A MaxSAT Approach to Inferring Explainable Temporal Properties

Rajarshi Roy Jean-Raphael Gaglione Daniel Neider Ufuk Topcu Zhe Xu

Problem statement: Infer a **Linear Temporal Logic (LTL)** formula from a set of trajectories labeled as positives and negatives, while being robust to potential **labeling errors** (i.e., allowing up to a given misclassification rate threshold).

Proposed algorithms: Two sound and complete algorithms:

1. A **MaxSAT** based approach, that guarantees a minimal inferred LTL formula under the problem constraints.
2. A **Decision Tree** learning algorithm based on the first algorithm, designed to reduce the computation time.

Experimental results: Comparison with Neider and Gavran[1] algorithms. Proposed algorithms usually produce shorter LTL formulas in less computation time when operating on noisy data.

[1] Learning Linear Temporal Properties, FMCAD 2018