DSBA-CPP-2024-Project
Technical Assignment for QT Project

Team:

- **Khoroshenkov Leonid** (input/output, normalization)
- **Rodionova Anna** (most parts of interface)
- **Yakhudin Artem** (clustering, some parts of interface)

Topic:

Implementing K-Means Clustering Algorithm in QT Creator for (specify) Dataset Analysis

Description of the Project:

This program aims to improve the quality of choice for cafe customers by providing a desktop application. She will solve clients' problems with choosing a dish that he will like, and will help with searching and sorting dishes according to the parameters that the client needs. Using a clustering algorithm, it will suggest other dishes similar to the one indicated by the user. The program will be integrated with existing APIs and will support bulk operations by uploading .csv files. The user will be able to search for dishes with the required parameters in real time, and the desktop application will also offer similar dish options

Requirements:

- **Programming Language**: The application will be developed using C++ and the Qt framework for the GUI.
- **Interface Approach**: Develop a user interface that allows users to sort dataset and input parameters(columns) on which the clustering algorithm will be used
- **External Data Handling(input and output)**: capability to read .csv files (datasets) and write .txt files (output files).
- **Error Handling**: Robust error handling mechanisms using throw, catch for a smooth user experience and implementing a message logging system* for debugging ease.
- **Object-oriented features**:

    1)Use of Inheritance to create a hierarchical structure of classes for different product categories.
    2)Implementation of Setters and Getters for manipulating class properties.
    3)Overloading of operators for enhanced class functionality.

Interface of our project:

The GUI will include the following components using Qt widgets:

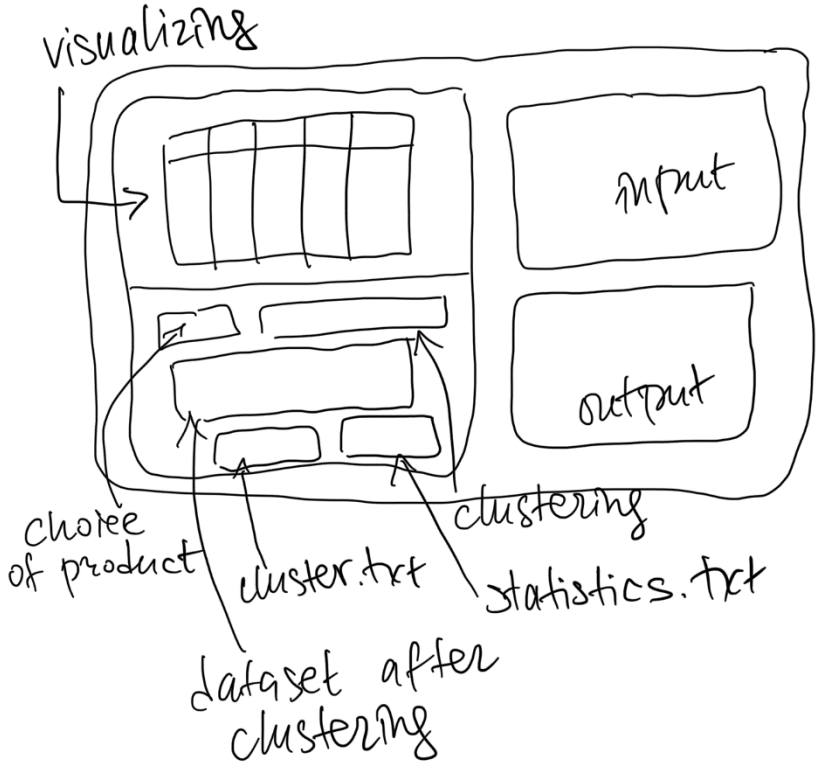
1. Algorithm parameters widgets (choice of number of similar dishes that will be shown, number of clusters, etc)

2. Choice of dataset widget

3. Visualization of the dataset - scatter plot / QGraphicsView

4. Algorithm results interface – save the clustering results (clustering, silhouettes) and analysis reports to files for future reference.

This is our early prototype of how our interface would look like



Tasks in GitHub project:

1.**Project initialization**:

- Set up the Git repository with a README and the initial project structure.
- Configure the Qt development environment.

2.**Cluster and point classes**:

- Develop functions for classes
- Use operator overloading for product comparison and other related operations.

3.**GUI interface**:

- Develop the GUI with the necessary widgets.

4.**Error handling Framework**:

- Establish a comprehensive error handling system to catch and respond to exceptions.

5.**Testing and Quality assurance**:

- Conduct thorough testing of all components.
- Refine the user interface based on feedback.

6.**Deployment and release**:

- Package the application for distribution.
- Release the first version of the application and monitor for issues