

CSC 7251/ 7260 2007-08

Total number of Project = 4

Project 1	Supervisor	Prof. LEUNG Ho Fung
	Project Title	Teleo-Reactive Programs and Agent Replanning in Dynamic Environment
	Description	<p>Remember that in CSC7112 we talked about hierarchical planning as well as the open minded commitment strategy of BDI agents? Some years ago Nilsson proposed an interesting problem concerning Teleo-Reactive programs and the triple tower architecture (see this paper for details). He showed how agents could be programmed so that they were so robust that they could automatically recover from external disruption during plan execution. The agents are open minded, yet very persistent and robust.</p> <p>One problem with this approach is that such plans presented as Teleo-Reactive programs are not automatically generated. In this project, we aim to research into the problem of automatic generation of TR programs as plans for open minded agents, which will be executed in an open and dynamic environment. The project is basically an interesting research project instead of a development project. Students are expected to work individually (though discussion and collaboration is encouraged).</p>
	References	
	No. of Students	Unlimited (an individual project)
Project 2	Supervisor	Prof. LEE Ho Man Jimmy
	Project Title	Non-standard Constraint Processing
	Description	<p>Industrial applications such as scheduling, binpacking, and resource allocation are instances of classical constraint satisfaction problems (CSP's). The expressive power of classical CSP's, however, has been shown to be insufficient to model some real-life problems, in which alternatives, priorities, conditions and changes in time play an essential role. Moreover, one is often confronted with over- or under-constrained problems. The difficulties give rise to the recent hot research topics in non-standard CSP's, which include, but not limited to, partial CSP's, hierarchical CSP's, fuzzy CSP's, relaxation of over-constrained CSP's, etc.</p>

On the other hand, the essential difficulty of CSP's induced much interest in solution techniques which may be appropriate to handle 'softer' CSPs. The non-standard CSP's often require or make possible the application of other solution methods than deterministic search. In this project, you will study one form of non-standard CSP's, and experiment and develop solution techniques.

References

1. J. Larrosa & T. Schiex. Solving Weighted CSP by Maintaining Arc Consistency. Artificial Intelligence. An International Journal. 159 (1-2): 1-26, 2004.
2. J. Larrosa & T. Schiex "In the quest of the best form of local consistency for Weighted CSP". In Proceedings of the International Joint Conference on Artificial Intelligence IJCAI-03. Acapulco, Mexico, 2003.
3. S. de Givry, F. Heras, J. Larrosa & M. Zytnicki. Existential arc consistency: getting closer to full arc consistency in weighted CSPs. In International Joint Conference on Artificial Intelligence IJCAI 2005. Edinburgh, UK, 2005.

No. of Students

2 groups

Project 3

Supervisor

Prof. NG Kam Wing

Project Title

Caching Mechanisms for P2P-based Media-on-Demand Systems

Description

The basic idea of a P2P-based media-on-demand (MoD) system is to allow the peers accessing the same media object to share the media data cached in their buffers with each other, thus reducing the workload imposed on the media server of the system. In general, the media object is split into segments, which is the smallest playable media content unit, and peers will use the segments as the unit for requesting and caching the media data. Typically, a peer in the P2P-based MoD system will try to pre-fetch and cache some segments which are immediately before its current playback offset in case of network jitters, where the available bandwidth might decrease unpredictably. As these pre-fetched segments are cached some time before their playback deadlines, the peer could ensure the quality of the streaming service under an unstable network environment to some degree. After a segment is played, the peer could either discard it immediately, or keep it in its buffer for some time. When requesting a segment, the peer will first try to obtain it from some other peers which have cached this segment in their buffers; if failed, it will then request the segment from the server. Obviously, in such a peer-assisted mechanism, in order to improve the system's service capacity, it is essential to increase the "hit

ratio” of the segment request among the peers, especially when the server’s capacity is limited. In this project, we focus on improving the performance of the P2P-based MoD systems by using novel caching mechanisms.

References 1. Ye Tian, Di Wu, and Kam-Wing Ng, “A Novel Caching Mechanism for Peer-to-Peer Based Media-on-Demand Streaming”, Elsevier Journal of System Architecture, to be published.

No. of Students 1-2

Project 4

Supervisor **Prof. NG Kam Wing**

Project Title Optimizing the Lookup Performance of Distributed Hash Table Systems under Churn

Description In recent years, the distributed hash table (DHT) has emerged as a promising approach to build a simple and yet efficient infrastructure for large-scale distributed applications, such as P2P file-sharing systems, P2P storage systems, content distribution networks, etc. A DHT is a hash table whose table entries are distributed among different peers located at arbitrary locations Different from traditional distributed systems, P2P systems are highly dynamic as peers may join or leave frequently. Such phenomenon of node dynamics is referred to as “churn”. For a DHT system, churn may cause the routing entries to become invalid and deteriorating its lookup performance greatly. In this project, we focus on improving the lookup performance of DHT systems under churn.

References 1. Di Wu, Ye Tian and K.W. Ng, “An Analytical Study on Optimizing the Lookup Performance of Distributed Hash Table Systems under Churn”, Concurrency: Practice and Experience, John Wiley, Volume 19 Issue 4, pp. 543-569, 2007.

No. of Students 1-2