Insurance Referee Assignment

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Problem Statement

The insurance company given in the insurance referee problem is required to verify if the claims of the customer in insurance cases are legit or not. The company deploys referees to various locations in order to examine damage like that of damaged vehicles and write well documented reports. The insurance company appoints referees internally from its own resources but also has an option of authorizing external referees to take over a case. The comprehensive assignment is to allot referees to insurance cases based on different weak and hard constraints. There is a maximum workload a referee can do per day, that is calculated by maximum number of working minutes per day. Referees are assigned specific geographical areas that are unique to the postal codes. Furthermore, referees could be experts in particular domains like passengers, cars, etc. The referees are assigned to regions according to degrees of preferences which are supported by type of cases. There is a fixed salary to internal referees that are paid monthly whereas external referees are paid according to the case. Each Insurance case is specified by the number of working minutes, the degree of damage by cost in Euros, and the amount an external referee gets if allotted to the case. The given problem has to focus on the assignment of referees to a particular case during a given working day. The set of referees that are available and the set of cases to be handled make up an instance. In accordance with the enumerated restrictions, the task is to designate exactly one referee to each case where a referee can be assigned to numerous cases.

Constraints(Hard)

- The maximum working minutes of a referee should always be equal to or less than the actual workload, where the total effort put forth in all the cases that this referee was assigned makes up the actual workload.
- A referee who has a preference 0 for a region should not be assigned in charge of that region at any cost.
- A referee who has a preference 0 for a case should not be assigned to that particular domain at any cost.
- Only internal referees should be assigned cases that have a damage cost/value greater than the threshold value.

Constraints(Weak)

- Internal referees are preferred rather than external referees in order to cut the cost for the company.
- Insurance cases should be assigned to external referees in such a way that the payments should be balanced among them i.e., all the referees get the opportunity to take cases so that the overall payments are alike.
- All the referees should get a fair chance of handling the cases in a way that their overall workload does not exceed the threshold value and is balanced in all the ways.
- Referees must be assigned cases according to their preference of domain. Highest Preference cases are the priority.
- Referees must be assigned cases according to their preference of region. Highest Preference regions are the priority.

Progress achieved

Firstly, I have read the project documentation thoroughly and seen all the lecture videos and the project description video uploaded by the professor and acquired complete understanding of the project and the problem statement . I analyzed various examples documented in the project

description and understood the main output expected from the problem statement . Acknowledged all the given cases and took note of all the edge cases as well in order to code without missing any of these cases. Obtained information regarding hard and weak constraints from the modules as well as from the online sources. Researched my way through Answer Set Programming(ASP) which helped me to execute the hard constraints till now.

Encountered issues and solutions

Understanding the hard constraints and weak constraints was the primary issue I ran across. I researched thoroughly from multiple sources about constraints before planning some of the edge cases and made a note of the appropriate solutions. I had several problems while coding hard constraints as the expected output did not match with my codes output. I have modified my code and certain cases in order to address the hard constraints which resulted in the desired output.

Completed Itemized tasks

- Variables and object constraints are declared.
- Depending on the type of the object formula was written for getting case details.
- Formula is written for getting referees and workload in a range of 0 to 720 minutes.
- Preferences of referees on type of cases and regions.
- Limitations on the number of referees per case and the workload shouldn't go above working minutes.
- Cases should be allocated to all the referees depending on the preferences mentioned.
- Case must not be allocated to external referees when the amount to be paid for a particular case goes beyond the threshold value .

Future Itemized tasks

- Weak constraint on total workload balance of all the referees.
- Weak constraint on total payment balance for external referees.
- Utilize the formula in the problem description to cut overall costs.
- Testing the developed code with the given examples.

References

1. https://www.sciencedirect.com/topics/computer-science/answer-set-programming.
2. https://spiral.imperial.ac.uk/bitstream/10044/1/33615/8/AcceptedVersion.pdf