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ĐẠI HỌC BÁCH KHOA HÀ NỘI

HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

ONE LOVE. ONE FUTURE.

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Applied Algorithm Lab

Balanced course assignment

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Balanced course assignment

- Assign courses to teachers s.t. time-conflict and preference conditions
- **Input & Constraints:** m teachers $T = \{1,2,\dots,m\}$ and n courses $C = \{1,2,\dots,n\}$.
  - Each teacher $t \in T$ has a preference list which is courses he/she can teach.
  - There is a list of pairs of conflicting two courses that cannot be assigned to the same teacher.
  - The load of a teacher is the number of courses assigned to her/him.
- **Objective:** Minimize the maximum load of a teacher.
- **Output:** The maximum load, or -1 for non-existing cases.

Balanced course assignment

- Example

stdin	stdout
4 12 5 1 3 5 10 12 5 9 3 4 8 12 6 1 2 3 4 9 7 7 1 2 3 5 6 10 11 5 1 2 1 3 1 5 2 4 2 5	3 Explain: Courses of teachers: 1: 1 10 12 2: 3 4 8 3: 2 7 9 4: 5 6 11

Balanced course assignment

- Idea to solve: Backtracking and Branch and bound
  - To store the solution: An array Sol[N].
    - `Sol[i] = j iff we arrange teacher j teaches subject i`
    - To compare the objective: `nbTeach[j] = number of subjects teacher j teaches`
    - A variable maxLoad to store current solution's maximum load
  - programming: write functions:
    - `void Try(int k) // select teacher for course k`
    - `bool check(int j, int k) // check if teacher j can teach course k`
    - `void solution() // change the current solution if find a better`
  - Branch and bound (in Try()): if one teacher has nbTeach[] larger than maxLoad: move to the bext branch.

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THANK YOU !