Project 2: Silent Disco Glamping Network

Problem description (note that the problem is only fictional)

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As a new travel startup, your company is launching a series of ultra-luxury "Glamping" (glamorous camping) sites across Australia. The campain aims to create an exclusive network of k locations where guests feel completely isolated from the rest of the world. To achieve this, your start-up needs to solve a tricky balance: you want the sites to be as far apart as possible (to maintain the "remote" vibe), but you also need to consider how expensive and difficult it is to set up a luxury camp in certain locations.

1 Objective: Maximizing Geographic Resilience

The goal is to pick a set of locations that maximises the ratio of "total isolation" to "total setup cost".

- The numerator (Total Isolation): This is the sum of the distances between all selected camps. The bigger this number, the more your startup can increase the experience of your customers.
- The Denominator (Weighted Cost Factor): Not all locations are equally easy to build in. Each location is given a cost Weight w_i:
  - High Weight w_i: super remote areas with difficult access, or places with high permit costs.
  - Low Weight w_i: locations that are still beautiful but have "glamping-friendly" infrastructure like road access and local catering.

2 Requirements

2.1 The k-Site Rule

Your start-up must pick exactly k sites to satisfy the investors.

2.2 The "I Can See You" Rule (Threshold)

To ensure total exclusivity, no two glamping sites can be within δ units of distances of each other. If they are too close, it ruins the "hidden gem" marketing.

2.3 The "Party Size" Rule (Capacity)

Each location has a maximum number of tents it can host a_i. The total number of tents across all k sites must be at least N to make the business profitable.

3 Data

- In the world of high-end tourism, guests don't want to drive 14 hours through the desert. They want to charter a small private plane. Logistic: a glamping site is only viable and "safety-ready" if there is a place to land nearby. Therefore, the airstrips are the potential locations. The locations data can be found here

https://ourairports.com/countries/AU/

- Data on fixed cost w_i and location capacity a_i and targeted tents N can be randomly generated. Overall, we would like a solution where we can adjust these parameters to make better decisions. Students can use the airstrips data to create fixed cost data (such as size of airports, logistics distance with major supply hub like a state capital).
- Data on threshold δ can be choosen randomly. But, we also like to have the adjust these parameters to make better decisions. We need to find what is the maximum δ so that the model is still feasible.

4 Expectations

We would like to have a computer algorithms to find the global optimal selections within a few minutes.