Title: Telecom Churn Prediction with Deep Learning: A Full-Stack Data Science Project in Action

Subtitle: Leveraging Deep Learning, TensorFlow, Keras, Flask, AWS, and PowerBI to build an end-to-end churn prediction solution for the telecom industry

Introduction

Hello, Medium community! I'm excited to introduce my latest project: a telecom churn prediction system using Deep Learning with Artificial Neural Networks (ANN) built with TensorFlow Keras. Churn prediction is the process of identifying customers who are likely to cancel their subscription or cease using a service. Accurate churn prediction allows businesses to proactively address customer concerns and improve retention strategies, which ultimately leads to increased customer satisfaction and loyalty. In this full-stack data science project, I will showcase the power of deep learning in predicting customer churn in the telecom industry and demonstrate how various technologies can come together to create an end-to-end solution. In this blog post, I will walk you through the different stages of the project, from Exploratory Data Analysis (EDA) to deploying the web application on AWS Elastic Beanstalk.

Exploratory Data Analysis and Data Preprocessing

The first step in this project was to explore the Telecom Churn dataset from Kaggle and preprocess it for the ANN model. I began by conducting a thorough EDA to identify trends, patterns, and potential issues in the data. This process involved data cleaning, handling missing values, and visualizing the data using various plots.

Once the EDA was complete, I preprocessed the data by applying feature scaling techniques such as Min-Max scaling and Standard Scaling. This step ensures that the ANN model can effectively learn from the data without being affected by different feature scales.

Building the Deep Learning ANN Model with TensorFlow Keras

With the data preprocessed, I moved on to designing and training the deep learning ANN model using TensorFlow Keras. I experimented with different architectures, activation functions, and optimization algorithms to find the best performing model for telecom churn prediction. After tuning the hyperparameters and training the model, I evaluated its performance using standard metrics such as accuracy, precision, recall, and F1-score.

Creating a Flask API for the Frontend Application

To make the churn prediction model accessible and user-friendly, I developed a web application using Flask. This application allows users to input raw data and receive a churn prediction (yes or no) based on the trained ANN model. I created a Flask API to serve as the bridge between the frontend and the backend, processing user input and returning predictions.

Deploying the Application on AWS Elastic Beanstalk and AWS RDS Integration

To make the application accessible to users, I deployed it on AWS Elastic Beanstalk, a platform-as-a-service (PaaS) that automates the deployment and management of web applications. Additionally, I integrated the application with AWS RDS (PostgreSQL) to retrieve the dataset for preprocessing user inputs. This integration ensures that the ANN model receives properly scaled inputs for accurate predictions.

PowerBI Dashboard for Data Insights

Lastly, I connected the AWS RDS with PowerBI to create a dashboard that displays insights from the Telecom Churn dataset. Using the probability scores generated by the ANN model, the dashboard provides valuable information on customer churn patterns and trends in the telecom industry. This data visualization tool empowers decision-makers with actionable insights to improve customer retention strategies.

Conclusion

This project demonstrates the power of combining various technologies to build an end-to-end data science solution for the telecom industry. From deep learning with TensorFlow Keras and Flask to AWS and PowerBI, each technology played a crucial role in creating an effective and user-friendly churn prediction system. I hope this blog post inspires you to explore the potential of full-stack data science projects and encourages you to create your own innovative solutions in the telecom sector and beyond.