Optimal Control of Markov Decision Processes with Temporal Logic Constraints

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This toolbox automatically generates an optimal control policy for a Markov Decision Process (MDP) that maximizes the probability of satisfying a Linear Temporal Logic (LTL) formula and minimize the expected cost in between satisfaction of a given proposition.

For more detail of the algorithm that produces the policy, please see [[1]](https://sites.bu.edu/hyness/optimal-ltl/#1). This software calls open source software [[2]](https://sites.bu.edu/hyness/optimal-ltl/#2) and [[3]](https://sites.bu.edu/hyness/optimal-ltl/#3).

**Requirements**

– Mac OS X 10.6, Linux and Windows (Linux and Windows should work, but let me know if there is any issue)  
– MATLAB 2010b or later with Bioinformatics toolbox (for SCC computation)

**Download**

[Optimal\_Control-LTL package](https://calinbelta.com/wp-content/uploads/2024/01/Optimal_Control-LTL.zip)

**How to use**

Download the software package: [Optimal\_Control-LTL package](https://calinbelta.com/wp-content/uploads/2024/01/Optimal_Control-LTL.zip) and run **ACPCLTL.m**

**References**

[1] Xu Chu (Dennis) Ding, Stephen L. Smith, Calin Belta, and Daniela. “Optimal Control of Markov Decision Processes with Temporal Logic Constraints”, submitted to Transactions on Automatic Control.

[2] “LTL2DSTAR”, <http://www.ltl2dstar.de/>.

[3] “LTL2BA,” [http://www.lsv.ens-cachan.fr/&#126gastin/ltl2ba/index.php](http://www.lsv.ens-cachan.fr/~gastin/ltl2ba/index.php).