
MA5895 : Numerical Optimization

Combined Assignment Report

Cell Tower Problem

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Summary : Hi

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Problem Statement

In city planning, the issue is to find out potential sites to plant the towers for given the population and budget constraint. To solve the problem, divide the population into small region based on maximum capacity to plant the tower sites. Each site location may also cover other specified number of locations. Out of all possible cell tower sites, find out the optimal locations which can serve maximum population keeping control over budget.

Approach to tackle the problem (In short)

In Fundamental of cellular network[1] it was mentioned that cellular network is

- Rectangular region is specified.
- Using limit of rectangular region population is generated by 5 clusters with appropriate *sigma* such that spread is enough to cover enough region and 10% of the population is randomly spread over given region.

- After generating population, the whole population is divided into given number small regions(clusters) using k-means algorithm.

Assumptions

Assumed that,

- The city is a rectangular region
-

Formulation

$$V(s) = \underset{Q(s,a)}{\operatorname{argmax}} \quad (1)$$

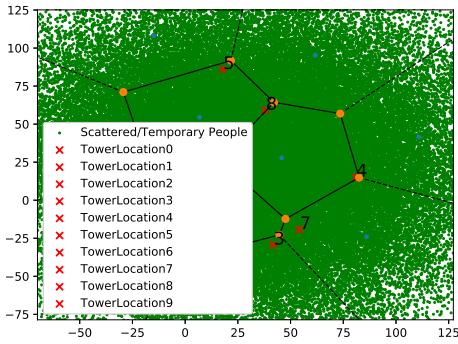
Algorithm

Hello

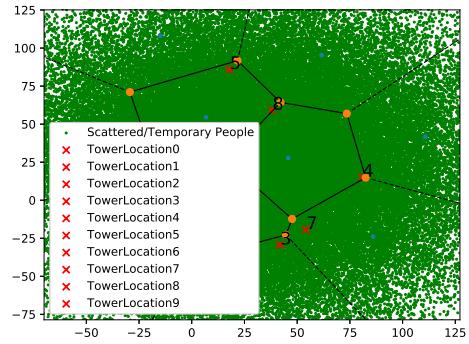
Results and Discussion

hello

Voronoi Diagram of few values of input



(a) Grid world with goal G1



(b) Grid world with goal G2

Figure 1: Grid world of four rooms. Blue:Agent, Green:Terminal The grid world-1(a) has terminal state G1 and grid world-1(b) has terminal state G2. Arrow indicates the optimal policy. The policy in fig-1(a) is obtained using option-1 where as same in fig.-1(b) by option-2

Computational time as a function of input parameters

Largest problem solution

References

- [1] D. Tipper, “Fundamentals of cellular networksnetworks,”