Model Checking (SS 2024) Homework 7

Deadline: May 27, 2024, 9:00 am
Submit your solution through TeachCenter

Task 1. [50 points] From LTL to Büchi Automata

Given an LTL formula $\varphi := (\, a \; U \; (Xb))$.

Transform φ into a Generalized Büchi Automata A_φ such that A_φ accepts exactly all the computations that satisfy φ. Use the algorithm from Vardi and Wolper that we discussed in the lecture. You can also find the algorithm on page 98 of the Model Checking book.

Task 2. [50 points] Büchi Games

Consider the definition of games defined in the lecture slides.

The Büchi winning condition is defined over a set of accepting states $F \subseteq Q$. Player 0 wins a game, if during the play, states in F have been visited infinitely often. The winning region W_0 for Player P0 is the set of all states from which Player P0 can enforce to win.

- Give the Pseudo Code to compute winning region W_0 in a game graph $G = <Q, E>$ with the Büchi Winning condition defined over the accepting states $F \subseteq Q$. Use the operate $Force(X)$ as defined in the lecture.
- Compute the Winning region W_0 for the following Game Graph, using the set of accepting states $F = \{q_1, q_3, q_5\}$. Give the intermediate steps of your algorithms (sets of states computed per iteration).