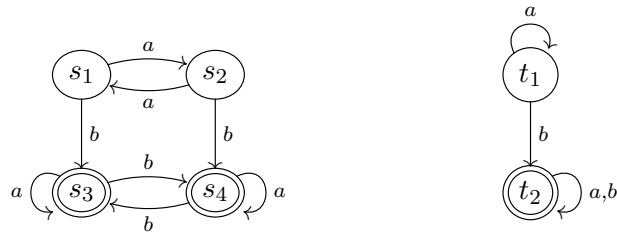


Exercises October 22

Coalgebra 2012-2013

Exercise 1. Consider the two automata below



Show that s_1 and t_1 accept the same language (using coinduction).

Exercise 2. A Moore automaton with inputs in A and outputs in B is a pair $(S, \langle o, t \rangle)$ where S is a set of states, $o: S \rightarrow B$ is the output function and $t: S \rightarrow S^A$ is the transition function.

- (i) Write the explicit definition of the functor that characterizes Moore automata as coalgebras. Give the definition of the functor on objects and arrows and show that it is indeed a functor.
- (ii) Moore automata are a slight variation on deterministic automata. More precisely, the codomain of the output function is changed from 2 to B . Similarly the carrier set of the final coalgebra for Moore automata is B^{A^*} (in contrast to 2^{A^*}). Provide the coalgebra structure on the final coalgebra and show that indeed this is the final coalgebra for the functor you provided in (i).

Exercise 3. A Mealy automaton with inputs in A and outputs in B is a pair (S, t) where S is a set of states, and $t: S \rightarrow (B \times S)^A$ is the transition function. Characterize the final coalgebra for Mealy automata. (hint: use the previous exercise).