CTL-RP: A Computational Tree Logic Resolution Prover

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Context of the work:

- Interested in CTL: Extension of propositional logic with temporal operators $A\Box, A\Diamond, A\bigcirc, A\mathcal{U}, A\mathcal{W}, E\Box, E\Diamond, E\bigcirc, E\mathcal{U}$ and $E\mathcal{W}$. 
Contribution:

- We have developed a refined resolution calculus $R_{CTL}^{\succ,S}$ for CTL.
  - $R_{CTL}^{\succ,S}$ requires transformation of an arbitrary CTL formula into a normal form $SNF_{CTL}^g$ for CTL.
  - $R_{CTL}^{\succ,S}$ includes 8 step resolution rules and 2 eventuality resolution rules.
- We have implemented $R_{CTL}^{\succ,S}$ in a theorem prover called CTL-RP.
1. CTL-RP is the first implemented resolution theorem prover for CTL.

2. CTL-RP implements the calculus $R_{CTL}^{\succ, S}$.
   - Transform most of the $SNF_{CTL}^{g}$ clauses into first-order clauses.
   - Utilise first-order resolution to emulate step resolution.
   - Reuse implementation of the first-order theorem prover SPASS.
   - Require extension of SPASS with an implementation of the loop search algorithm for eventuality resolution.

3. We have compared CTL-RP with another tableau-based theorem prover Tableau Workbench.
   (Some experimental results are presented on the poster).