Configuration Manual

MSc Research Project
MSCFTD1- Master of Science in Fintech (Financial Technology)

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MSc Project Submission Sheet

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Programme: ……MSCFTD1……**Year:** ……2024/2025..

Module: ……..……

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Submission Due Date: ……11TH August 2025……..……

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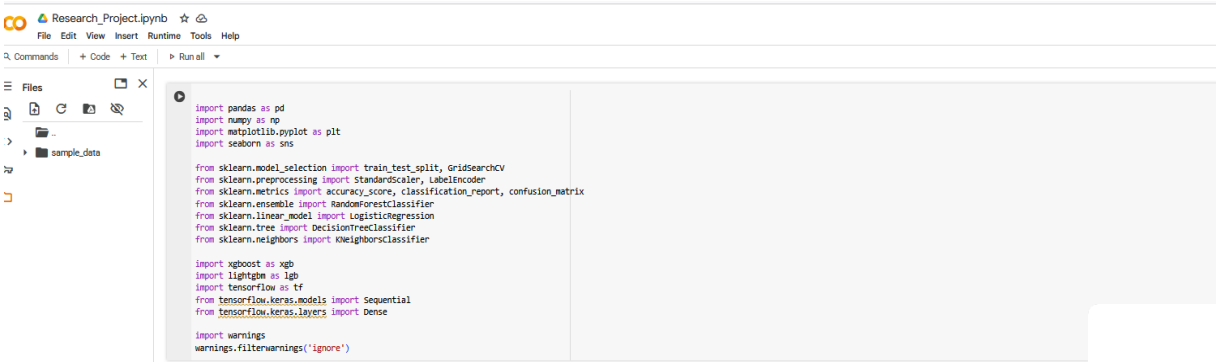
This manual provides step-by-step guidance for configuring and running the Credit Risk Default Prediction project based on the Jupyter Notebook artifact attached to the project. The project uses Python programming Language for data preprocessing, feature engineering, modeling, and evaluation of machine learning techniques for loan default prediction. It is designed to run in environments like Google Colab or a local setup. Configuration focuses on environment setup, dependency installation, dataset preparation, and model engineering.

Setup

The project can run in Google Colab (cloud-based, no local install needed) or locally via Jupyter Notebook.
Google Colab Setup

1. Open a web browser and navigate to colab.research.google.com.
2. Upload the ipynb file or open it from GitHub/Drive.
3. Install dependencies in the first cell (such as the libraries needed for the code)
4. Mount Google Drive for persistent storage: Add a cell with google. colab import drive; drive. Mount('/content/drive').



Dataset Preparation

Download the dataset: collect the dataset Loan_Default_Dataset.csv (source from Kaggle). Place it in the working directory in Colab.
Load the dataset: In the notebook, update the path in df = pd.read_csv('/content/Loan_Default_Dataset.csv') if needed.
Verify: Run df.head() to inspect the first 5 rows, ensuring 34 columns (e.g., ID, year, loan_limit, ..., Status, dtir1) and no immediate errors.

Model Configuration
The notebook trains eight models namely KNN, LightGBM, DNN, ANN, Random Forest, Decision Tree, XGBoost, Logistic Regression with hyperparameter tuning via GridSearchCV. Customize as follows:

Preprocessing:

Imputation: Default is forward-fill (ffill) and mean. Change strategy in SimpleImputer(strategy='median') for median imputation if outliers are a concern.
Encoding/Scaling: No changes needed unless adding one-hot encoding for categorical features (replace LabelEncoder with OneHotEncoder from scikit-learn).

Class Balancing:
Enable SMOTE: Add from imblearn.over_sampling import SMOTE; smote = SMOTE(random_state=42); X_train, y_train = smote.fit_resample(X_train, y_train) before modeling.
For ensembles: Set class_weight='balanced' in RandomForestClassifier or scale_pos_weight in XGBoost (calculate as len(y_train[y_train==0]) / len(y_train[y_train==1])).

Hyperparameter Tuning:

GridSearchCV: Expand grids, e.g., for XGBoost: param_grid = {'learning_rate': [0.01, 0.1, 0.3], 'n_estimators': [100, 200, 300], 'max_depth': [3, 5, 7, 9]}.
Neural Network: Adjust layers in model = Sequential([Dense(64, activation='relu', input_shape=(X_train.shape[1],)), Dense(32, activation='relu'), Dense(1, activation='sigmoid')]). Change epochs or batch size in model.fit(X_train, y_train, epochs=50, batch_size=32, validation_split=0.2).

Evaluation:

Add AUC-ROC: Import from sklearn.metrics import roc_auc_score and compute roc_auc_score(y_test, model.predict_proba(X_test)[:,1]).
Visualize: Extend with ROC plots via sklearn.metrics.roc_curve.

Running the Notebook

Execute cells sequentially: Start with imports, load dataset, preprocess, then model and evaluate.
Runtime: 20-45 minutes on CPU; faster with GPU for Neural Network.
Output: Trained models, performance metrics (e.g., classification reports), feature importances, and correlation heatmap.
Troubleshooting:
Errors in imports: Reinstall dependencies.
Memory issues: Reduce batch size or use Colab's high-RAM runtime.
Dataset not found: Ensure correct path.

This manual ensures smooth configuration for replicating or extending the project.