Dinosaur War: A Strategic Game of Utter Chance

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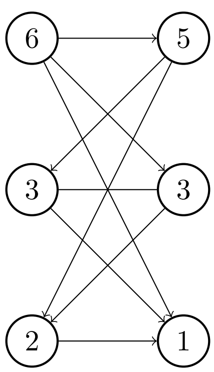
Abstract

TODO

1 The Game

2 Dominance Score



3 Dominance in Dino Matrices

$$\begin{array}{cc} & \begin{matrix}\mathbf{5}\end{matrix} \\ \begin{matrix}\mathbf{6}\end{matrix} & \begin{bmatrix} 1 \end{bmatrix} \end{array}$$

$$\begin{array}{cc} & \begin{matrix}\mathbf{3} & \mathbf{5}\end{matrix} \\ \begin{matrix}\mathbf{3} \\ \mathbf{6}\end{matrix} & \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \end{array}$$

Figure 1: Dinosaur Cards

$$
\left[\begin{array}{cccc}
 & \mathbf{1} & \mathbf{3} & \mathbf{5} \\
\mathbf{2} & \begin{array}{c|cc} & \mathbf{3} & \mathbf{5} \\ \hline \mathbf{3} & 1 & 0 \\ \mathbf{6} & 0 & 1 \end{array} & \begin{array}{c|cc} & \mathbf{1} & \mathbf{5} \\ \hline \mathbf{3} & 2 & 0 \\ \mathbf{6} & 0 & 2 \end{array} & \begin{array}{c|cc} & \mathbf{1} & \mathbf{3} \\ \hline \mathbf{3} & 2 & 1 \\ \mathbf{6} & 1 & 2 \end{array} \\
\mathbf{3} & \begin{array}{c|cc} & \mathbf{3} & \mathbf{5} \\ \hline \mathbf{2} & 0 & 0 \\ \mathbf{6} & 0 & 0 \end{array} & \begin{array}{c|cc} & \mathbf{1} & \mathbf{5} \\ \hline \mathbf{2} & 2 & 0 \\ \mathbf{6} & 0 & 2 \end{array} & \begin{array}{c|cc} & \mathbf{1} & \mathbf{3} \\ \hline \mathbf{2} & 2 & 0 \\ \mathbf{6} & 0 & 2 \end{array} \\
\mathbf{6} & \begin{array}{c|cc} & \mathbf{3} & \mathbf{5} \\ \hline \mathbf{2} & -2 & -1 \\ \mathbf{3} & -1 & -2 \end{array} & \begin{array}{c|cc} & \mathbf{1} & \mathbf{5} \\ \hline \mathbf{2} & 0 & 0 \\ \mathbf{3} & 0 & 0 \end{array} & \begin{array}{c|cc} & \mathbf{1} & \mathbf{3} \\ \hline \mathbf{2} & 1 & 0 \\ \mathbf{3} & 0 & 1 \end{array}
\end{array}\right]
$$

(a) Recursive game matrix

$$
\left[\begin{array}{cccc}
 & \mathbf{1} & \mathbf{3} & \mathbf{5} \\
\mathbf{2} & (\mathit{1} + .5 = 1.5) & (-\mathit{1} + 1 = 0) & (-\mathit{1} + 1.5 = .5) \\
\mathbf{3} & (\mathit{1} + 0 = 1) & (\mathit{0} + 1 = 1) & (-\mathit{1} + 1 = 0) \\
\mathbf{6} & (\mathit{1} + -1.5 = -.5) & (\mathit{1} + 0 = 1) & (\mathit{1} + .5 = 1.5)
\end{array}\right]
$$

(b) Payoff matrix

Figure 2: $\{2, 3, 6\}$ vs. $\{1, 3, 5\}$

$$
\begin{array}{cc}
 & \begin{array}{ccc} \mathbf{1} & \mathbf{3} & \mathbf{6} \end{array} \\
\begin{array}{c} \mathbf{2} \\ \mathbf{3} \\ \mathbf{6} \end{array} &
\begin{bmatrix}
\begin{array}{cc} & \begin{array}{cc} \mathbf{3} & \mathbf{6} \end{array} \\ \begin{array}{c} \mathbf{3} \\ \mathbf{6} \end{array} & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \end{array} &
\begin{array}{cc} & \begin{array}{cc} \mathbf{1} & \mathbf{6} \end{array} \\ \begin{array}{c} \mathbf{3} \\ \mathbf{6} \end{array} & \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \end{array} &
\begin{array}{cc} & \begin{array}{cc} \mathbf{1} & \mathbf{3} \end{array} \\ \begin{array}{c} \mathbf{3} \\ \mathbf{6} \end{array} & \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} \end{array} \\
\begin{array}{cc} & \begin{array}{cc} \mathbf{3} & \mathbf{6} \end{array} \\ \begin{array}{c} \mathbf{2} \\ \mathbf{6} \end{array} & \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \end{array} &
\begin{array}{cc} & \begin{array}{cc} \mathbf{1} & \mathbf{6} \end{array} \\ \begin{array}{c} \mathbf{2} \\ \mathbf{6} \end{array} & \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \end{array} &
\begin{array}{cc} & \begin{array}{cc} \mathbf{1} & \mathbf{3} \end{array} \\ \begin{array}{c} \mathbf{2} \\ \mathbf{6} \end{array} & \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} \end{array} \\
\begin{array}{cc} & \begin{array}{cc} \mathbf{3} & \mathbf{6} \end{array} \\ \begin{array}{c} \mathbf{2} \\ \mathbf{3} \end{array} & \begin{bmatrix} -2 & -1 \\ -1 & -2 \end{bmatrix} \end{array} &
\begin{array}{cc} & \begin{array}{cc} \mathbf{1} & \mathbf{6} \end{array} \\ \begin{array}{c} \mathbf{2} \\ \mathbf{3} \end{array} & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \end{array} &
\begin{array}{cc} & \begin{array}{cc} \mathbf{1} & \mathbf{3} \end{array} \\ \begin{array}{c} \mathbf{2} \\ \mathbf{3} \end{array} & \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \end{array}
\end{bmatrix}
\end{array}
$$

(a) Recursive game matrix

$$
\begin{array}{cc}
 & \begin{array}{ccc} \mathbf{1} & \mathbf{3} & \mathbf{6} \end{array} \\
\begin{array}{c} \mathbf{2} \\ \mathbf{3} \\ \mathbf{6} \end{array} &
\begin{bmatrix}
(\mathit{1}+0=1) & (-\mathit{1}+.5=-.5) & (-\mathit{1}+1.5=.5) \\
(\mathit{1}-.5=.5) & (\mathit{0}+.5=.5) & (-\mathit{1}+1=0) \\
(\mathit{1}-1.5=-.5) & (\mathit{1}+0=1) & (\mathit{0}+.5=.5)
\end{bmatrix}
\end{array}
$$

(b) Payoff matrix

Figure 3: $\{2,3,6\}$ vs. $\{1,3,6\}$

4 Pieceyard

References

[1] Wikipedia: https://en.wikipedia.org/wiki/Minimax_theorem