**Customer Churn Deep Learning Model**

**1. Overview:**

Introduction: This deep learning model aims to forecast customer churn within a telecom company.

Significance: Predicting churn helps in proactive customer retention strategies and business planning.

**2. Goal & Objectives:**

Aim: Forecast customer churn based on telecom customer data.

Objective: Develop a reliable model that assists in identifying customers likely to churn.

**3. Data:**

Training Set: Comprised of 4250 entries and 19 features, including the 'churn' target variable.

Test Set: Consists of 750 entries lacking the 'churn' target variable for predictive purposes.

**4. Data Preprocessing:**

Cleaning: Removed redundant columns to enhance model efficiency.

Encoding: Employed one-hot encoding for categorical variables.

Exploratory Data Analysis (EDA): Utilized pandas profiling report and heatmap for identifying highly correlated features, enhancing feature selection, and understanding data patterns.

**5. Model Architecture:**

LSTM Model: Incorporated within a class structure, encompassing functions for various operations:

Data Preprocessing: Includes scaling, normalization, reshaping, etc.

Training: Training and validation split functions, learning rate reduction, and early stopping.

**6. Training Process:**

Executed the model to train on the prepared dataset.

Validation: Validated against test data, obtaining predictive outcomes.

**7. User Interaction:**

User Input: Allows for user-driven test case scenarios to predict churn likelihood.

Prediction: Enables user interaction for predictions based on input data.

Evaluation: Engages users with model performance metrics.

**8. Evaluation Metrics:**

Classification Report: Exhibited accuracy at 94% for model predictions.

ROC Curve: Plotted the curve with an area under the curve (AUC) at 92% for model evaluation.

**9. Results:**

Model Persistence: Saved the trained model for future usage or deployment in real-world scenarios.

**10. Usage & Deployment:**

Application: Ready for implementation in predicting customer churn, showcasing functionalities and performance metrics.