Sistemas Inteligentes
Grado en Ingeniería Informática
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Lecture 1. Constraint Satisfaction Problems

ACTIVITY 4. TASTKS AND WORKERS. LOCAL SEARCH

Suppose that n workers have to perform n tasks, and that we know the time cij of realization by the i-th worker (ti) of the j-th task (Tj). The problem is to assign to each worker one and only one task, so that the overall time of accomplishment of all tasks is minimal.

Next we present as an example for n = 4 a table Q = (qij) with the times that each worker needs to perform each task:

	Task 1	Task 2	Task 3	Task 4
worker 1	12	43	15	7
worker 2	9	10	6	4
worker 3	5	13	29	2
worker 4	4	11	17	9

1. Solve this constraint satisfaction problem using local search strategies. At least these functions are needed:

Cost Function:

function c = fCost (x)

- Receive an assignment x (1: n) of a task to each worker, and return the overall cost
- Create the Cost matrix M (nxm), as the above example.
- Calculate the overall cost of the assignment x

Successors: think about how to generate the successors states from a given current state

2. **Local Search:** solve this problem at least up to level 3 beginning in: [1 2 3 4]

3. **Implement in Matlab** local search for this problem

SCHEME

```
function [X, C]=localSearch()

%% X= final assignment and C=Overall Cost
%%

%% 1. Initializations
  (......)

%% 2. Search loop
while  (conditions)
    currentVar=mod(itera,N)+1;
    S=Successors(currentVar);     %Generate all the valid successors from currentVar
   (......)                                 %Calculate the cost of each successor state
                                            %%Choose the state with the best evaluation function
                                            %% Updates
   (...)
end
```