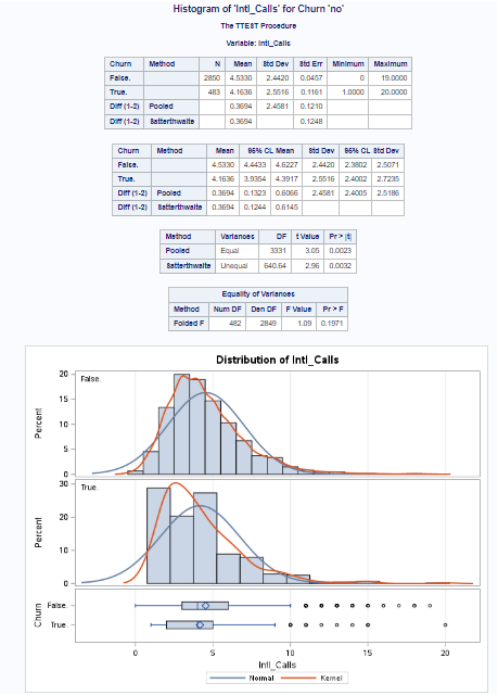
Method	Num DF	Den DF	F Value	Pr > F
Folded F	482	2849	1.01	0.9149

Distribution of Intl_Charge

Jivko Jeff Uzoff

Intl_Calls and Churn

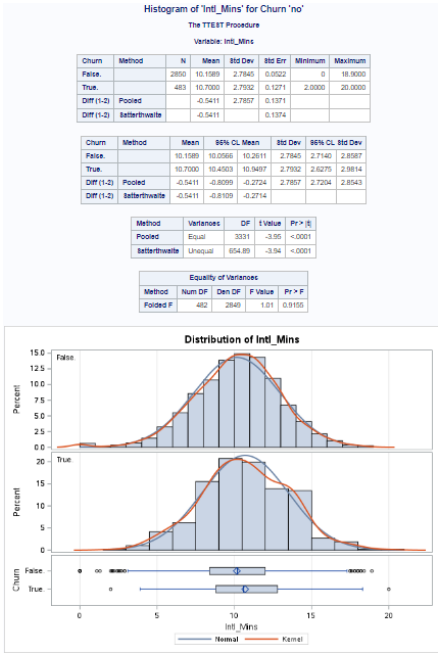
- Significant Association: The p-values (0.0023 and 0.0032) indicate a significant difference in the number of international calls between churned and non-churned clients. However, non-churned clients made slightly more international calls on average (0.3694 calls higher). While the difference is statistically significant, its small magnitude suggests that Intl_Calls might not be a strong standalone predictor of churn.



Intl_Mins and Churn

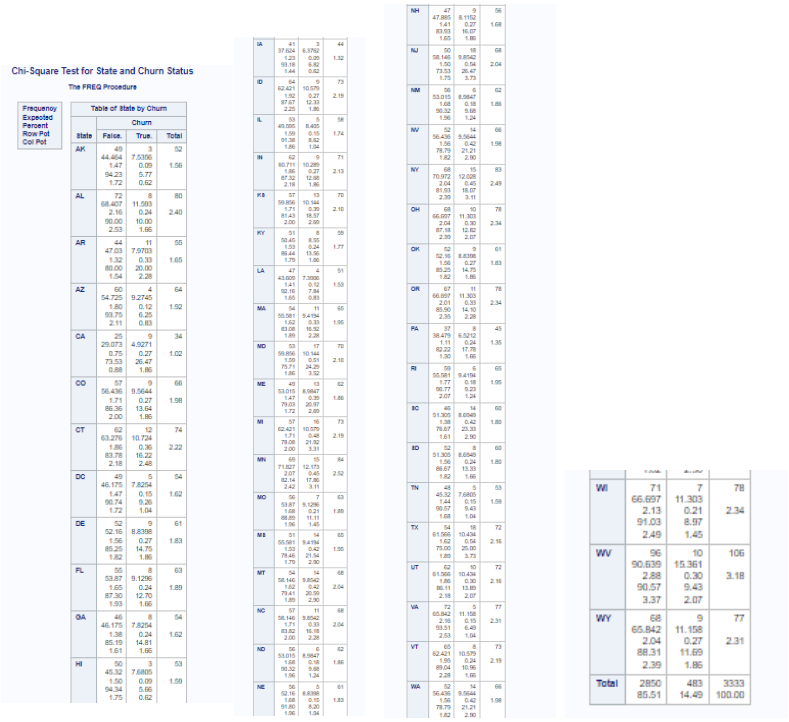
- Significant Association: The p-value (0.0001) indicates a significant difference in international minutes between churned and non-churned clients. Clients who churned had a slightly higher mean number of international minutes (10.70) compared to those who did not churn (10.16). While the difference is significant, it may be only one of several factors contributing to churn.

Jivko Jeff Uzoff



State and Churn

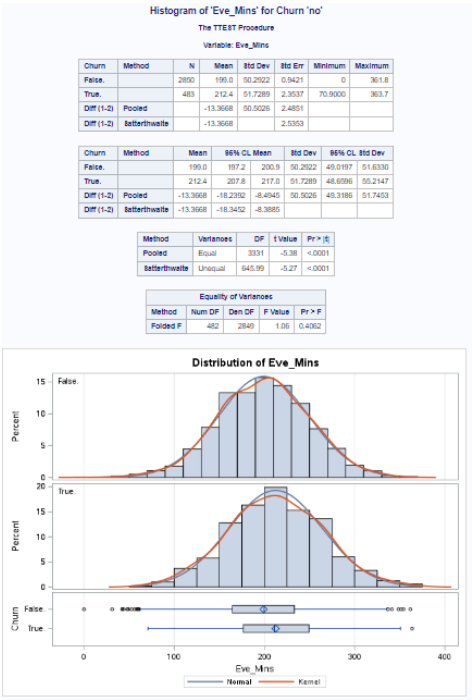
- Weak to Moderate Association: The p-value (0.0023) and Cramer's V (0.1578) indicate a moderate association between the client's state and churn status. States like West Virginia (14.49%) and Mississippi (21.54%) show higher churn rates, whereas states like North Dakota (9.68%) and Nebraska (8.20%) have lower churn rates. While state is associated with churn, the strength of this relationship is limited.



Jivko Jeff Uzoff

Eve_Mins and Churn

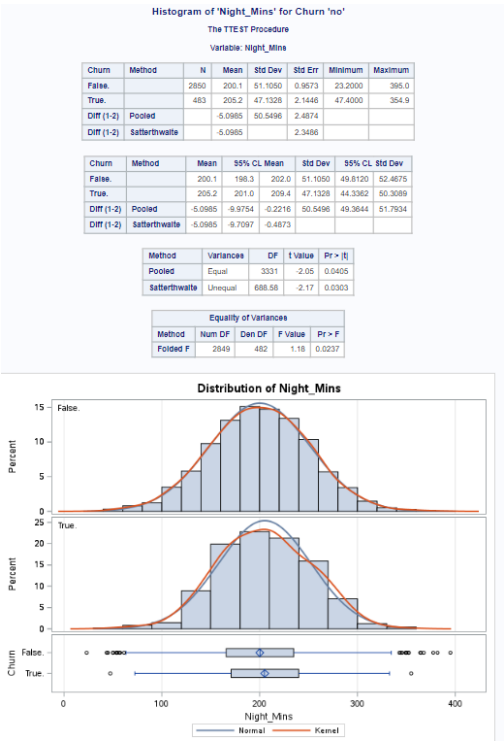
- Significant Association: The p-value (< 0.0001) indicates a significant difference in the number of evening minutes between churned and non-churned clients. Clients who churned had more evening minutes (212.4) compared to non-churned clients (199.0). This suggests that higher evening usage may be linked to a higher likelihood of churn, making Eve_Mins a potential predictor of churn.



Night_Mins and Churn

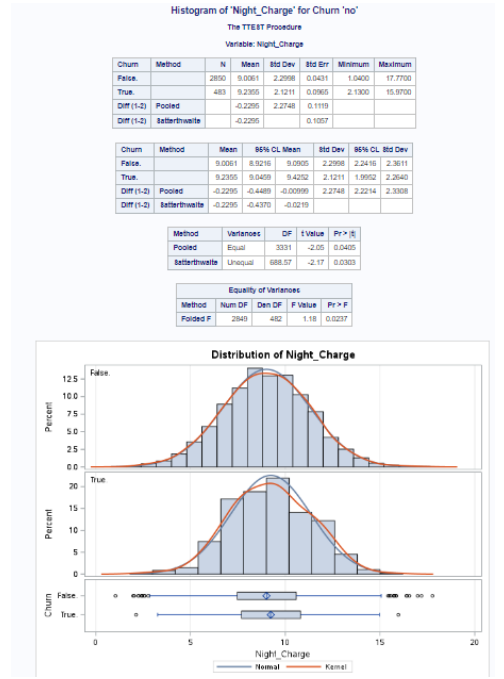
- Significant Association: The p-values (0.0405 and 0.0303) indicate a significant difference in the number of night minutes between churned and non-churned clients. Churned clients had slightly more night minutes (205.2) than non-churned clients (200.1). Although the difference is statistically significant, the small magnitude may limit its practical importance as a predictor of churn.

Jivko Jeff Uzoff



Night_Charge and Churn

- Significant Association: The p-values (0.0405 and 0.0303) indicate a significant difference in night charges between churned and non-churned clients. Clients who churned had slightly higher night charges (9.24) compared to those who did not churn (9.01). While the difference is statistically significant, its small size suggests that Night_Charge may have limited practical significance as a predictor of churn.



Jivko Jeff Uzoff

Recommendations

1. Leverage Day_Mins Usage:

- Recommendation: Identify clients with high daytime usage (Day_Mins) as a priority for retention strategies. Since clients with higher daytime minutes are more likely to churn, targeting this group with special offers or loyalty rewards could help reduce churn. Consider offering personalized plans that cater to high daytime usage needs, ensuring these customers feel valued and satisfied with their service.

2. Deprioritize Day_Calls as a Churn Indicator:

- Recommendation: Given that the number of daytime calls (Day_Calls) does not significantly impact churn, it may not be worthwhile to focus retention efforts on this factor. Instead, direct resources towards attributes that show a stronger correlation with churn, such as Day_Mins or CustServ_Calls.

3. Focus on Customer Service Interactions (CustServ_Calls):

- Recommendation: Pay close attention to clients who frequently contact customer service (CustServ_Calls), as this group shows a strong likelihood of churning. Implement proactive retention strategies, such as offering personalized resolutions, enhanced support, and follow-up communications after each service interaction to address concerns and improve customer satisfaction.

4. Segment Clients with International Plans (Intl_Plan):

- Recommendation: Clients with international plans (Intl_Plan) are moderately more likely to churn. Segment this group for tailored retention efforts, such as offering exclusive international plan benefits, discounts, or add-ons to increase satisfaction and reduce the likelihood of churn. Additionally, ensure that the international plan meets their specific needs by regularly updating and communicating new plan options.

5. Monitor International Charges (Intl_Charge):

- Recommendation: Clients with higher international charges (Intl_Charge) are more likely to churn. Monitor international usage closely and consider offering targeted discounts, bundle offers, or loyalty perks for high international users to reduce their likelihood of leaving. Clear communication about international charge policies can also enhance transparency and customer trust.

6. Limit Focus on International Calls (Intl_Calls):

- Recommendation: While the difference in the number of international calls (Intl_Calls) between churned and non-churned clients is significant, its small magnitude suggests it may not be a strong standalone predictor. However, you can incorporate international call patterns into a broader churn prediction model, combining it with attributes such as Intl_Charge or Intl_Mins. This approach can provide a more comprehensive view of international activity and its impact on churn.

7. Track High International Minutes Usage (Intl_Mins):

- Recommendation: Clients with higher international minutes (Intl_Mins) are more likely to churn, though the effect may be modest. Consider offering specialized retention plans for high international minute users, such as discounted international minute packages or personalized offers to keep these clients engaged.

8. Tailor Strategies Based on State Demographics (State):

- Recommendation: Customize churn reduction strategies based on state demographics, especially in states with higher churn rates, like Mississippi and West Virginia. Consider region-specific marketing campaigns or support programs that address the unique needs and preferences of clients in these states. For states with lower churn rates, such as North Dakota and Nebraska, focus on maintaining customer satisfaction to prevent churn.

9. Target Clients with High Evening Minutes Usage (Eve_Mins):

- Recommendation: Clients with higher evening minutes (Eve_Mins) are more likely to churn, making them a key segment for retention efforts. Tailor retention campaigns to this group by offering special evening-time packages, loyalty rewards, or usage-based promotions to encourage them to stay with the service.

10. Limit Focus on Night Minutes (Night_Mins):

- Recommendation: Although the difference in night minutes (Night_Mins) usage between churned and non-churned clients is significant, the small magnitude limits its impact as a primary churn predictor. However, it should not be disregarded entirely. Night minutes usage can be included in retention strategies that focus on identifying and supporting high-usage clients across different time periods (e.g., day, evening, and night), ensuring they receive personalized offers or usage-based rewards.

11. Limit Focus on Night Charges (Night_Charge):

- Recommendation: While there is a significant difference in night charges (Night_Charge) between churned and non-churned clients, the small size of this difference suggests that it may not be a major factor in churn decisions. Instead, night charges can be used as a secondary metric in conjunction with more impactful predictors, such as Day_Mins or Eve_Mins. Retention efforts should prioritize these stronger attributes while keeping night charges in mind as a supplementary factor.

By implementing these recommendations, the company can enhance its retention strategies, better identify at-risk clients, and ultimately reduce churn rates, leading to improved customer loyalty and long-term revenue stability.