Graph Games AND THE ASSUMPTIONS ON ENVIRONMENT

MPI-SWS PRESENTS A CMMRS POSTER
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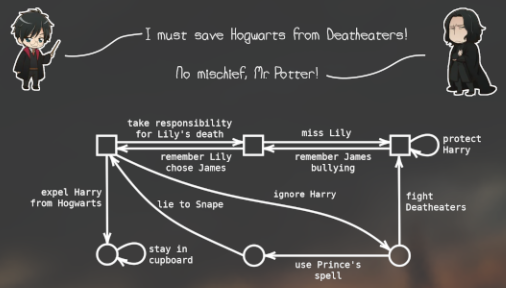


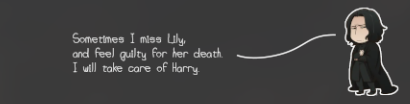
-Two player games are used to model many important problems of computer science and cyber physical systems.

-Harry has a winning objective, and needs to find a strategy to win from a given vertex. Requires assumption that Snape is adversarial.

-Finding a strategy for parity objective takes quasipolynomial time.

-Harry might not be able to satisfy the objective, if Snape acts adversarially.

-Snape might be a good person, and might even help Harry.



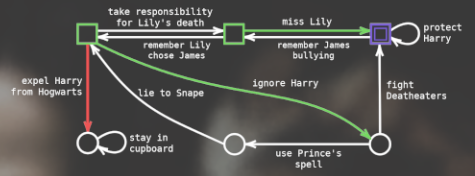
Question: How can Snape help Harry satisfy his objective? What can Harry assume about Snape's behavior?

-Harry must not expect too much from Snape!

-Harry needs SIM assumptions on Snape:
>Sufficient enough for him to be able to satisfy the objective,
>Implementable by Snape,
>Maximally permissive, allowing all non-adversarial behaviors.

Büchi objective

-Visit the marked vertices infinitely often.



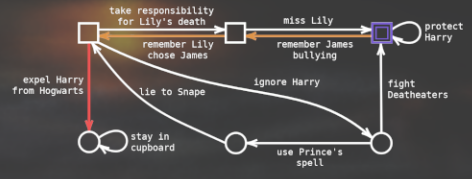
-We compute the following SIM assumption:

>safety assumption: never take the red edge,

>group liveness assumption: if green vertices are visited inifnitely often, then take green edges infinitely often.

coBüchi objective

-Eventually stay in the marked vertices.



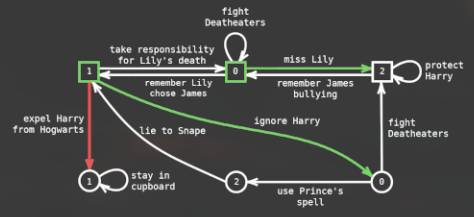
-We compute the following SIM assumption:

>safety assumption: never take the red edge,

>coliveness assumption: eventually stop taking the orange edges.

Parity objective

-Maximum of label seen infinitely often is even.



-We compute the following SIM assumption:

>safety assumption: never take the red edge,

>conditional group liveness assumption: if label 1 is visited infinitely often, and green vertices are visited infinitely often, then infinitely often take green edges.

Experiments

Name	#vertices	#edges	#colors	SIMpA	GIST
lilydemo19	108	162	4	0.009	0.167 *
amba decomposed tburst4	1061	1618	4	0.112	685.687
amba decomposed lock 3	1558	2336	3	0.074	2999.650
lilydemo17	3102	5334	7	0.220	Timeout
ltl2dba07	4368	6657	4	0.399	2085.74 *
amba decomposed arbiter	36,824	67,018	4	203.104	Timeout
amba decomposed encode 14	1,245,861	1,869,092	3	2960.110	Timeout

Conclusions

-Our algorithm runs in polynomial time, and works much better than the previous works, in practice.

-Our algorithm always succeeds in computing SIM assumptions, while previous ones fail to even compute sufficient assumptions.

-Our algorithm is the first to compute maximally permissive assumptions.