Solving Extensive-form games

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Finding Nash equilibrium in imperfect information EFG

- Existence of pure strategy Nash not guaranteed
- Convert to normal-form game and find NE there
- Backward induction does not work
- Approximative regret minimizing methods
- LP based on sequence form
- Iterative building with sequence-form LP

Sequence-form representation

- Based on sequences
- Realization plans
- Even more compressed than behavioral strategies
- Extended utility function

Sequence-form LP

- $I(\sigma)$ returns the information set where the last action of the sequence σ took place
- $seq(I_i)$ returns sequence of player i which leads to I_i (there can be only one)

$$\max_{r_1,v} \quad v(I([])) \tag{1}$$

$$s.t.\ v(I(\sigma_2)) \leq \sum_{I_2 \in seq_1(I_2)=\sigma_2} v(I_2) + \sum_{\sigma_1 \in \Sigma_1} g_1(\sigma_1,\sigma_2) r_1(\sigma_1), \quad \forall \sigma_2 \in \Sigma_2 \tag{2}$$

$$r_1([]) = 1 \tag{3}$$

$$r_1(\sigma_1) = \sum_{a \in A(I_1)} r_1(\sigma_1 \cdot a), \quad \forall I_1 \in \mathcal{I}_1, \sigma_1 = seq(I_1) \tag{4}$$

$$r_1(\sigma_1) \geq 0, \quad \forall \sigma_1 \in \Sigma_1 \tag{5}$$