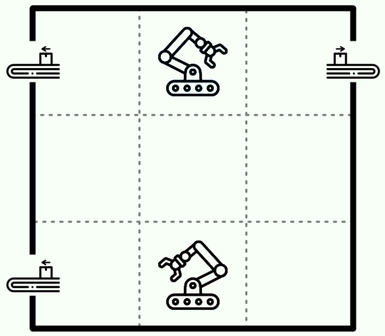
Permissiveness for Strategy Adaptation

Ashwani Anand, Satya Prakash Nayak, and Anne-Kathrin Schmuck

MPI-SWS, Germany

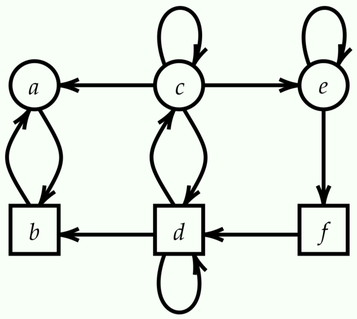
1 2 3

Two Cyber-Physical Systems



- Two systems with own specifications
- Sharing the same workspace
- Independent policies might not exist

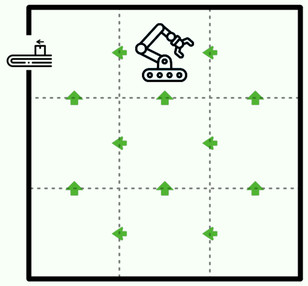
Game on Graphs



$\phi_0 = \square\Diamond d$
$\phi_1 = \Diamond\square\{c, d, e\}$
$\phi_2 = \Diamond\square\{c, d, f\}$

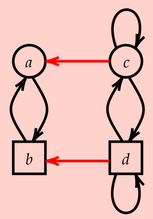
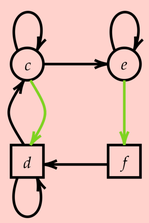
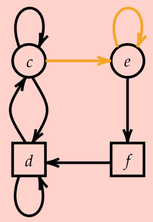
- Two players with own objectives
- Sharing the same game graph
- Independent strategies might not exist

Strategy Templates

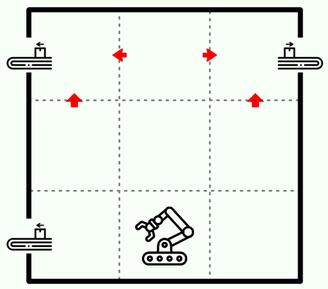


- Gives choices to the system,
- Computable in polynomial time, if environment is helpful,
- Matches best known complexity, for adversarial environment.

Templates

Safety	Group liveness	Co-liveness
		
Never take these actions	Take one of these actions infinitely	Take these actions only finitely often

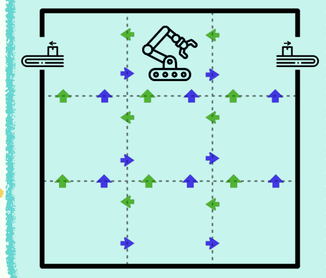
Assumption Templates[1]

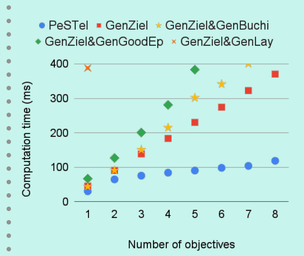


- Permissive for the environment,
- Computable in polynomial time, for any omega-regular objective
- Existing approaches require solving an NP-hard problem

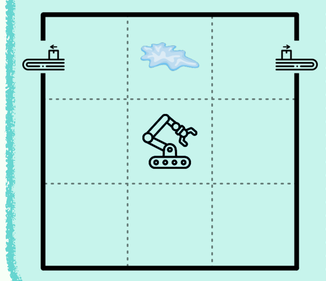
Applications

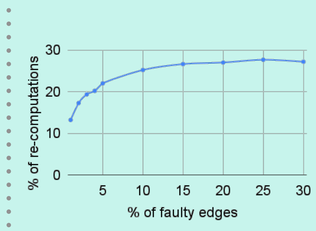
Composition[2]





Strategy Adaptation[2]





Negotiation[3]