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# Quantitative Reductions and Vertex-Ranked Games

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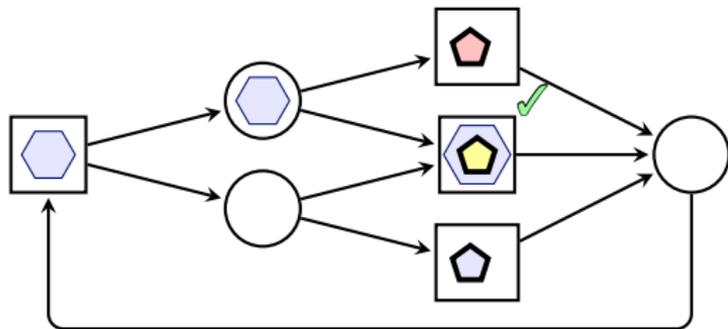
Saarland University

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Highlights 2017 - London

# Reachability Games

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Winning condition: Play reaches either  or  or 

# The Big Picture

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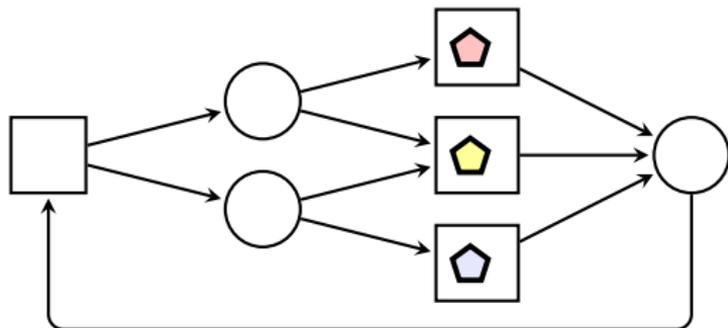
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Reachability



# Generalized Reachability: The Problem

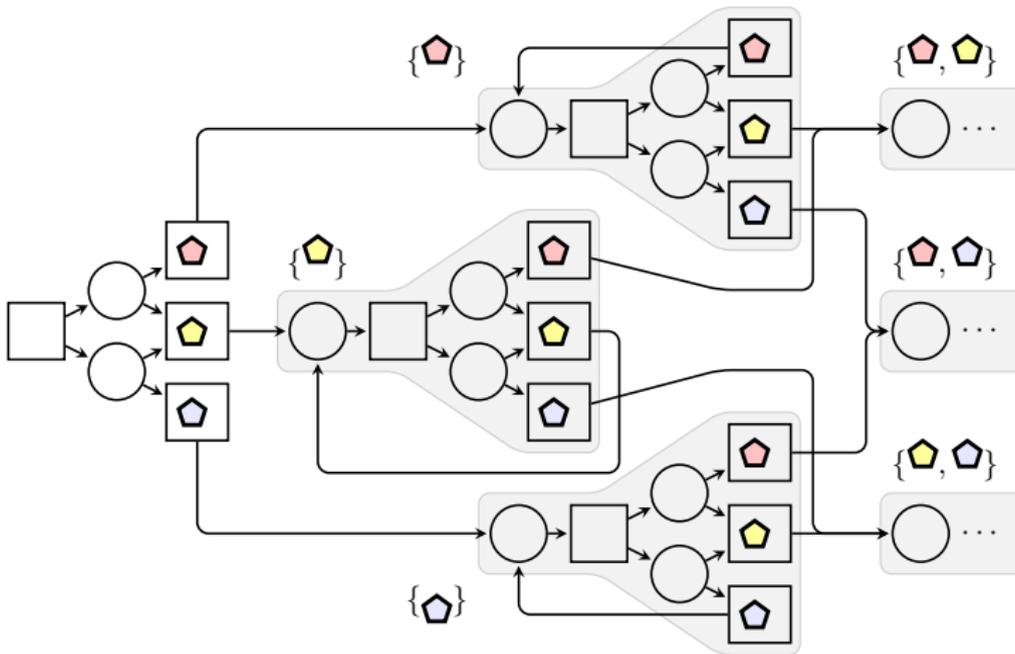
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Winning condition:

Reach one from  $\{\text{red pentagon}, \text{yellow pentagon}\}$  and one from  $\{\text{yellow pentagon}, \text{blue pentagon}\}$ .

# Generalized Reachability: One Solution



Winning condition: Reach some memory state  $S$  with  
 $S \cap \{\text{red}, \text{yellow}\} \neq \emptyset$  and with  $S \cap \{\text{yellow}, \text{blue}\} \neq \emptyset$

Reachability Condition

# The Big Picture

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Quantitative  
Generalized  
Reachability

Quantitative

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Qualitative

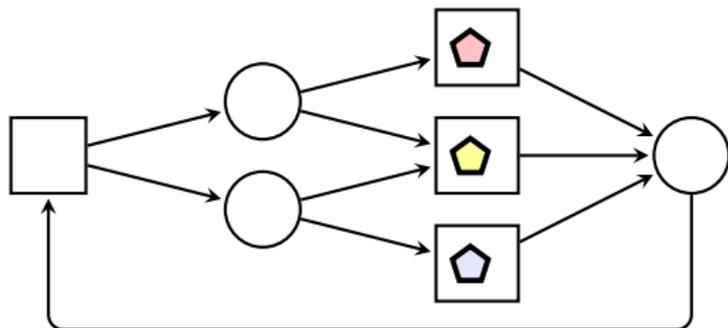
Reachability



Generalized  
Reachability

# Quantitative Generalized Reachability

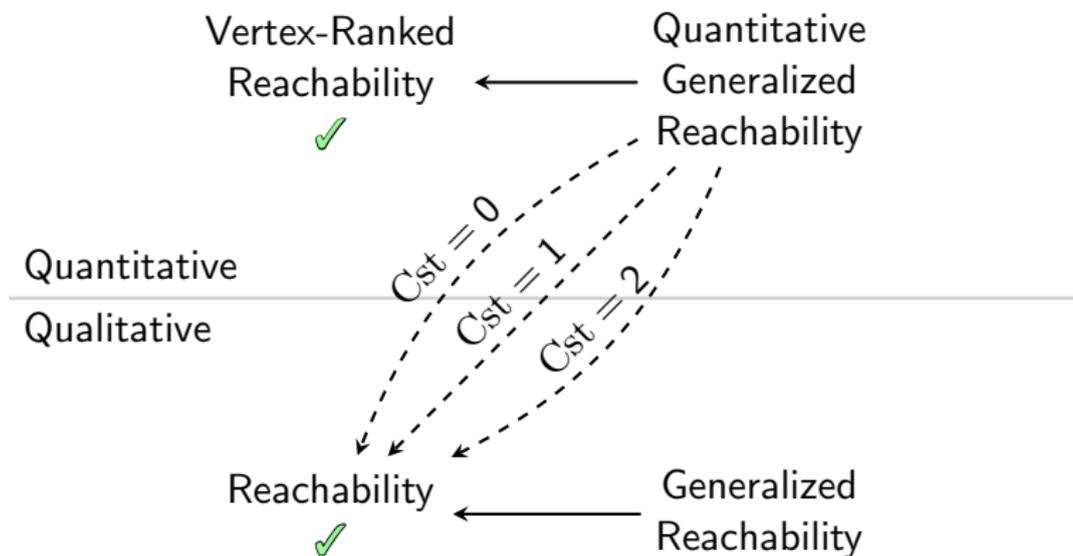
Assign cost to each play.



$$\text{Cst}(\rho) = \begin{cases} 0 & \text{if } \{\text{red pentagon}, \text{yellow pentagon}\} \text{ and } \{\text{yellow pentagon}, \text{purple pentagon}\} \text{ are visited} \\ 1 & \text{if one of them is visited} \\ 2 & \text{if neither is visited} \end{cases}$$

# The Big Picture

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# Conclusion

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## Contribution

- Lifted reductions to quantitative games
- Solved wide range of general-purpose quantitative games

## Next Steps

