Architecture

Architecture

BACK ORDER PREDICTION

Revision Number – 1.3

Last Date of Revision – 27/03/2022

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Architecture

Document Version Control

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| --- | --- | --- | --- |
| Date | Version | Description | Author |
| 24-03-2022 | 1.0 | Abstract, | Naveen |
|  |  | Introduction |  |
| 25-03-2022 | 1.1 | Architecture | Naveen |
| 26-03-2022 | 1.2 | Architecture | Naveen |
|  |  | Design |  |

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Abstract

Inventory backorder prediction is widely recognized as an important component of inventory models. However, backorder prediction is traditionally based on stochastic approximation, thus neglecting the substantial amount of useful information hidden in historical inventory data. To provide those inventory models with a big data-driven backorder prediction, we propose a machine learning model equipped with an under sampling procedure to maximize the expected profit of backorder decisions. This is achieved by integrating the proposed profit-based measure into the prediction model and optimizing the decision threshold to identify the optimal backorder strategy. We show that the proposed inventory backorder prediction model shows better prediction and profit function performance than the state-of-the-art machine learning methods used for large imbalanced data. Notably, the proposed model is computationally effective and robust to variation in both warehousing/inventory cost and sales margin. In addition, the model predicts both major (non-backorder items) and minor (backorder items) classes in a benchmark dataset.

Introduction

Why this Architecture Design documentation?

The main objective of the Architecture design documentation is to provide the internal logic understanding of the Back Order Prediction code. The Architecture design documentation is designed in such a way that the programmer can directly code after reading each module description in the documentation.

1 Architecture

ARCHITECTURE

PYTHON

SQL SERVER

Data (CSV)

EDA

DATA PREPROCESSING

IMPORT PYTHON LIBRARIES & READ DATA

FEATURE SELECTION

FITTING MODEL WITH LIGHT GBM

FEATURE ENGINEERING

CREATING A WEB PAGE FOR DEPLOYMENT

SAVE MODEL IN PICKLE FILE

HYPER PARAMETER TUNNING

EXPORT DATA BACK TO SQL SERVER

DEPLOYMENT ON LOCAL HOST USING FLASK AND VS CODE

DEPLOYMENT ON HEROKU

CREATING POWER BI REPORT

INPUT VALUE & PREDICT FINAL RESULT

ARCHITECTURE

2 Architecture design

This project is to create an interface for the user to know their approximate Back Order Prediction, in addition to this, in need of getting the real time project experience we are importing the gathered data into our own database and then start the project from the scratch.

2.1 Data gathering from main source

The data for the current project is being gathered from Kaggle dataset, the link to the data is:

https://www.kaggle.com/competitions/untadta/data

2.2 Data description

There are about 1m+ records of sales information such as sku,national\_inv,lead\_time,min\_bank,forecast\_3\_month,sales\_3,6,9\_months etc.

2.3 Upload data into SQL SERVER

Created an api for the upload of the data into the SQL SERVER database, steps performed are:

* Connection is made with the database.
* Created a database with name ineuron.
* Create command is written for creating the data table with required parameters.
* And finally, a insert command is written for uploading the dataset into sale table by bulk insertion.

2.4 Export data from database

In the above created api, the download url is also being created, which downloads the data into a csv file format and upload the csvs in sql server and then through pyodbc library connection is made with python and the data is extracting in python notebook to perform next steps.

2.5 Data pre-processing

Steps performed in pre-processing are:

* First the data types are being checked and found only the sale column is of type integer.
* Checked for null values as there are few null values, those rows are dropped.
* Converted all the required column into the date time format.
* Performed one-hot encoding for the required columns.
* Scaling is performed for required data.
* And, the data is ready for passing to the machine learning algorithm.

2.6 Modelling

The pre-processed data is then visualized and all the required insights are being drawn. Although from the drawn insights, the data is randomly spread but still modelling is performed with different machine learning algorithms to make sure we cover all the possibilities. And finally, as expected Light xgbm classifier performed well and further hyperparameter tuning is done to increase the model’s accuracy.

2.7 UI integration

Both CSS and HTML files are being created and are being integrated with the created machine learning model. All the required files are then integrated to the app.py file and tested locally.

2.8 Data from user

The data from the user is retrieved from the created HTML web page.

2.9 Data validation

The data provided by the user is then being processed by app.py file and validated. The validated data is then sent for the prediction.

2.10 Rendering the results

The data sent for the prediction is then rendered to the web page.And the Power Bi report made through SQL Server to show the results and difference between actual and predicted back orders.

2.11 Deployment

The tested model is then deployed to Heroku. So, users can access the project from any internet devices.