**Zorang Assessment Question**

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| College Name | SRM INSTITUTE OF SCIENCE AND TECHNOLOGY |
| College Reg. No. | RA2011026010159 |
| Project Title | Finding the optimal routes for delivery agents to deliver parcels from a store to consumers. |
| Video Link |  |
| Expected Inputs | I have  1 store  100 Parcels  100 locations (Longitude, Latitude)  10 Delivery guys (Agents)  Conditions :-   1. After finishing the deliveries, the agents will come back to the store. 2. Not necessary that all delivery agents will deliver the same number of orders. But each agent will deliver at least one order strictly. 3. Delivery agent can pick multiple orders in one trip.   Assumptions :-   1. All 100 orders are ready at the same time. 2. All delivery agents go at the same speed. 3. Consider straight line distance between any two coordinates. |
| Expected Outputs | 1. Return array of location id each agent will deliver   Like [[1,2,3,9...] , [33, 45, 56], ….., [99], [100, 23]]   1. Consider agents are indexed as 1 to 10. |
| Approach | 1. All orders Should be delivered. 2. The total time taken for all deliveries should be minimized. 3. Each agent starts from the store, makes their deliveries, and returns to the store.   I made two files (Backend part) & (Frontend part)   1. The first script (First.py) is useful for *backend calculations* and logistics planning. 2. The final script (Final.py) is useful for *frontend* *display*, where users can interactively view routes and locations on a map. |
| Dataset | 1. External JSON file hosted at '<https://zorang-recrutment.s3.ap-south-1.amazonaws.com/addresses.json>'. 2. A tuple store\_coordinates = (28.9428, 77.2276) 3. calculating distances using the haversine formula 4. list of lists, agent\_routes, where each sublists represents the set of address IDs assigned to a particular agent. 5. google\_api\_key containing the Google Maps API key. & folium map for enhanced visualization. folium.Marker and folium.PolyLine for Highlighting (store and addresses) and (Equator and Prime meridian) respectively. |
| Algorithm | 1. Round-Robin distribution algorithm (I used)   Rest these can also be used , but are bit complex because if we remember in Travelling salesman problem (1 guy is there , and n -locations are there) , but in this assessment question 10 guys are there and n-locations are there , so it is tough to implement these down algorithm but can give most optimized result.  2. proximity  3. Concept of Longitude & Latitude in ML (GIS)  4. Data Granularity  5. Two popular algorithms used in remote sensing technology  Density-based spatial clustering of applications with noise (DBSCAN)  And hierarchical density-based spatial clustering of applications with noise (HDBSCAN)  6. K-Means Clustering  7. Clark-Wright Savings Algorithm  8. Genetic Algorithms |
| Deadline | Assessment Question came on 19th Jan ,2024  Completion Deadline aimed to be on 20th Jan , 2024. |
| Comments | Thank you to the Company Zorang  and Special thanks to Anjali Rathi mam, for give the best  brain storming problem ever. |