Low Level Design (LLD)

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CLUSTERING FOR CUSTOMER SEGMENTATION AND UNDERSTANDING

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Low Level Design (LLD)

**Abstract**

Effective decisions are mandatory for any company to generate good revenue.

In these days competition is huge and all companies are moving forward with their own different strategies .We should use data and take a proper decision. Every person is different from one another and we don’t know what he/she buys or what their likes are.

But, with the help of machine learning technique one can sort out the data and can find the target group by applying several algorithms to the dataset .Without this ,It will be very difficult and no better techniques are available to find the group of people with similar character and interests in a large dataset .Here ,The customer segmentation using K-Means clustering helps to group the data with same attributes which exactly helps to business the best .We are going to us elbow method to find the number of clusters and at last we visualize the data . And at the end we can do prediction on groups using classification machine learning algorithms.

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**1 Introduction**

**1.1 Why this Low-Level Design Document?**

The main purpose of this LLD documentation is to feature the required details of the project and supply the outline of the machine learning model and also the written code. This additionally provides the careful description on however the complete project has been designed end-to-end.

**1.2 Architecture**

PYTHON

SQL SERVER

Data (CSV)

EDA

DATA PREPROCESSING

IMPORT PYTHON LIBRARIES & READ DATA

FEATURE SELECTION

FITTING MODEL WITH K-MEANS & LIGHTGBM

FEATURE ENGINEERING

CREATING A WEB PAGE FOR DEPLOYMENT

SAVE MODEL IN PICKLE FILE

HYPER PARAMETER TUNNING

DEPLOYMENT ON LOCAL HOST USING STREAMLIT AND VS CODE

EXPORT DATA BACK TO SQL SERVER

DEPLOYMENT ON AWS

CREATING POWER BI REPORT

INPUT VALUE & PREDICT FINAL RESULT

ARCHITECTURE

**2. Architecture Design**

This project is to make associate interface for the user to grasp their approximate Customer Segmentation Prediction worth, additionally to the present, it would like of obtaining the important time project expertise we have a tendency to square measure mercantilism the gathered information into our own information then begin the project from the scratch.

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**2.1. Data Gathering**

The data for the current project is being gathered from the Bank related to their creid card customer’s list.

**2.2. Tool Used**

• Python 3.9 is employed because the programming language and frame works like numpy, pandas, sklearn and alternative modules for building the model.

* Visual Studio Code is employed as IDE.
* For visualizations seaborn and components of matplotlib are getting used
* For information assortment prophetess info is getting used version

management.

• AWS is employed for deployment

* SQL SERVER IS USED FOR DATABASE.
* Power Bi is used for creating a report.

**2.3 Data Description**

There are about 10000 record of customer’s credit card information with Cust\_ID , Balance , Purchases , Cash\_Advance etc columns.

HLD

**2.4 Import Data into Database**

* Created associate api for the transfer of the info into the SQL SERVER info, steps performed are:
* Connection is created with the info.
* Created a info with name customer\_segment.
* Create command is written for making the info table with needed parameters.
* And finally, a insert command is written for uploading the knowledgeset into data table by bulk insertion.

**2.5 Export Data into Database**

In the above created api, the download url is also being created, which downloads the data into a csv

file format.

**2.6 Data Preprocessing**

Steps performed in pre-processing are:

* First the info sorts square measure being checked and located solely the value column is of sort number.
* Checked for null values as there square measure few null values, those rows square measure born.
* Converted all the desired column into the date time format.
* Performed one-hot cryptography for the desired columns.
* Scaling is performed for needed information.
* And, the info is prepared for passing to the machine learning formula

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**2.7 Modelling**

The pre-processed information is then envisioned and everywhere the specified insights are being drawn. Though from the drawn insights, the info is at random unfold however still modelling is performed with completely different machine learning algorithms to form positive we tend to cowl all the chances and eventually, for sure k-means and lightgbm classifier performed well and any hyperparameter calibration is finished to extend the model’s accuracy.

**2.8 UI Integration**

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

**2.3 Data from User**

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

**2.4 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.

**2.11 Rendering Result**

The data sent for the prediction is then rendered to the web page. And predicted result will be added in new table and export to sql server and the powerbi report is created through making connection of sql server with powerbi.

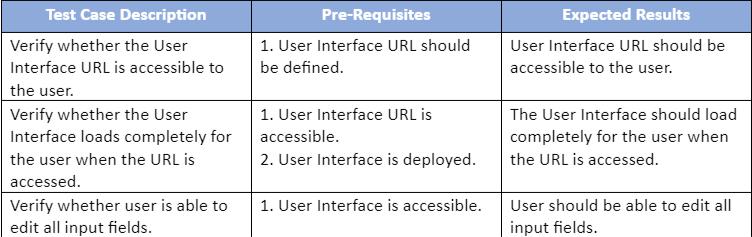
**3. Deployment**

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

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**3.1 Unit Test**



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