

CCIS 4100: in-class exercise on minimax

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Complete the following either on your own or in small groups.

Street fighter II



Figure 1: Ryu (left) v. Ken in Street Fighter 2. (I am old.)

Street fighter II is a classic arcade game in which international characters gather in exotic locales to brawl, somewhat inexplicably.

We are going to assume a (very) simplified version of this game wherein Ryu and Ken (pictured) *take turns* performing one of the following two options: *punch* (P) or *block* (B). The *block* action has no effect on immediate effect on health, but means that a punch on the subsequent turn from the opponent will not affect health.

In these video games, health was always a scalar, and one lost the match when this reached 0. We will assume the score at any node is (Ryu's health) - (Ken's health) - so Ryu is the *max* agent and Ken the *min*. Thus at depth 0, $s = 0$. Assume an unblocked punch (P) costs 10 points in health to the recipient.

1. Starting from depth 0 (where $S = 0$ because Ken and Ryu have equal health), draw three layers in the tree.

2. We assume Ryu (max) has the first turn. What is the ‘best’ action to begin with according to *minimax*? Or does it matter?
3. Ignoring minimax, but looking at the tree yourself, do you think there is a best action to take here? What is it and why? Do you think this highlights an issue with the minimax approach?
4. **bonus** (for those with extra time to think about). Imagine we removed the sequential turn-taking aspect here, and moves could be made simultaneously by Ken and Ryu. How would this effect minimax? Would the underlying approach remain useful? Other thoughts on how we might approach this?