

Monte-Carlo Tree Search by Best Arm Identification



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Emilie Kaufmann

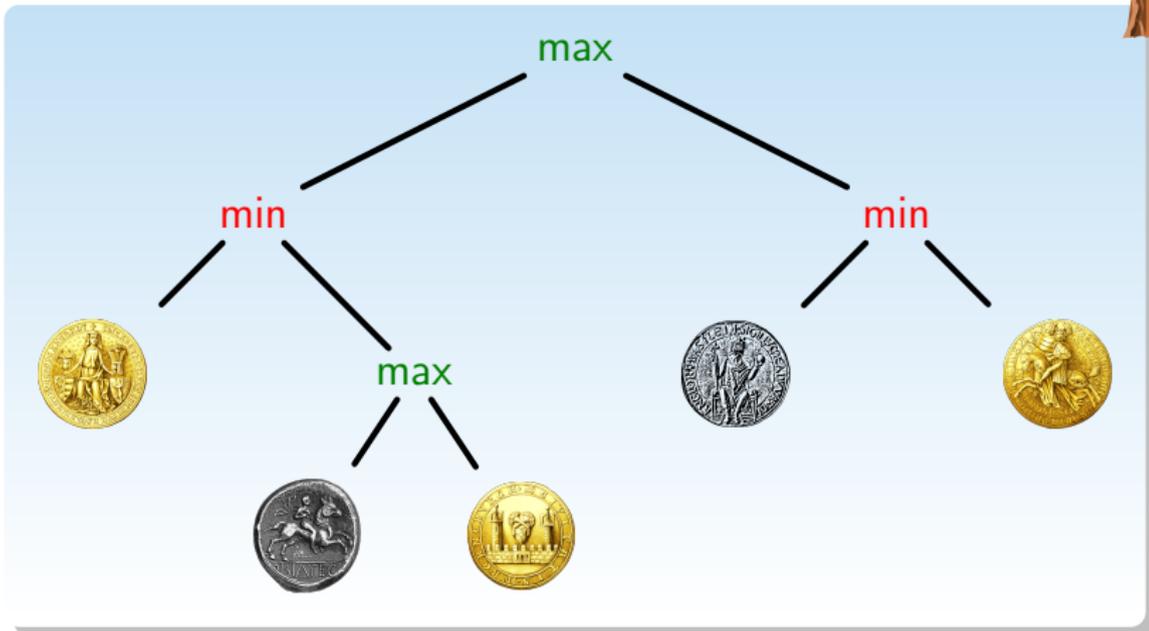


Wouter M. Koolen



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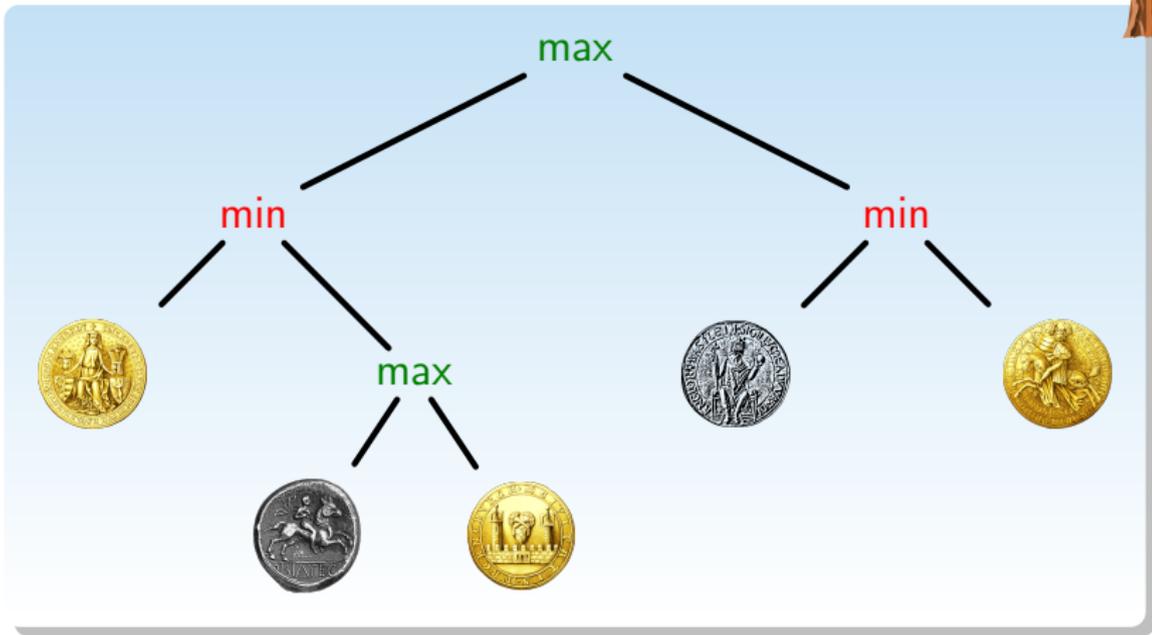
Model



Maximin Action Identification Problem

Find **best move at root** from samples of **leaves**.

Model



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guarantee?

Methods for Best Arm Identification



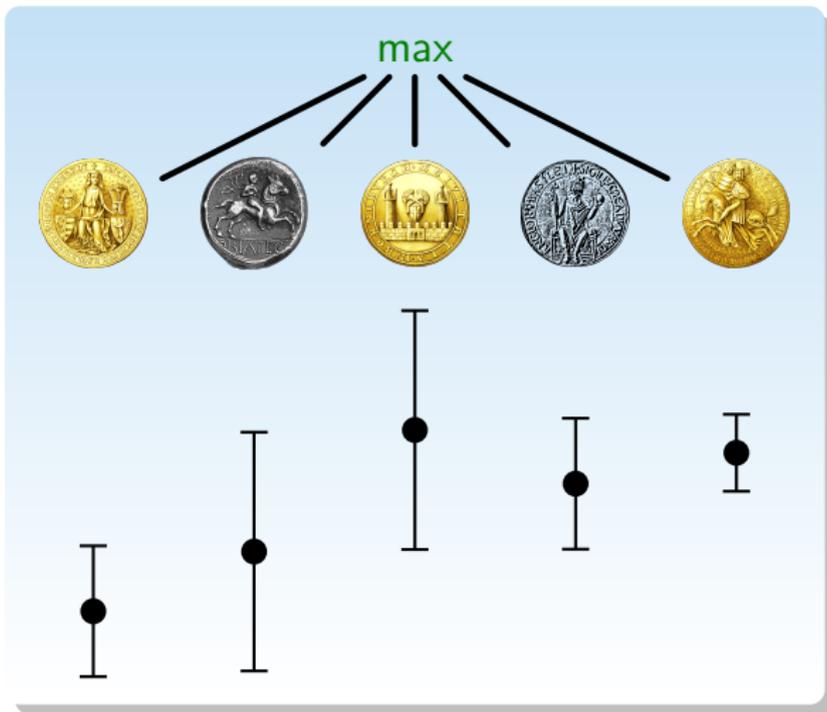
Methods for Best Arm Identification



LUCB,
UGapE,

...

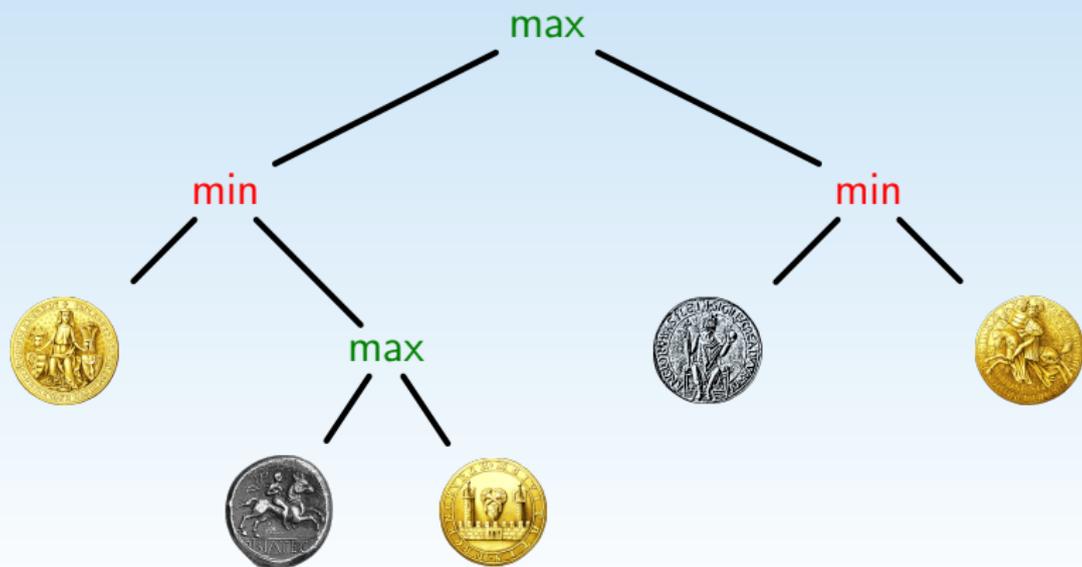
Methods for Best Arm Identification



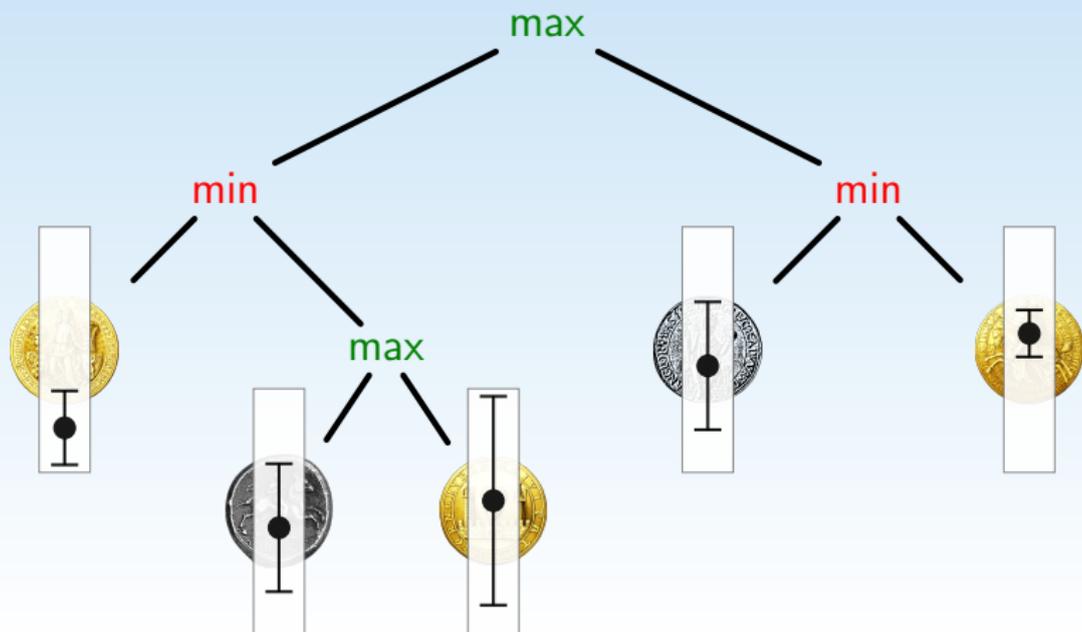
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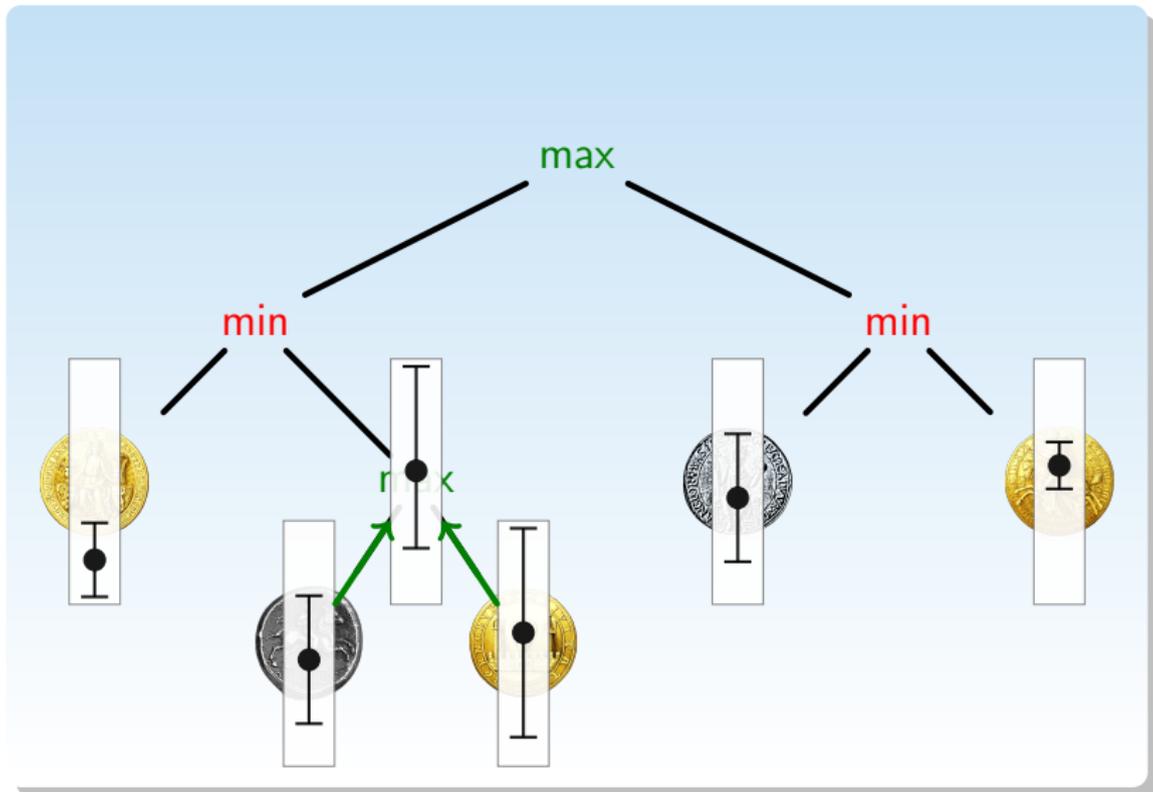
Reduction of MCTS to BAI



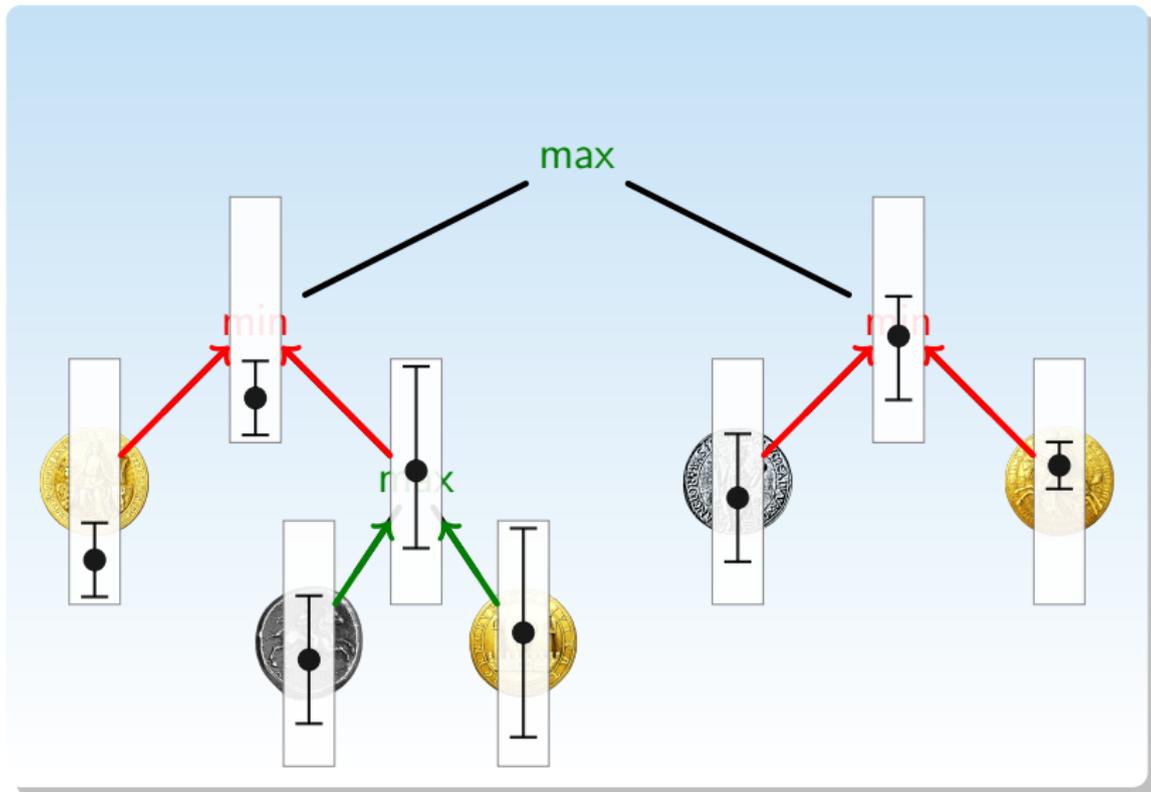
Reduction of MCTS to BAI



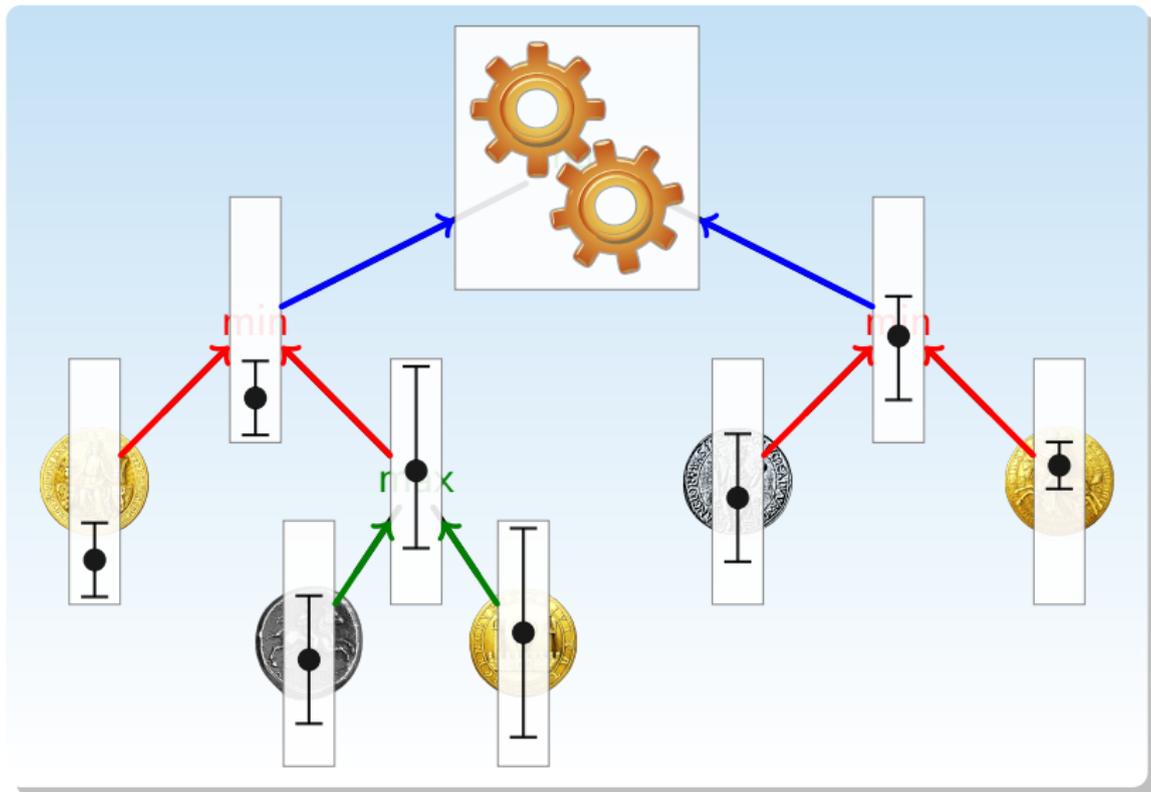
Reduction of MCTS to BAI



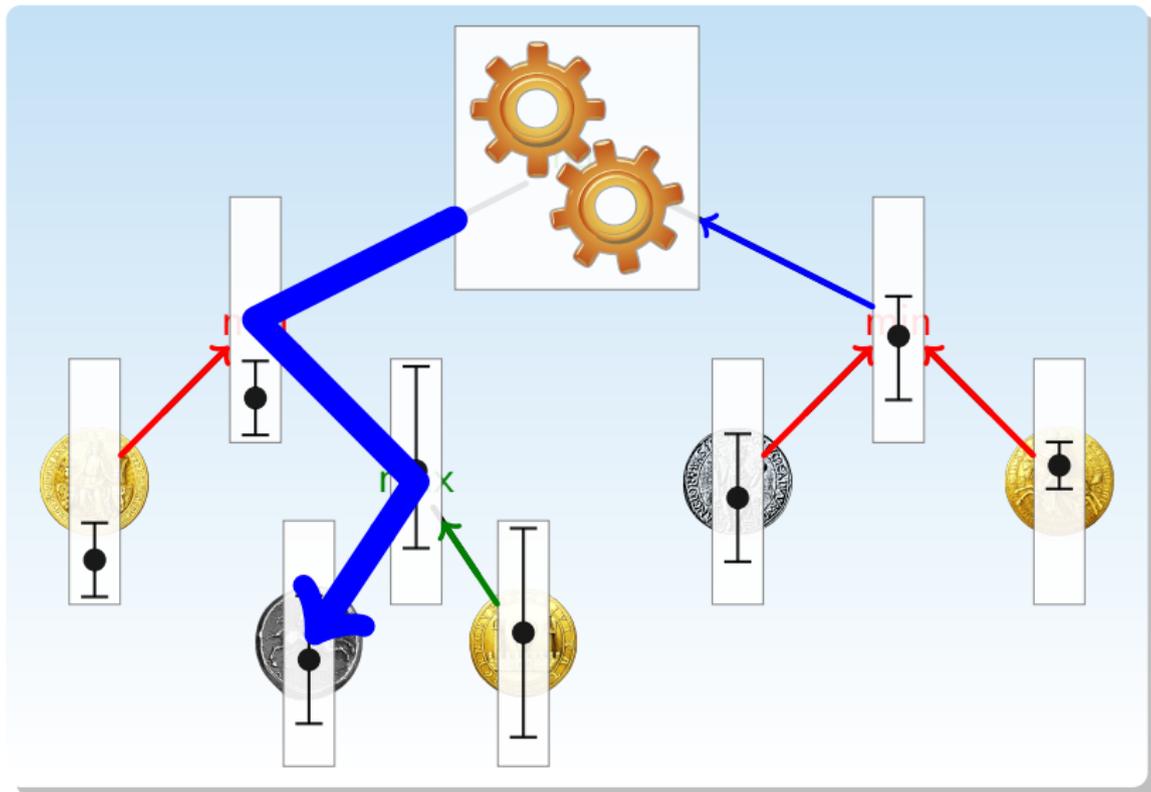
Reduction of MCTS to BAI



Reduction of MCTS to BAI



Reduction of MCTS to BAI





Correctness

(ϵ, δ) -PAC algorithms

Efficiency

Sample complexity function of *leaf gaps* Δ_ℓ

$$O\left(\sum_{\ell \in \mathcal{L}} \frac{1}{\Delta_\ell^2 \vee \epsilon^2} \log\left(\frac{1}{\delta}\right)\right)$$

See you at 6:30, **Pacific Ballroom #3!**