Third ASP Competition
Detailed scoring regulations

The Competition Organizing Committee

Università della Calabria

Change Log

- **V.1.10**
  - A small clarification in Scoring Framework.
- **V.1.01**
  - Better specify score for Optimization Problems.
- **V.1.00**
  - First version.

For the definition of the scoring framework, we adopted as a starting point the one exploited in the first and second ASP Competitions. Such framework was mainly based on a weighted sum of the number of instances solved within the given time-bound; however, we decided to extend it by rewarding additional scores to systems well performing in terms of evaluation time.

1 Scoring Framework

A system S could get 100 points per each given benchmark problem P; then, the final score of S consists of the sum over the scores coming from all benchmarks. The overall score of a system S on a problem P counting N instances is denoted by $S(P)$.

Search Problems. We note first that

$$S(P) = 0$$

if S returned an answer which is incorrect for at least one instance of P. Otherwise, the score has been computed by the sum

$$S(P) = S_{solve}(P) + S_{time}(P)$$

where S_{solve} is defined as

$$S_{solve}(P) = \alpha \frac{N_S}{N}$$

for N_S being the number of instances solved by P within the time limit. Actual running time has been taken into account by defining S_{time} as:

$$S_{time}(P) = \frac{100 - \alpha}{N} \sum_{i=1}^{N} \left(1 - \left(\frac{\log(t_i + 1)}{\log(t_{out} + 1)}\right)\right)$$

where t_{out} is the maximum allowed time and t_i the time spent by S while solving instance i. Both $S_{solve}(P)$ and $S_{time}(P)$ have been rounded to the nearest integer.

Optimization Problems. As in the previous edition, the score in the case of optimization problems depends on the quality of the given solutions; in addition, as in the case of decision problems, time performance is taken into account. We assume the cost function associated to optimization problems must be minimized (the lower, the better), and it has 0 as its lowest bound. For each problem P, a system is rewarded of a number of points defined as

$$S_{opt}(P) = \alpha \cdot S^{\alpha}_{opt}$$

where S^{α}_{opt} is computed by properly summing, for each instance of P, one of more of these rewards:

1. 0 points, if the system does not produce any solution within the time limit;
2. $\frac{1}{N}$ points, if, in case of an unsatisfiable instance, the system correctly outputs INCONSISTENT;
3. $\frac{1}{4N}$ points, if the system produces a correct witness;
4. $\frac{1}{4N}$ points, if the system outputs OPTIMUM FOUND and the correct optimum solution;
5. $\frac{1}{2N} \cdot e^{M-Q}$ points, where Q denotes the quality of the solution produced by the system, and M denotes the quality of the best answer produced by any system for the current instance, for M normalized to 100.

Taking into account that an incorrect answer cause the whole benchmark to pay no points, three scenarios may come out: timeout, unsatisfiable instance, and solution produced. It is hence worth noting that points of groups (1), (2) and (3-4-5) cannot be rewarded for the same instance.

The overall score of a system for an optimization problem P is given by the sum

$$S(P) = S_{opt}(P) + S_{time}(P)$$

where $S_{time}(P)$ is intended as defined above.

In the present competition, for each problem domain we set $t_{out} = 600$ seconds and $\alpha = 50$; N has been set to 10 for the System Track, while varied from problem to problem for the Model & Solve Track, reaching up to 15 instances per single benchmark problem.