Petri Net Plans
General documentation

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Introduction

Petri Net Plans (PNP) is a formalism for high level description of complex plans (i.e., set of actions interacting in a complex way). PNP is useful to program cognitive agents (such as robots, videogame agents, multi-robot/multi-agent systems, etc.).

PNPs are inspired to languages for reasoning about actions, yet they are more expressive than most of them, offering a full fledged set of operators for dealing with non-instantaneous actions, sensing actions, action failures, concurrent actions and cooperation in a multi agent context.
PNPs include also choice operators used for non-deterministic execution and for learning in the plan space through a Reinforcement Learning algorithm.

PNPs are more expressive than Finite State Machines (FSM) and allow for automatic plan analysis, which can provide formal guarantees on the performance of the plans. Execution of PNPs is extremely efficient and allows the design of real-time pro-active and reactive behaviors.

PNPs have been used in several robotic applications, including soccer **(Best Demo Award at AAMAS 2008),** search and rescue, surveillance, multi-robot cooperation, social robots, etc.

Resources

Web site: http://pnp.diag.uniroma1.it

github: https://github.com/iocchi/PetriNetPlans

github wiki: https://github.com/iocchi/PetriNetPlans/wiki

Docker hub: https://hub.docker.com/repository/docker/iocchi/pnp

Scientific articles

V.A. Ziparo, L. Iocchi, Pedro Lima, D. Nardi, P. Palamara. Petri Net Plans - A framework for collaboration and coordination in multi-robot systems. Autonomous Agents and Multi-Agent Systems, vol. 23, no. 3, pp. 344-383, 2011.

E. Sebastiani, R. Lallement, R. Alami, L. Iocchi. Dealing with On-line Human-Robot Negotiations in Hierarchical Agent-based Task Planner. In Proc. of International Conference on Automated Planning and Scheduling (ICAPS), 2017.

V. Sanelli, M. Cashmore, D. Magazzeni, L. Iocchi. Short-Term Human Robot Interaction through Conditional Planning and Execution. In Proc. of International Conference on Automated Planning and Scheduling (ICAPS), 2017.

Luca Iocchi, Laurent Jeanpierre, Maria Teresa Lazaro, Abdel-Illah Mouaddib. A Practical Framework for Robust Decision-Theoretic Planning and Execution for Service Robots. In Proc. of International Conference on Automated Planning and Scheduling (ICAPS) 2016: 486-494, 2016.

Fabio Maria Carlucci, Lorenzo Nardi, Luca Iocchi, Daniele Nardi. Explicit representation of social norms for social robots. In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2015: 4191-4196.

L. Nardi and L. Iocchi. Representation and Execution of Social Plans through Human-Robot Collaboration. In Intern. Conf. on Social Robotics. 266-275. Springer International Publishing, 2014.

E. Bastianelli, D. Bloisi, R. Capobianco, F. Cossu, G.Gemignani, L. Iocchi, D. Nardi. On-line Semantic Mapping. In 16th International Conference on Advanced Robotics, 2013.

P. Palamara, V. Ziparo, L. Iocchi, D. Nardi, P. Lima, H. Costelha. A robotic soccer task using Petri Net Plans. In Proc. of 7th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS), 2008.

(See more on PNP web site)

Tutorials

Main tutorial
https://docs.google.com/document/d/1k9010Ih97Cr6_wcB3hjiyZzdf_JtrkaXPFaJAhTO36g

Video tutorials
https://www.youtube.com/playlist?list=PLyk5DuHplcDe0G4vwWnokdsVCD5hImMW-

Installation instructions

Available in Main Tutorial e in Video Tutorial 1.

Examples and demos

Available in Main Tutorial e in Video Tutorials.