**REPORT ON TELECOMMUNICATION CHURN**

Problem Statement: Your goal is to create an end-to-end machine learning solution for predicting customer churn in the telecom industry. This assignment encompasses data engineering, data analysis, and model training. Successful completion of this task will not only demonstrate your technical abilities but also your problem-solving skills and potential to lead the tech team as the VP.

Accomplished Tasks:

1. Data Collection: acquired data from Kaggle (telecom churn)
2. Data Preprocessing and Engineering: Did feature scaling and label encoding
3. Data Analysis: Visualized many categorical values and performed EDA.
4. Model Development: Developed various models logistic regression, decision trees, random forests, or gradient boosting.
5. Model Evaluation: Evaluated my model using evaluation metrics and performed hyperparameter tuning to optimize model performance.
6. Interpretation and Recommendations:

The logistic regression model with SMOTE has an accuracy of 0.5140123873183295. This means that the model correctly predicts whether a customer will churn 51.4% of the time.

Interpretation of Logistic Regression Model Findings:

**Accuracy:** The logistic regression model with SMOTE achieves an accuracy of approximately 51.4%. This accuracy indicates the proportion of correctly predicted outcomes (churn or not churn). While accuracy is a useful metric, it's essential to consider other metrics, especially in cases of class imbalance.

**Feature Importance:** Logistic regression provides coefficients for each feature, indicating their impact on the likelihood of churn. Positive coefficients increase the likelihood of churn, while negative coefficients decrease it.

**Significant Features:** Identify the features with the most significant coefficients (both positive and negative) as they have the most influence on predicting churn.

Important Features for Predicting Churn:

Based on the logistic regression model, the most important features for predicting churn are:

1. Total Charges: This feature appears to be significant, as it has a relatively large coefficient. A higher value of Total Charges may increase the likelihood of churn.
2. Estimated Salary: The coefficient for estimated\_salary is also notable. Customers with higher estimated salaries may be less likely to churn.
3. Data Used: Data\_used plays a role in predicting churn. Higher data usage may correlate with a higher likelihood of churn.
4. Calls Made: The number of calls made also affects churn prediction. More calls made may indicate a higher likelihood of churn.
5. Age: Age can be a significant factor. Younger customers may have a different likelihood of churn compared to older customers.

Actionable Recommendations to Reduce Churn:

Based on the analysis and model findings, here are actionable recommendations for the company to reduce churn:

1. Customer Segmentation: Segment customers based on their TotalCharges, age, and estimated salary. Target marketing efforts and retention strategies differently for each segment.
2. Personalized Offers: Offer personalized discounts, packages, or incentives to customers with higher estimated salaries to encourage them to stay.
3. Improve Data Plans: Consider offering competitive and attractive data plans to retain customers who heavily rely on data usage.
4. Customer Support: Enhance customer support services, especially for customers who make a significant number of calls. Address their concerns and issues promptly.
5. Customer Engagement: Implement strategies to engage with younger customers effectively. This could include tailored promotions or services that cater to their preferences.
6. Feedback and Surveys: Regularly collect feedback and conduct customer satisfaction surveys to understand their needs and concerns. Use this feedback to make improvements.
7. Churn Prediction Alerts: Implement a system that identifies customers at high risk of churning and proactively reaches out to them with retention offers.
8. Competitor Analysis: Continuously monitor the offerings and promotions of competitors. Adjust your own offerings to remain competitive in the market.
9. Loyalty Programs: Develop and promote customer loyalty programs that reward long-term customers and encourage them to stay.

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