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Title: Explainable constraint solving and optimization

As artificial intelligence (AI) tools employ more advanced reasoning mechanisms and computation, it becomes increasingly difficult to understand why certain decisions are made. Explainable AI research aims to fulfill the need for trustworthy AI systems that can explain their reasoning in a human-understandable way. I am mainly interested in explainable symbolic AI, in particular constraint solving and optimization (including answer set programming, satisfiability solving).

In a recent preliminary study, we started working on a framework for explainable constraint solving (ECAI 2020), but that study erected many more research questions related to scalability (the ability to explain large instances), generality (the ability to answer different types of questions) and interactability (the ability to interact in a natural and fluent way with a user).

In am interested in research in the general area as well as in related fields such as explainable planning. Possible topics include:

- Efficient algorithms for explanation generation (both for satisfiable and unsatisfiable problems), for instance building on existing (maximal) satisfiability solvers
- Researching conceptual questions as to what constitutes a “good” explanation in the context of constraint solving
- Researching notions of abstraction in the context of explanations
- Researching aspects of interactivity in the context of explaining constraint problems.

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