IBM- NAAN MUDHALVAN

**DAC\_Phase 5**

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Register Number: 210821243061 College: Kings Engineering College Domain: Data Analytics with cognos Project: Customer Churn Prediction

**Program:**

import pandas as pd

from matplotlib import pyplot as plt import numpy as np

df = pd . read\_csv(*r*"Customer Churn.csv") df.sample(5)

df.drop('customerID' , *axis*='columns' , *inplace* = True) df.dtypes

df.TotalCharges.values df.MonthlyCharges.values

pd.to\_numeric(df.TotalCharges, *errors*='coerce').isnull() df1 = df[df.TotalCharges!= ' ']

df1

df1.shape df1.dtypes

df1.TotalCharges = pd.to\_numeric(df1.TotalCharges) df1.TotalCharges.dtypes

tenure\_churn\_no = df1[df1.Churn=="No"].tenure tenure\_churn\_yes = df1[df1.Churn=="Yes"].tenure

plt.hist([tenure\_churn\_yes,tenure\_churn\_no],

*label*=["Churn=Yes","Churn=No"]) plt.legend()

*def* unique\_col\_values(*df*): for col in *df*:

if *df*[col].dtypes == 'object': print(*f*'{col}:{*df*[col].unique()}')

unique\_col\_values(df1)

df1.replace("No internet service", "No" , *inplace* =True) df1.replace("No phone service", "No" , *inplace* =True)

unique\_col\_values(df1)

yes\_no\_columns = ['Partner','Dependents', 'PhoneService','MultipleLines','OnlineSecurity', 'OnlineBackup',

'DeviceProtection', 'TechSupport', 'StreamingTV', 'StreamingMovies', 'Contract', 'PaperlessBilling','Churn']

for col in yes\_no\_columns:

df1[col] . replace({'Yes':1 , 'No':0},*inplace*=True)

for col in df1: print(*f*'{col}:{df1[col].unique()}')

df1['gender'].replace({'Female': 1 , 'Male':0},*inplace*=True) df1.gender.unique()

df2=pd.get\_dummies(*data*=df1,*columns*=["InternetService","C ontract","PaymentMethod"])

df2.columns df2.sample(4) df2.dtypes

col\_to\_scale = ['tenure', 'MonthlyCharges' , "TotalCharges"]

from sklearn . preprocessing import MinMaxScaler scaler = MinMaxScaler()

df2[col\_to\_scale] = scaler.fit\_transform(df2[col\_to\_scale])

df2.sample (4)

for col in df2: print(*f*'{col}:{df2[col].unique()}')

X= df2.drop('Churn',*axis*='columns') Y=df2['Churn']

from sklearn.model\_selection import train\_test\_split X\_train, X\_test, Y\_train, Y\_test = train\_test\_split(X,Y,*test\_size*=0.2,*random\_state*=5)

X\_train.shape X\_test.shape

X\_train[:10] len(X\_train.columns)

import tensorflow as tf

from tensorflow import keras

model = keras.Sequential([ keras.layers.Dense(20,*input\_shape*=(26,),

*activation*='relu'),

keras.layers.Dense(1, *activation*='sigmoid'),

])

model.compile(*optimizer*='adam',

*loss*='binary\_crossentropy', *metrics*=['accuracy'])

model.fit(X\_train, Y\_train, *epochs*=100)

## Project Objective, Design Thinking Process, and Development Phases:

**Objective:** The main goal of our project is to predict when customers are likely to leave our business and, more importantly, to find ways to prevent that from happening.

**Design Thinking Process:**

1. **Empathize:** To kick things off, we put ourselves in our customers' shoes, trying to understand what drives them to leave. We collected data, like customer feedback and their history with us.
2. **Define**: With this understanding, we defined our problem clearly: customer churn. We set specific goals and metrics to measure our success.
3. **Ideate:** We brainstormed various techniques and data sources that might help us predict churn effectively.
4. **Prototype:** We created a predictive model using the chosen techniques.
5. **Test:** We assessed how well our model performs using past data, so we can make improvements.
6. **Implement:** Once our model is solid, we integrate it into our business processes and gather feedback for further refinement.

## Development Phases:

**Data Collection and Preprocessing:** We gathered historical data on our customers, including things like their demographics, purchase history, how they've interacted with us, and whether they've churned. We cleaned and organize this data.

**Feature Engineering:** We pinpointed the most important features that influence churn, such as how long a customer has been with us, how often they interact with us, and their satisfaction scores.

Model Selection: Based on our needs, we'll choose a suitable technique like logistic regression, decision trees, or something more advanced like neural networks.

**Training and Validation:** We'll teach our model on part of the data and evaluate its performance using data we've kept aside. We'll fine-tune it if necessary.

**Data Visualization:** We'll use tools like IBM Cognos to create visualizations, making it easier to grasp data patterns and model results. **Deployment:** Our predictive model will be put to work, helping us predict which customers are likely to churn in real time.

**Monitoring and Continuous Improvement:** We won't stop here. We'll constantly monitor how our model performs and make adjustments as customer behavior changes.

## Analysis Objectives, Data Collection, Data Visualization, and Predictive Modeling:

**Analysis Objectives:**

* 1. **Identify Churn Factors:** We aim to find out what's causing customers to leave. Are there specific patterns or trends?
  2. **Predict Churn:** We want to build a model that can forecast which customers are likely to churn in the future.

## Data Collection Process:

* + - We'll collect data from a variety of sources, including our customer relationship management systems, sales records, customer support interactions, and feedback surveys.

## Data Visualization using IBM Cognos:

* + - We'll utilize IBM Cognos to generate interactive dashboards and reports. These visuals will help us understand customer behavior, spot trends, and highlight crucial metrics.

## Predictive Modeling:

* + - We'll choose the right algorithm (like logistic regression, random forests) and feed it historical customer data to train it.
    - The data will be split into training and testing sets to assess how well our model works.
    - We'll measure its performance using metrics such as accuracy, precision, recall, and F1-score.
    - We'll fine-tune our model and tweak its settings as needed.

## How Insights and Prediction Models Help Reduce Customer Churn: Insights and prediction models are incredibly useful for businesses looking to cut down on customer churn:

* 1. **Early Warning System:** Our model will act as an early warning system, flagging customers at risk of leaving so we can take action to retain them.
  2. **Personalized Retention Strategies:** The insights gained will help us understand why customers leave. We can then craft personalized strategies for each customer, making them more likely to stay.
  3. **Resource Allocation:** Instead of using the same approach for everyone, we can allocate resources more efficiently, focusing on those at higher risk of churning.
  4. **Product and Service Improvement:** Insights can reveal where we're falling short, allowing us to improve our offerings.
  5. **Customer Satisfaction:** By addressing customer concerns and pain points, we can increase overall satisfaction, making it less likely that they'll leave.
  6. **Revenue Growth:** Retaining more customers means increased revenue and better profitability for our business.