ASP Challenge Problem:
Insurance Referee Assignment Problem

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Abstract

This project's objective is to demonstrate the problem of assigning insurance referees and try to solve it using knowledge representation and reasoning while keeping all of these restrictions in mind.

1. Problem Statement

A supplier of insurance must determine the veracity of customer claims in insurance claims. This is accomplished by sending referees to various locations to assess damages (such as wrecked vehicles) and to produce a report. In addition to using its own internal judges, the insurance company can also approve outside referees to handle a case. The overall goal is to allocate referees to insurance cases using a combination of strong and weak constraints. The maximum workload a referee can have each day is the number of working minutes, which decides how much work they can complete. Regional assignments for referees are made progressively based on their preferences.

The postal numbers for these areas make them identifiable. Referees may also focus on specific disciplines. (e.g. passenger cars, trucks, etc). The distribution of referees among the various case categories promotes a variety of preferences with regard to the regions. According to the anticipated handling time (in working minutes), the damage (in euros), and the compensation an outside referee would receive if they were assigned the case, insurance cases are categorized. In our example, we will assign referees to cases over the period of one business day. An instance is made up of the cases that need to be handled and the referees that are accessible. There must be one referee appointed to each case.

2. Progress Made

One party will promise another party reimbursement in the event of a specific loss, damage, or injury in exchange for a fee in order to safeguard oneself from financial loss and this is known as a known as Insurance. It is a risk management technique that is mainly used to guard against the danger of a possible loss. If the insured suffers a loss that might be covered by the insurance policy, they submit a claim to the insurer for handling by a claims adjuster. A deductible is an upfront payment that must be made as a condition of an insurance policy before the insurer will settle a claim.

After briefly outlining the issue, I'd like to suggest a fully automated method for completing the insurance referral job quickly and almost errorlessly. I have decided to use Answer Set Programming (ASP) to address this issue because it provides default logic, which is crucial for common sense thinking. Answer set programming (ASP), a type of declarative programming, is intended for difficult search issues. It is based on the steady model semantics of logic programming. Since the search problems are simplified to computing stable models, answer set solvers—programs for building stable models—are used to carry out search in ASP. The computational method that is improved in the creation of numerous answer set solvers uses the DPLL algorithm, and in principle, it always terminates. Additionally, using the simple and powerful modeling language of ASP, combinatorial issues can be represented as logic programs. The Clingo system then computes response sets that represent solutions to the given issue using such a logic program. Additionally, it is very easy to specify the real time constraints in our scenario using Clingo language.

Instances with a list of potential referees, a list of cases to be managed, a cutoff for outside referees, and preferences for regions and case types are given for demonstrating this project. I also considered the hard and weak constraints the problem offered.

3. Challenges Encountered and Resolution Plan

I've described the challenges I ran into with the part I actually accomplished. A list of the challenges I'm having with the components I need to perform is also comprised.

- The true workload, which is the total quantity of time spent on all cases assigned to this referee, shall not exceed the maximum number of working minutes for a referee. In order to rectify this, I continually check to make sure that the current workload, combined with the effort of the case, is below the referee's maximum allowed workload.
- A referee who is not in charge of the area in any manner cannot be given a case. To fix this, I'm changing the rules so that, in addition to taking into consideration other restrictions, if a referee for a given postc has a higher "pref," then that referee will be given that particular case. The referee won't receive instances featuring that postc if the pref is set to 0.
- The case cannot be assigned to a referee who is not in any way in control of the case's kind. In order to get around this, a case should be presented to a referee who has stronger preferences for it while still considering other limitations into account. In order for me to assign a case to a specific referee, a referee's preference for a caset must be zero.
- There is a cutoff point that is determined by a fact of form for cases that can be submitted to an outside referee. As a consequence, I'm making sure to fix this by ensuring that instances that cause more damage than what externalMaxDamage specifies would be assigned to internal referee.

4. Task Accomplished

The projects-related duties listed below have already been finished.

- I created the logic so that it prevents the real workload, which is the sum of the efforts put forth in all of the cases assigned to this referee, from exceeding the maximum number of working minutes for a referee.
- I built the logic so that a referee with no preferences for any regions cannot be given a case; in other words, if they have no preferences for any regions, they won't be receiving that case.
- Because of the logic I've laid out, a case cannot be given to a referee who isn't in control of that specific category of cases.
- Only internal referees can be given cases with damage amounts above a predetermined threshold because of the logic I've outlined.
- I have written the reasoning in such a way that the referee should give particular case types and geographical regions more weight when handling cases.

Future Tasks / Completion Plan

The upcoming tasks that need to be finished for this undertaking are listed below:

- I need to put the logic into practice so that cases are fairly assigned to referees (internal and external), balancing their total workload.
- I have to put the reasoning into practice so that cases for external referees should be assigned fairly, i.e., their total compensation should be equal.
- I have to put the logic into practice so that internal referees are favored in order to save money on external referees.
- I'll attempt to make the processes even more efficient.

I have already begun putting my plans into action, and I will complete and make all of the deadlines for the aforementioned tasks in my future plan.