India-map

Step1:- Basic K center with k=5

Intial centers: Thiruvanthepuram (South)
Itanagar (Northeast)
Jaipur (Northwest)
Bhuvaneshwar (East)
Mumbai (West)

Intial r' = 709.788 km

Step2:- Distance setR: Client to facility distances (28×28 = 784)
client-facility distan

Total distances = 784

~~Unique~~ sample = 30 values.

Min = 50, 25th percentile = 400km, Median = 800km,

Max = 2500km

Step3: Generate partations :-

How many facilities place near each center?

$${}^{n}C_r = {}^{9}C_4 = \frac{(9+4-1)!}{(4-1)!} = \frac{12!}{3!} = \frac{9!}{4!(5!)}$$

= 126 partations.

= 3630 Combinations

(1,1,1,1,1)
(0,0,0,1,4)
(2,2,1,0,0)

Skip degenerate partations like (5,0,0,0,0)

= 121 partations × 30 radii

= 3630 combinations

Step 4:- Build Network Flow graph with radius = 600km

Edge capacities: Source - Client (w=1)

Client - Facility (w=1) if

(distance $r + r' = 600 + 710 = 1310$ km)

Facility - Sink = 8 (capacity constraint)

Step 5: Run max flow :→

flow max = 28 (all clients served Feasible)

flow max < 28 (some clients unassigned infeasible).

Iteration 150: partation (0,0,0,1,4) r = 965.2km

feasible ✓

flow value = 28, New best = 965.2km

Iteration 318: partation (0,0,0,2,3) r = 799.7km

flow value = 28 feasible ✓

Iteration: 845 : partation (0,0,1,1,3) r = 601.2kms

flow value = 28, feasible ✓

Iteration: 2310:

partation (1,1,1,1,1) r = 55.8km

flow value = 28, feasible ✓

New best = 55.8km optimal.