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Assignment - 1

Optimization of Conference Schedules

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Approach Followed: m-random restarts Hill Climbing

Taken Inputs:

Line 1: k: the number of papers per session
Line 2: p: number of parallel sessions
Line 3: t: number of time slots
Line 4: C: trade-off constant
Starting from Line 5, Input of space-separated lists of distances between every paper are taken

Algorithm:

Step 1: Create list which stores local maximum goodness obtained in each iteration.
(store_local_maximum_goodness_score = [ ] **)**

Step 2: Created empty Conference Schedule 2D array where rows denote **parallel sessions (p)** and columns denote **time slots(t) ;**
Create temporary list of all papers where total number of papers are **n = k * p * t ;**

Step 3: Append first paper randomly in the first time slot and first session of Conference Schedule & make current maximum goodness score = 0.0 and remove that paper from the temporary list of all papers.

Step 4: Try each paper from the temporary list of all papers in each parallel session of the particular time slot which increases the goodness score and finally select the paper from the temporary list of all papers which gives the improved current maximum goodness score.

Step 5: Remove that finally selected paper from the temporary list of all papers and Update the current maximum goodness.

Step 6: **Repeat step 4** to **step 5** until each parallel session of all time slots are completely filled and if time limit >1.8 sec will stop further filling and fill remaining slots randomly and return the goodness schedule.

Step 7: After filling the conference Schedule array complete calculate the goodness core and store it in the store_local_maximum_goodness_score list.

Step 8: **Repeat step 1** to **step 6** for m number of iterations i.e. it will result in m number of random restarts.

Step 9: **Return the Maximum of (store_local_maximum_goodness_score list**) *# as this will be the Global Maximum Goodness score achieved.*

Motivation for selecting this approach:

1. Normal Hill Climbing approach can stuck at local maxima.
2. So to improve the version of Normal Hill Climbing we take random restart.
3. But further improvement in this, introduced m-random restarts approach and look for best possible solution which increases goodness score at each step while climbing hill that can take us closer to the goal (i.e., top of the global maximum of hill).

Time Complexity: $\mathbf{m * t * (k*p) * (t*k*p) = t^2k^2p^2}$ *(**m** is constant taken = 3 here)*

Space Complexity: $\mathbf{p * t * k}$ (*To store the papers in Conference Schedule Array)*