IMPLEMENTATION NOTES FOR LABS 3 AND 4

KYEREMANTENG, PRINCE SAMUEL

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LAB 3 – WATER DISTRIBUTION NETWORK

Design a cost-effective expansion plan for a city's water distribution network using a greedy algorithm.

The plan prioritizes areas based on population density, proximity to water sources, and infrastructure readiness.

ALGORITHM IN PSEUDO-CODE

Input: List of areas with attributes: name, population density, proximity, infrastructure readiness, expansion needed.

Sort areas by population density, proximity, and infrastructure, in descending order.

Initialize an empty list for the expansion plan.

For each area in the sorted list:

> *If expansion is needed, add the area name to the expansion plan.*

Output: List of area names in the expansion plan.

ASSUMPTIONS AND CONSTRAINTS

- Assumes that each area's data is accurately represented by population density, proximity, and infrastructure.
- Assumes the greedy approach is suitable for prioritizing high-need areas efficiently.
- Randomly generated data is used for simulation purposes.

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LAB 4 – WATER ALLOCATION

The objective of this project is to design a greedy algorithm to allocate limited water resources to agricultural zones to maximize crop yield and support sustainable farming, using a greedy algorithm based on crop priority, region, and seasonal availability.

ALGORITHM IN PSEUDO-CODE

1. Input: Total water available, list of zones with attributes: name, priority, region, seasonal availability, water needed.

2. Sort zones by priority, region, and seasonal availability, in descending order.

3. Initialize an empty dictionary for the allocation plan.

4. For each zone in the sorted list:

a. If total water available is greater than 0:

i. Determine water allocated as the minimum of total water available and water needed.

ii. Record the zone name, water needed, and water allocated in the allocation plan.

iii. Subtract the water allocated from total water available.

5. Output: Dictionary of zones with records of water needed and water allocated.

ASSUMPTIONS AND CONSTRAINTS:

In building this dp model, the following assumptions were made:

- Assumes accurate representation of each zone's priority, region, and seasonal water availability.
- Assumes the greedy algorithm effectively addresses immediate water needs given limited resources.
- Randomly generated data is used for simulation purposes.