ASP Challenge Problem:
Insurance Referee Assignment Problem

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Abstract

The goal of this project is to illustrate the insurance referee assignment issue and attempt to resolve it using knowledge representation and reasoning while maintaining all the such limitations in mind.

1. Problem Statement

An insurance provider must analyze if client claims in insurance claims are credible. To facilitate this, it dispatches referees to various sites to examine damages (e.g. damaged cars) also produce a report. The insurance company can authorize external referees to handle a case in addition to using its own internal referees. To assign referees to insurance cases using a combination of strong and weak constraints is the overall task. The amount of working minutes per day, which is the maximum workload a referee can have each day, determines how much work they can accomplish. Referees are assigned gradually to regions based on their preferences. These regions are recognized by their postal codes. Referees might also specialize in particular fields (e.g. passenger cars, trucks, etc). Regarding the regions, the distribution of referees across different case categories encourages a range of preferences. Insurance cases are classified according to the anticipated handling time (in working minutes), the harm (in euros), and the compensation an outside referee would get if they were given the case. Our example focuses on assigning referees to cases throughout the course of a single working day. The set of referees that are available and the set of cases that need to be handled make up an instance. Each case must have exactly one referee assigned to it.

2. Progress Made

In order to protect oneself from financial loss, one party will guarantee another party reimbursement in the event of a certain loss, damage, or injury in return for a fee and this is called Insurance. It is a method of risk management that is primarily employed to protect against the risk of a potential loss. The insured makes a claim to the insurer for processing by a claims adjuster if they sustain a loss that may be covered by the insurance policy. A deductible is an obligatory upfront cost imposed by an insurance policy prior to the insurer paying a claim.

So, after briefly outlining the problem, I would like to propose a completely automated method for accomplishing task of insurance referral quickly and with virtually no error. Answer Set Programming (ASP) offers default reasoning, which is essential for common sense thinking, hence I have chosen to use ASP to tackle this problem. Declarative programming in the form of answer set programming (ASP) is targeted at challenging search problems. It is founded on the logic programming stable model semantics. Answer set solvers, which are programs for creating stable models, are used to conduct search in ASP since search issues are reduced to computing stable models. The DPLL algorithm is enhanced in the computational process used in the construction of numerous answer set solvers, and in theory, it always terminates. Additionally, Combinatorial problems can be modeled as logic programs using ASP's straightforward and effective modeling language. Then, using such a logic program, the Clingo system computes response sets that reflect answers to the given problem. Furthermore, using Clingo language, it is quite simple to specify the actual time limitations in our scenario.

For demonstrating this project, instances are provided with a set of available referees, a set of cases to be handled, a threshold for external referees, and preferences for regions and case kinds are provided for showing this project. I also took into account the problem's provided hard and weak constraints.

3. Challenges Encountered and Resolution Plan

I have outlined the difficulties I encountered for the portion I executed. I have also included a summary of the difficulties I'm encountering for the components that I need to execute.

- The maximum number of working minutes for a referee shall not be exceeded by the true workload, which is the entire amount of time spent on all cases assigned to this referee. I continuously check to make sure that the previous workload plus the effort of the case are below the referee's maximum permissible workload in order to correct this.
- A referee who is not in any way in control of the region cannot be given a case. To remedy this, I'm making it so that, in addition to taking into account other limitations, if for a given postc a referee has higher "pref," then that case will be allocated to that specific referee. However, if the pref is set to 0, the referee will not receive instances involving that postc.
- A referee who is not in charge of the case's kind in any way cannot be given the case. A case should be given to a referee who has stronger preferences for it while still taking into consideration other constraints in order to get around this. A referee's preference for a caset must be zero in order for me to allocate that case to that particular referee.
- There is a threshold for instances that can be referred to an outside referee that is established by a fact of form. As a result, I'm making sure that instances that do more harm than what externalMaxDamage stipulates would be assigned to internal referee in order to fix this.

4. Task Accomplished

The following project-related tasks have already been completed.

- I have designed the logic in such a way that the maximum number of working minutes for a referee cannot be exceeded by the actual workload, which is the total of the efforts made in all of the cases allocated to this referee.
- I have designed the logic so that a referee who has zero preferences for any regions cannot be handed a case, which essentially means they won't be getting that case if they have zero preferences for any regions.
- A referee who is not in charge of the particular type of case cannot be handed a case because of the logic I have written.
- I have written the logic such that only internal referees can be assigned cases with damage amounts above a predetermined threshold.
- I have written the logic such that referee should give higher precedence to certain case kinds and certain geographic areas while handling cases.

Future Tasks / Completion Plan

The following is a list of the upcoming tasks that must be completed for this project:

- I have to implement the logic such that Referees (internal and external) should be assigned cases fairly, meaning that their overall workload should be balanced.
- I have to implement the logic such that External referee cases should be assigned fairly, meaning that their overall compensation should be equal.
- I have to implement the logic such that In order to reduce the expense of external referees, internal referees are preferred.
- I will try to optimize the operations even further.

I have already started implementing the activities I had planned, and I will finish and meet deadlines for all of the tasks listed above in my future plan.