

RL and Planning Under Uncertainty (ANU, Sem2, 2008)
Lab 5: Algebraic Decision Diagrams & MDPs
Lab Instructor: Scott Sanner

READ CHAPTER 3 THROUGH 3.3 OF SANNER'S THESIS!!!

Agenda:

1. Download *mdp_dd.tgz* from the course website. See README.DD and README.MDP for instructions on decision diagrams and the Java version of SPUDD.
2. How can you build ADDs from arbitrary expressions?
 - a. If $v_1=1$ then 5 else 2
 - b. If $v_1=1$ then 5 else (If $v_2=1$ then 3 else 2)
 - c. [If $v_1=1$ then 5 else 2] +
[(If $v_1=1$ then 5 else 2) *
(If $v_1=1$ then 5 else (If $v_2=1$ then 3 else 2))]
3. Construct expressions for linearly- and exponentially-sized ADDs of arbitrary numbers of variables.
4. Construct two single binary operations (either +,*, or max) on your linearly-sized ADDs that yields linear- & quadratically-sized results.
5. Now use Affine ADDs (AADDs) in place of ADDs, any space savings? For further reading see Chapter 3 of Sanner's thesis or...

S. Sanner, and D. McAllester (2005). Affine algebraic decision diagrams (AADDs) and their application to structured probabilistic inference. In Proceedings of the 19th International Joint Conference on AI (IJCAI-05).

6. Review the SPUDD factored MDP file format, for example 'prob/mdp/ex/coffee.dat'. Can you construct a factored MDP that has a linearly-sized solution in the number of variables? How about an exponentially-sized solution in the number of variables?