

# Customer Churn Prediction



## INTRODUCTION:

Customer Churn prediction is a dynamic field that combines data analytics and machine learning to help businesses reduce customer attrition

It empowers companies to take data driven actions ,ultimately fostering stronger customer relationships and sustained profitability

Customer churn could happen for many different reasons,and churn analysis help to identify the right one ,opening up opportunities to implement effective retention strategies

Customer churn examples:

- Subscription cancellation

- Suspending account

- Decreased activity for some time

- Non-renewal of a contract or service agreement

- Provider switch

Advanced machine learning techniques commonly used for customer churn prediction using data analytics

### 1.Ensemble learning:

Random forest model: Random forest models combine multiple decision trees to reduce overfitting and increase prediction accuracy

Gradient boosting: Algorithms like XGboost,Light bgm,and catboost use gradient boosting to build powerful predictive models

### 2.Feature engineering:

Create new features that capture customer behavior,such as customer lifetime value,recency,frequency,and monetary value(RFM analysis)

### 3.Anomaly detection

Identifying unusual customer behavior using techniques like isolation forests or one class SVMs

#### 4. Time-series analysis:

Analyzing historical customer data as a time series to detect temporal patterns in churn

#### 5. Hyperparameter optimization

Using techniques like Bayesian optimization or grid search to find the best parameters for your models

#### 6. Transfer learning:

Leveraging pre-trained models on related tasks, such as recommendation systems or customer segmentations, to enhance churn prediction

#### 7. Model evaluation:

Using advanced metrics like AUC-ROC, AUC-PR, or F1-score to assess model performance, especially when dealing with imbalanced datasets

#### 8. Imbalanced data handling:

Techniques like oversampling, undersampling, or synthetic data generation to address class imbalance issues in churn prediction

#### 9. AutoML:

Automated machine learning platforms can help automate the model selection and hyperparameter tuning process, making it easier to find the best model for the specific churn prediction problem

#### 10. Recurrent neural networks (RNNs):

RNNs are used for sequence modeling, making them suitable for churn prediction when dealing with time-series data

#### 11. Data preprocessing:

Data preprocessing involves cleaning and transforming data to make it suitable for analysis and this includes handling missing values, outliers, and feature engineering

#### 12. Feature selection:

Identifying the most relevant features is essential for accurate churn



prediction and common features include customer lifetime value, usage patterns, and customer support interactions

Content of project:

Churn prediction relies on data from various sources, including senior citizen,

gender, tech support, phone service, multiple lines, internet service and customer feedback

Data source

Dataset link: <https://www.kaggle.com/datasets/blastchar/telco-customer-churn>

A	B	C	D	E	F	G
customerID	gender	SeniorCitizen	Partner	Dependent	tenure	PhoneService
7590-VHV	Female	0	Yes	No	1	No
5575-GNV	Male	0	No	No	34	Yes
3668-QPY	Male	0	No	No	2	Yes
7795-CFO	Male	0	No	No	45	No
9237-HQI	Female	0	No	No	2	Yes
9305-CDS	Female	0	No	No	8	Yes
1452-KIO	Male	0	No	Yes	22	Yes
6713-OKO	Female	0	No	No	10	No

Conclusion and Future work (Phase 2):

Project conclusion:

In phase 2 conclusion, the project on customer churn prediction using advanced machine learning techniques has yielded significant insights and practical outcomes

Future work include incorporating these future work considerations will help maintain the effectiveness and relevance of your customer churn prediction system,ensuring its continued contribution to the success of your businesses