

**provide a readme file for the chustomer churn model we created**

Here is a sample README file for the customer churn prediction model you created:

# Customer Churn Prediction Model  
  
## Overview  
This project builds a machine learning model to predict customer churn — identifying customers likely to stop using a service. Early identification helps businesses improve retention strategies and reduce revenue loss.  
  
## Data  
The dataset contains customer information such as demographics, account details, and service usage. Important columns include:  
- Customer demographics (Age, Gender, Geography)  
- Account info (Tenure, Balance, Number of products)  
- Activity indicators (Credit card, Active membership)  
- Target: `Exited` (1 if customer churned, 0 otherwise)  
  
## Features and Preprocessing  
- Handled missing values and encoded categorical features.  
- Scaled numerical features using standardization.  
- Built a preprocessing pipeline to ensure consistent feature transformation for training and new data.  
  
## Models Compared  
- Dummy Classifier: Baseline model making trivial predictions.  
- Logistic Regression: Linear model to estimate churn probability.  
- Random Forest: Ensemble model capturing nonlinear feature interactions.  
  
## Model Training and Evaluation  
- Data split into training and test sets.  
- Models trained on training data.  
- Performance evaluated on test data using metrics:  
 - Precision-Recall AUC (PR-AUC)  
 - ROC AUC  
 - F1 score (optimized by threshold tuning)  
   
## Threshold Tuning  
- Search for best probability cutoff that maximizes F1 score for Logistic Regression.  
- Enables better balance between precision and recall in predictions.  
  
## Results  
- Random Forest achieved the best PR-AUC and ROC-AUC.  
- Final model saved using `joblib` for future deployment.  
  
## Usage  
- Load the saved model pipeline.  
- Prepare new data with the same features.  
- Use `predict()` or `predict\_proba()` to generate churn predictions.  
   
## Dependencies  
- Python 3.x  
- scikit-learn  
- pandas  
- numpy  
- joblib  
  
## How to Run  
1. Train model: Run `train.py` to fit models and save the best one.  
2. Predict churn: Use `predict.py` with new customer data.  
3. Evaluate performance with provided scripts/notebooks.  
  
## Contact  
For questions or collaboration, reach out at [email@example.com].  
  
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This README covers project objectives, data, modeling steps, evaluation, and usage to guide users and maintainers.

This summary provides clear documentation to explain and use your churn prediction model effectively. It can be extended with code references or more detailed instructions if needed.

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1. <https://stripe.com/resources/more/how-to-build-a-customer-churn-model-a-guide-for-businesses>

1. <https://learn.microsoft.com/en-us/fabric/data-science/customer-churn>

1. <https://huggingface.co/AnilKumarK2004/bank-customer-churn-prediction-gbclassifier/blob/main/README.md>

1. <https://www.cloudera.com/content/dam/www/marketing/resources/ebooks/accelerating-customer-churn-prediction.pdf?daqp=true>

1. <https://www.scribd.com/document/478652014/churn-README-txt>

1. <https://www.reddit.com/r/learnmachinelearning/comments/ucwt5v/p_customer_churn_machine_learning_project/>

1. <https://www.docker.com/blog/how-to-develop-and-deploy-a-customer-churn-prediction-model-using-python-streamlit-and-docker/>

1. <https://www.kaggle.com/code/bhartiprasad17/customer-churn-prediction>