**Low-Level Design ( LLD )**

Customer Personality Analysis

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**Abstract**

This document outlines the low-level design for the Customer Personality Analysis system. The system uses machine learning algorithms to cluster customer data to summarise the segments.

**Introduction**

**1.1 What is an LLD Document?**

An LLD document describes the detailed design of a software system. It provides a comprehensive description of the system architecture, design, and implementation.

**1.2 Scope**

The scope of this document is to provide a detailed design for the Customer Personality Analysis system. The system will be able to cluster the data based on customer data and summerize their behaviour.

**2. Architecture**

The Customer Personality Analysis system will be based on a client-server architecture. The client will be a web application that allows users to input customer details and receive a cluster to which they belong to. The server will be responsible for processing the input data, running the machine learning algorithms, and generating the cluster number.

**3. Architecture Design**

**3.1 Data Collection**

The system will collect data from different sources such as APIs and publicly available datasets. The data will be stored in a database for analysis.

**3.2 Data Description**

The collected data will include customer details such as date of birth, income, marital status, number of children, education level and expenses. The data will be in structured CSV format and will be used for training the machine learning models.

**3.3 Importing Data into Database**

The system will have a module to import data from external sources into the database. The data will be preprocessed and stored in the appropriate format for further analysis.

**3.4 Exporting Data from Database**

The system will have a module to export data from the database for analysis and reporting purposes.

**3.5 Data Preprocessing**

The collected data will be preprocessed to remove missing values, outliers, and redundant features. This will improve the accuracy of the machine learning models.

**3.6 Model Creation**

The system will use machine learning algorithms such as PCA, KNN, DBSCAN, Agglomerative clustering algorithm, to train and test the models. The models will be evaluated based on metrics such as silhouette score.

**3.7 Data from User**

The user will input customer details such as age, income, marital status, number of children, education level and expenses into the web application. This data will be passed to the server for processing.

**3.8 Data Validation**

The input data will be validated to ensure that it is in the correct format and within the acceptable range.

**3.9 Rendering the Results**

The server will generate a cluster number to which the customer belongs to based on the input data and the trained machine learning models. The cluster number and its features will be displayed on the web application for the user.

**4. Deployment**

The Customer Personality Analysis system will be deployed on a Streamlit platform. The system will be scalable, reliable, and secure.

**4.1 Unit Test Cases**

The system will have a comprehensive set of unit test cases to ensure that it meets the design requirements and functions correctly. Test cases will be developed for each module and integration testing will be performed to verify the system as a whole.

By following this low-level design, the Customer Personality Analysis system can be developed and deployed with a clear understanding of the system architecture, design, and implementation. This ensures that the system meets the requirements of the stakeholders and is scalable, reliable, and secure.