151248620: OBJECT-ORIENTED PROGRAMMING II

2022-2023 SPRING SEMESTERS

PROJECTS REPORTS

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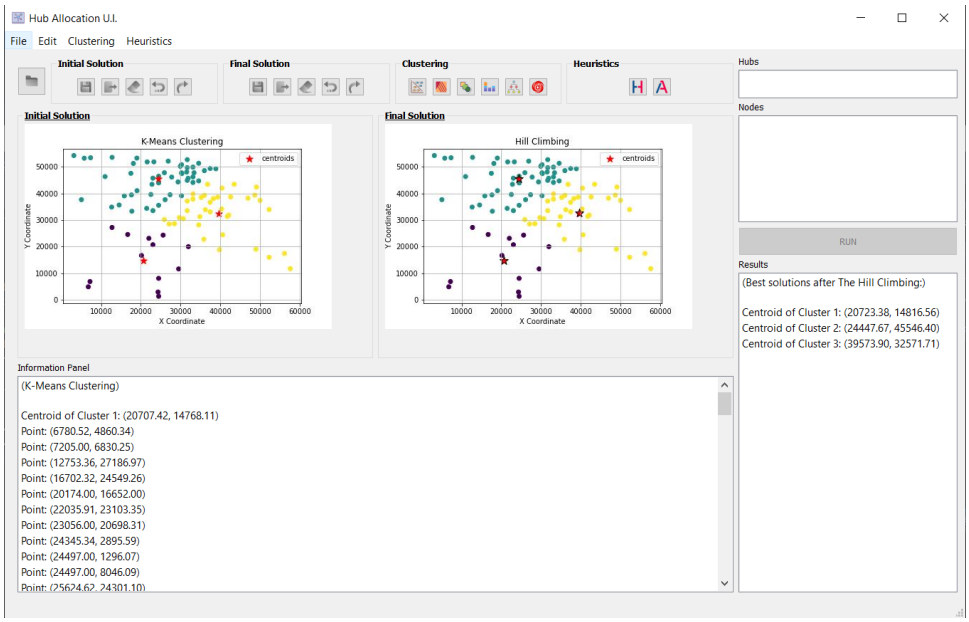
In this assignment, an interface is designed to perform clustering operations on a point group. The interface is coded to display the resulting graph into the desired format using various clustering techniques. The "scikit-learn" library was primarily used for clustering functions. In addition, other necessary libraries such as Pyqt5, matplotlib and PIL were used to integrate the found results into the interface.

The interface of the application is shown in Figure 1.



(Figure 1)

The interface is divided into 4 menus: File, Edit, Clustering, and Heuristics. These menus provide various functions to perform different operations on the data.

The File menu includes basic functions such as opening and saving images.

The Edit menu provides functions to clear the "Source" and "Output" images and navigate back and forth.

The Clustering menu offers 6 clustering algorithms: "K-Means," "Affinity Propagation," "Mean Shift," "Spectral Clustering," "Hierarchical Clustering," and DBSCAN.

The Heuristics menu contains 2 precision algorithms: "Hill Climbing" and "Simulated Annealing." These algorithms aim to enhance the clarity of the cluster centers identified in the previous step.

The application is organized into 5 groups with corresponding buttons: "Open File," "Initial Solution," "Final Solution," "Clustering," and "Heuristics." The Initial Solution section displays the graph obtained as a result of applying clustering algorithms, while the Final Solution section presents the optimized graph of clusters and centers achieved through Hill Climbing and Simulated Annealing Algorithms. This design ensures a user-friendly and intuitive interface.

Also, a window opens to get the parameters required for each operation from the user.

The Information Panel showcases the results obtained from the clustering operations, which can be saved as a .txt file on the user's computer if desired.

The Results Panel displays the optimized outcomes and also enables the user to save them as a .txt file on their computer.

Additionally, shortcuts are available for all essential actions, ensuring ease of use