Report - DSA Project

Mini Project on Currency

Members of the Team:

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2. Shubh Karman Bhullar

3. Rohan Madineni

4. Knv Karthikeya

TA

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Objective :

To make a program that serves as a trade-bank management system.

Functionalities:

1. Adding/Deleting a Trade-bank
2. Adding/Deleting a currency in a given Trade-bank.
3. Adding/Deleting a currency conversion in a specified Trade-Bank.
4. Finding the best path to convert currency A to B along with it's cost and chosen Trade-bank.

Data Structures used:

1. The Trade-Banks are stored in forms of Linked Lists.

2. An Adjacency Matrix in the form of Linked Lists as it was easy for us to add and delete a given currency. Adjacency matrix contains a given currency.
3. Conversion of Adjacency Matrix into an Adjacency List as it is better in terms of time complexity to use a Adjacency List for algorithms like Dijkstra.
4. Each bank contains a graph that is stored in terms of Adjacency matrix which is later converted to an Adjacency list as mentioned above.
5. All currencies are stored in terms of structs.

    Which contains :

    1. Currency name stored in a string.
    2. Weight of the currency conversion.
    3. Pointer to the next currency node.
6. Distance array used in Dijkstra.
7. Priority queues used in Dijkstra using a binary heap.

Algorithms used :

1. The main algorithm used was to calculate the shortest path of between the given currencies. Dijkstra was implemented along with priority queues.
2. DFS algorithm used for finding cycles in the graph.

Time complexity of the algorithms used :

1. Time complexity of Dijkstra is O((E + V) * log(V)) which can be simplified to O(E * log(V)).
2. Time complexity of DFS is O(V + E).

Division of Work :

1. Prerak : Creating the User-Interface, Adding/Deleting the banks,currencies and conversions.Creation of Adjacency Matrix and Adjacency List and Input Program.
2. Shubh and Karthikeya : Algorithms and their implementation with modifications according to the given problem statement.

Shubh : Implemented Priority queues using a binary heap that was implemented in Dijkstra and worked on readme where he gave a brief description about Dijkstra and priority queues functions.

Karthikeya : Worked on Dijkstra to find the smallest path from-to given currencies. Used DFS for testing certain cases. Implemented DFS to find certain cycles in a given bank.

3. Rohan : Worked on the ReadMe and tested our the final code by helping the team by creating testcases. Fixed Bugs present in the code.

Link of our Repository on github.

https://github.com/grokebloke/DSA---mini-project