SIM DEACTIVATION PREDICTION

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Introduction to SIM Deactivation Prediction

The prediction of SIM deactivation holds immense importance in the modern telecommunications er retention is paramount. By accurately forecasting potential deactivations based on various indicators, companies can intervene with tailored marketing strategies and service improvements. This slide delves into the significance of being proactive rather than reactive in customer relationship management, ensuring service providers remain competitive and responsive to market dynamics.

Understanding SIM Deactivation

Diving Deeper into the Key Concepts

•**Definition of SIM Deactivation:** SIM deactivation refers to the process by which a user's mobile SIM card is rendered inactive, typically loss of service. This can occur voluntarily by the user or involuntarily due to external factors. resulting in the

•**Causes of Deactivation:** Several factors contribute to SIM deactivation, including dissatisfaction with service, financial constraints, changes in user behavior, and aggressive competitors. Identifying these triggers is essential for predictive modeling.

•**Impact on Stakeholders:** When a SIM is deactivated, both customers and service providers face unique challenges; customers lose access to essential services, while providers suffer revenue loss and diminished market share, highlighting the need for effective retention strategies.

Data Collection and Preprocessing

Data Collection
This is the process of gathering raw data from various sources. Common sources include:

- Databases (SQL, NoSQL)
- APIs (Twitter API, financial data APIs, etc.)

Data Preprocessing
This step involves cleaning and transforming raw data into a format suitable for analysis or model training.

- **Data Reduction**:
  - Dimensionality reduction (PCA, t-SNE)
  - Feature selection

Focus of the Framework

Included:

- Voluntary SIM deactivation by customers
- Behaviourally-driven churn
- Intentional inactivity or switching to competitors
- Dissatisfaction with service experience or perceived value

Excluded:

- SIM card damage or technical issues
- Network migration errors
- Number portability errors
- Backend system faults or provisioning failures

ML Models for Prediction

1. Linear Regression : Models the relationship between independent variables and a continuous dependent variable using a straight line.

2. Decision Trees: Splits data into branches based on feature values, leading to decisions or predictions.

3. Random Forest: Builds multiple decision trees and combines their predictions (ensemble method).

4. Support Vector Machine (SVM) : Finds the best hyperplane that separates classes with the maximum margin.

Model Evaluation and Performance Metrics

Because **SIM deactivation is often imbalanced** (fewer deactivations than active users), relying only on accuracy is misleading. You need more **targeted metrics**.

1. **Accuracy:**
   Good for balanced classes, but not reliable if most users stay active.
2. **Precision:**
   Important if you want to avoid flagging active users incorrectly as deactivating.
3. **Recall :**
   Important if missing a deactivating user is costly (e.g., churn reduction efforts)
4. **score:**
   Harmonic mean of precision and recall. Best when there's a class imbalance.

Model Interpretation and Feature Importance

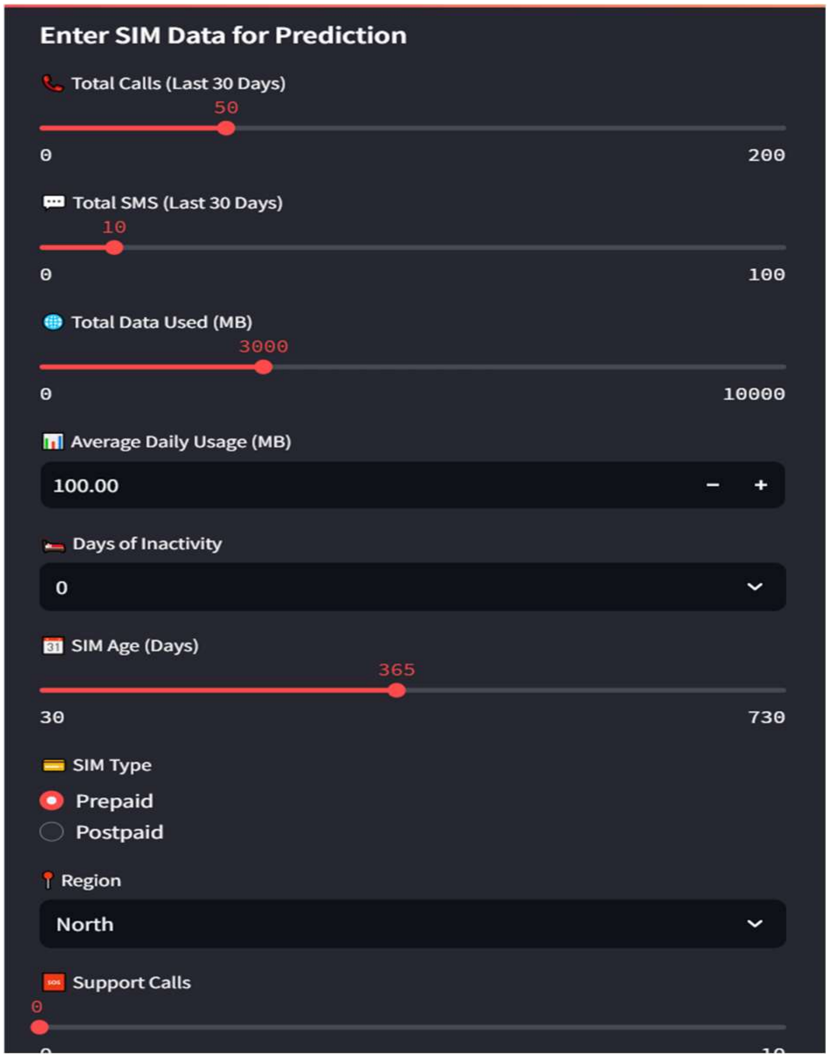
In predictive modelling for SIM deactivation, interpretability is critical for both technical validation and business adoption. Understanding *why* a model makes certain predictions ensures transparency, builds stakeholder trust, and supports informed, actionable decisions.

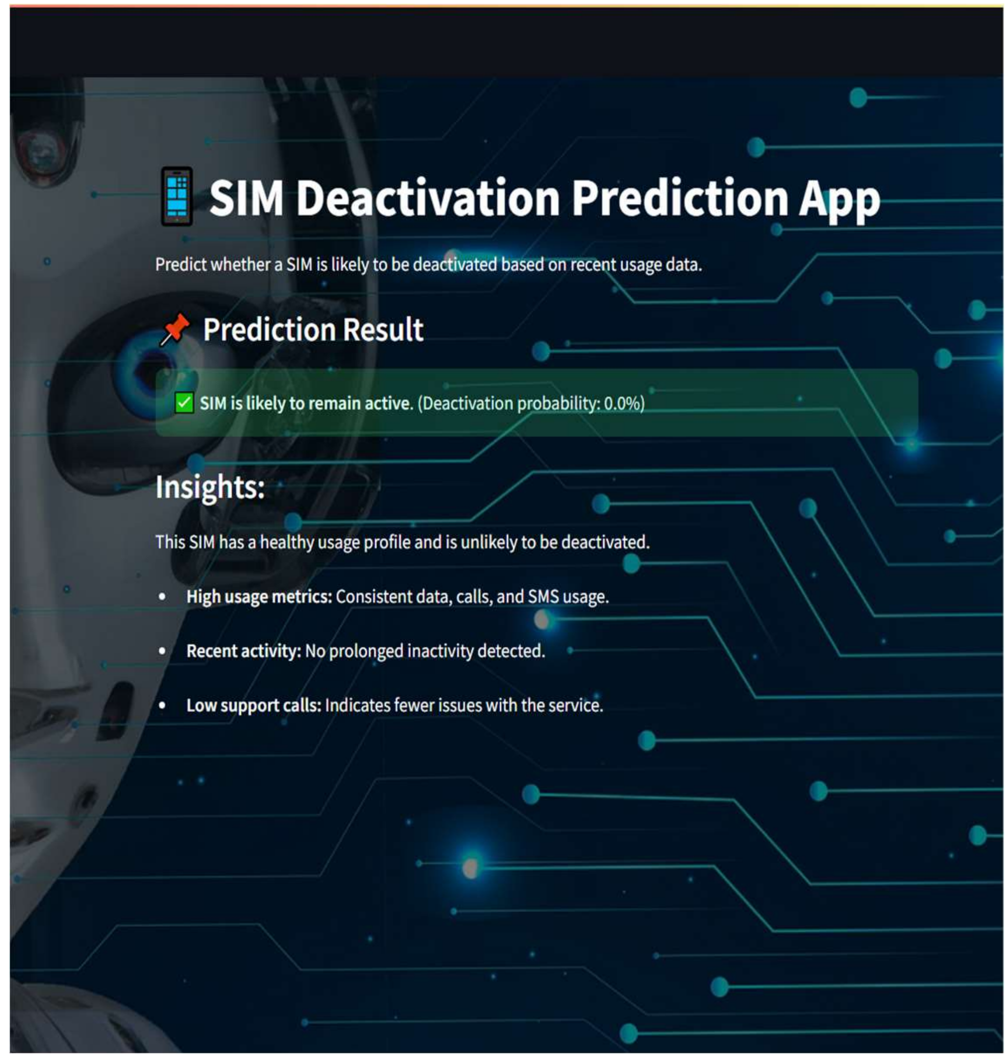
Post-training, models are interpreted to understand key predictors of SIM deactivation. Tools used include:

- Feature Importance Scores (for Random Forest and XGBoost)
- Confusion Matrix Analysis to understand misclassification trends

Example Feature Importance Output

Rank	Feature	Type	Importance Score
1	Days since last recharge	Behaviour	0.24
2	Drop in data usage (last 2 weeks)	Behaviour	0.19
3	No outgoing calls (last 7 days)	Usage	0.16
4	Plan not renewed	Subscription	0.12
5	Customer complaints filed	Support	0.09


Enter SIM Data for Prediction
Total Calls (Last 30 Days)
50
0
200
Total SMS (Last 30 Days)
10
0
100
Total Data Used (MB)
3000
0
10000
Average Daily Usage (MB)
100.00
Days of Inactivity
0
SIM Age (Days)
365
30
730
SIM Type
Prepaid
Postpaid
Region
North
Support Calls
0


SIM Deactivation Prediction App
Predict whether a SIM is likely to be deactivated based on recent usage data.
Prediction Result
SIM is likely to remain active. (Deactivation probability: 0.0%)
Insights:
This SIM has a healthy usage profile and is unlikely to be deactivated.
High usage metrics: Consistent data, calls, and SMS usage.
Recent activity: No prolonged inactivity detected.
Low support calls: Indicates fewer issues with the service.

Insights from Feature Importance

Using models like Random Forest and XGBoost, feature importance was calculated to identify which customer behaviours contribute most to SIM deactivation. Top features typically included:

- Recharge frequency
- Last recharge date
- Call and data usage
- Customer tenure
- Inactive days before churn

These findings are consistent with business intuition: users who stop recharging or reduce usage activity are at higher risk of deactivation.

Conclusion

The prediction of SIM deactivation presents a valuable opportunity for telecom operators to proactively manage customer churn, optimize resource allocation, and enhance customer retention strategies. By leveraging historical usage data, customer behaviour patterns, and machine learning models, we can identify high-risk SIMs before they are deactivated.

Our findings indicate that key factors influencing SIM deactivation include prolonged inactivity, declining usage patterns, reduced recharge frequency, and changes in location behavior. Models such as Random Forest, XGBoost, and Logistic Regression showed promising accuracy in predicting deactivation risks, with XGBoost providing the highest overall performance.


THANK
YOU