Optimally Resilient Strategies in Pushdown Safety Games

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Highlights 2020
\[ \omega + 1 \quad \omega + 1 \quad \omega + 1 \quad \omega + 1 \quad \omega + 1 \quad \omega + 1 \quad \cdots \]

\[ 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad \cdots \]

0
Theorem

Player 0 has a (globally) optimally resilient strategy in every pushdown safety game with disturbances.

Note

No longer true in infinitely branching arenas!
Lemma
Let $G$ be a pushdown safety game with initial vertex $v_I$. If $r(v_I) \neq \omega + 1$, then $r(v_I) < 2^{|G|} \cdot |\Gamma|^{|G|}$ (not the actual value).

Note
Bound is tight for pushdown and one-counter arenas.
Theorem

The following problem can be solved in triply-exponential time: “Given a pushdown safety game $\mathcal{G}$ with initial vertex $v_i$, determine the resilience value of $v_i$”. Also, an optimally resilient strategy from $v_i$ can be computed in triply-exponential time.

Note

None.
Theorem
The following problem can be solved in polynomial space: “Given a one-counter safety game $G$ with initial vertex $v_I$, determine the resilience value of $v_I$”.

Note
No strategy computed.
Thank you for watching.

A longer version of this talk is available on the YouTube channel of MFCS 2020 (linked from my homepage)

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