香港浸會大學理學院
HKBU Faculty of Science

for favour of posting

DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

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Time:	17 March 2009 (Tuesday) 10:00 am – 12:00 nn (35 mins presentation and 15 mins Q & A)
Venue:	T909, Cha Chi Ming Science Tower, HSH Campus

"POMDP Compression and Decomposition via Belief State Analysis"

Abstract

Partially observable Markov decision process (POMDP) is a commonly adopted mathematical framework for solving planning problems in stochastic environments. Computing the optimal policy of POMDP for large-scale problems is known to be intractable. In this thesis research, we propose a hybrid approach for compressing POMDP to improve its tractability. A novel orthogonal non-negative matrix factorization (NMF) is proposed and incorporated into a value-directed framework for ensuring the quality of the computed policies after the compression. In addition, we propose to decompose POMDP problems by clustering belief states where the clustering criterion function is designed to minimize the inter-cluster transition probabilities so as to reduce the formulation accuracy loss due to the decomposition. To reduce the additional compression overhead, we propose to apply the interior-point gradient acceleration to NMF and have derived an accelerated version. Also, we also introduce an eigenvalue analysis to study the compressibility of a POMDP problem with respect to our proposed methods. All the proposed methodologies have been evaluated empirically based on some commonly used benchmark problems and compared with other existing POMDP compression approaches. They have been demonstrated to give superior performance in obtaining high quality policies at a much lower dimensionality of the belief state space, and thus much reduced computational time.

***** ALL INTERESTED ARE WELCOME *****