

Oracle® Banking Cash Management

Cash Flow Prediction User Guide



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Preface

Purpose

This document explains the machine learning approach used to build the cash flow prediction feature, which is available as part of Oracle Banking Cash Management.

Audience

This document is intended for the following audience:

- Customers
- Partners

Document Accessibility

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Personal information used in the interface or documents are dummy and does not exist in the real world. It is only for reference purposes.

Acronyms and Abbreviations

NA

Related Resources

The related documents are as follows:

1. Oracle Banking Getting Started User Guide
 2. Oracle Banking Common Core User Guide
- [Purpose](#)
 - [Before You Begin](#)
 - [Module Pre-requisite](#)
 - [Audience](#)
 - [Documentation Accessibility](#)
 - [Critical Patches](#)
 - [Diversity and Inclusion](#)
 - [Related Resources](#)
 - [Conventions](#)
 - [Screenshot Disclaimer](#)
 - [Acronyms and Abbreviations](#)

- [Basic Actions](#)
- [Icons](#)

Purpose

This document explains the machine learning approach used to build the cash flow prediction feature, which is available as part of Oracle Banking Cash Management.

Before You Begin

Kindly refer to the **Getting Started User Guide** for information on common functionalities like login, navigation, and general settings before proceeding with this guide.

Module Pre-requisite

Specify **User Id** and **Password**, and login to the **Home** screen.

Audience

This guide is intended for the following User/User Roles:

Table 1 Audience

Role	Function
Back-office executive	Input functions for transactions
Back-office managers/officers	Authorization of functions
Product Managers	Product definition and authorization

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Critical Patches

Oracle advises customers to get all their security vulnerability information from the Oracle Critical Patch Update Advisory, which is available at [Critical Patches, Security Alerts and Bulletins](#). All critical patches should be applied in a timely manner to ensure effective security, as strongly recommended by [Oracle Software Security Assurance](#).

Diversity and Inclusion

Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to

build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our products and documentation. We are also mindful of the necessity to maintain compatibility with our customers' existing technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

Related Resources

The related documents are as follows:

- *Oracle Banking Common Core User Guide*
- *Oracle Banking Security Management System User Guide*
- *Oracle Banking Getting Started User Guide*
- *Collections User Guide*
- *Netting User Guide*
- *Receivables and Payables User Guide*
- *EOD Configuration Guide*
- *Kafka Configuration Guide*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which user supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that user enter.

Screenshot Disclaimer

Personal information used in the interface or documents are dummy and does not exist in the real world. It is only for reference purposes.

Acronyms and Abbreviations

NA

Basic Actions

The basic actions performed in the screens are as follows:

Table 2 Basic Actions

Actions	Description
Approve	Click Approve to approve the initiated record. This button is displayed once you click Authorize.
Audit	Click Audit to view the maker details, checker details of the record. This button is displayed only for the records that are already created.
Authorize	Click Authorize to authorize the record created. A maker of the screen is not allowed to authorize the same. Only a checker can authorize a record. This option is displayed only for the already created records.
Cancel	Click Cancel to cancel the action performed.
Close	Click Close to close a record. This action is available only when a record is created.
Collapse All	Click Collapse All to hide the details in the sections. This button is displayed once you click Compare.
Compare	Click Compare to view the comparison through the field values of old record and the current record. This button is displayed in the widget once you click Authorize.
Confirm	Click Confirm to confirm the action performed.
Expand All	Click Expand All to expand and view all the details in the sections. This button is displayed once you click Compare.
Menu Item Search	Specify the menu name to search and select the required screens from the list. This option is used to search and navigate the required screens.
New	Click New to add a new record. The system displays a new record to specify the required data. The fields marked with asterisk are mandatory.
OK	Click OK to confirm the details in the screen.
Reject	Click Reject to reject the initiated record. This button is displayed once you click Authorize.
Save	Click Save to save the details entered or selected in the screen.
Unlock	Click Unlock to update the details of an existing record. The system displays an existing record in editable mode. This option is displayed only for the records that are already created.
View	Click View to view the details in a particular modification stage. This button is displayed in the widget once you click Authorize.
View Difference only	Click View Difference only to view a comparison through the field element values of old record and the current record, which has undergone changes. This button is displayed once you click Compare.

Icons

The list of icons available on the screens are as follows:

Table 3 Icons - Common

Icon	Function
	Minimize
	Maximize
	Close
	Perform Search
	Open a list
	Date Range
	Add a new record
	Navigate to the first record
	Navigate to the last record
	Navigate to the previous record
	Navigate to the next record
	Grid view
	List view
	Refresh
	Delete
	Add/Remove Columns
	Click this icon to add a new row.

Table 3 (Cont.) Icons - Common

Icon	Function
	Click this icon to delete a row, which is already added.
	Calendar
	Alerts
	Info

Table 4 Icons - Widget

Icon	Function
	Open status
	Unauthorized status
	Rejected status
	Closed status
	Authorized status
	Modification Number

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Introduction

Individual currency's future provisioned transactions are the basis for cash position projections.

In real life, timely settlements are seldom expected, resulting in a widening variance between actual and projected cash positions based on this approach.

We model our solution on a transaction-based approach, which involves rebuilding individual transactions, based on the pivots of time delay, spread as in single/multiple tranches, and tranche intervals.

Example,

Basic Individual Transaction: 1000 USD, expected payment date on 26th May 2024

Assumption: Availability of sufficient transactions with varying payment patterns, for models to get trained ~ 2000

Machine Learning Prediction outcomes:

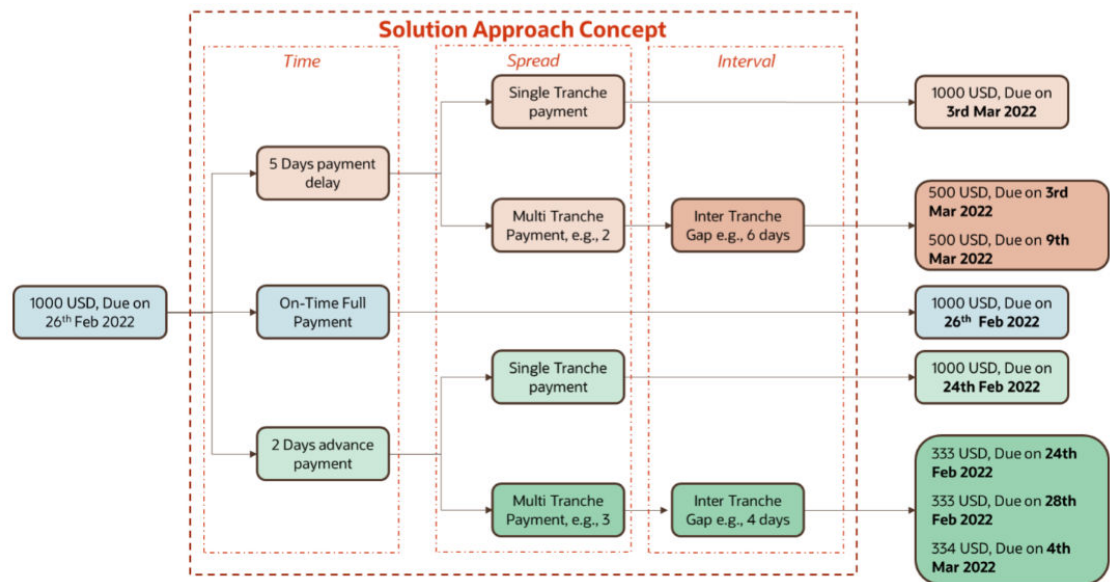
- 2 days advance payment for the first tranche
- Spread 3, i.e. multi-tranche payment.
- Tranche interval of 4 days

New rebuilt Transaction:

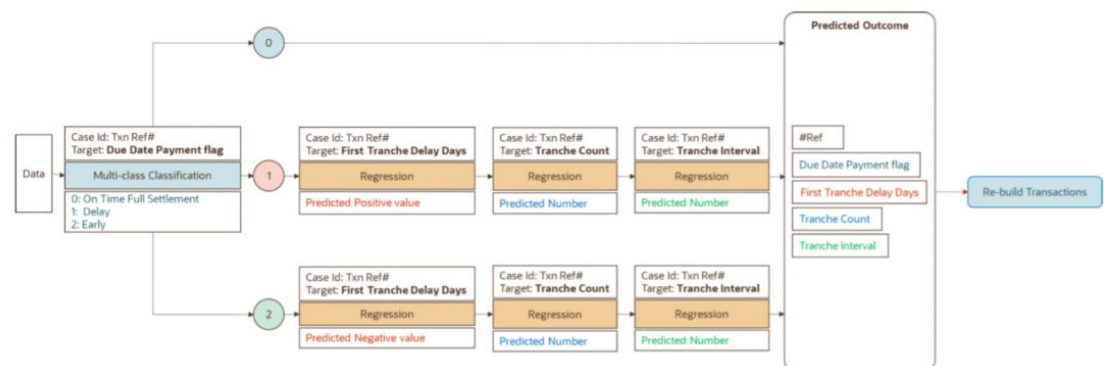
- 333 USD, 24th May 2024
- 333 USD, 29th May 2024
- 334 USD, 3rd June 2024

We aggregate the new transaction breakup, re-built over date and across currencies, to build the projections of final cash flow and cash positions.

Solution Concept



Implementation Architecture



This topic contains following sub-topics:

- [Machine Learning Techniques](#)
- [Data Model Used](#)

1.1 Machine Learning Techniques

The solution uses in-database OML4SQL, which is available by default with database version 19c and above.

1. Multi-Class Classification

- The machine learning framework builds individual model, for each of the following industry accepted algorithms,
 - Decision Tree
 - Naive Bayes

- iii. Random Forest
 - iv. Support Vector Machines
 - v. Neural Network
 - vi. Generalized Linear Models
 - b. When we compare models, we select the one that best represents the underlying data.
 - c. Model Metrics used to compare models,
 - i. **AUC**(Area Under the Curve) – The model's robustness is measured by this value, which is between 0 and 1. The closer the value is to 1, the better the model.
 - ii. **Accuracy** – Measured as a function of predicted vis-à-vis actual in the testing dataset.
 - d. The important attributes, their individual weights and constant value used in building the model are stored in the database.
- 2. Regression**
- a. The machine learning framework builds individual model, for each of the following industry accepted algorithms,
 - i. Support Vector Machines
 - ii. Neural Network
 - iii. Generalized Linear Models
 - b. The models are compared, and the best model is selected which best represents the underlying data.
 - c. Model Metrics used to compare models,
 - i. **RMSE**(Root Mean Square Error)
 - d. The important attributes, their individual weights and constant value used in building the model are stored in the database.

Note

Overall, there are one multi-classification model and three regression models for this solution

1.2 Data Model Used

Column	Type
Reference Number	CHARACTER
Corporate ID	CHARACTER
Account Number	CHARACTER
Virtual Account Number	CHARACTER
Source Application	CHARACTER
External Reference Number	CHARACTER
Customer Reference Number	CHARACTER
Counterparty ID	CHARACTER
Cashflow Code	CHARACTER

Column	Type
Cashflow Type	CHARACTER
Start Day	NUMBER
Start Month	CHARACTER
Start Year	CHARACTER
Expected Amount	NUMBER
Currency	CHARACTER
Channel	CHARACTER
Payment Due in Days	NUMBER
Disputed	CHARACTER
Due Month End	CHARACTER
Due_ Month_ 1Half	CHARACTER
Due_ Month_ 2Half	CHARACTER
Due Month	NUMBER
Total Settlement Tranche Count	NUMBER
First Tranche Delay Days	NUMBER
Average Tranche gap Days	NUMBER
Total Amount paid	NUMBER
Total Amount paid	NUMBER
Over due Amount	NUMBER
Historic Average gaps between payments	NUMBER
Historic delay ratio	NUMBER
Historic Cashflow code delay ratio	NUMBER
Historic First pay Delay ratio	NUMBER
Historic average prepaid First Tranche Delay	NUMBER
Total prepaid First Tranche Count	NUMBER
Last Paid Status	CHARACTER
Total Paid Count	NUMBER
Total Paid Amount	NUMBER
Total Paid Late Count	NUMBER
Total Paid Late Amount	NUMBER
Total Overdue count	NUMBER

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