The Game of Hog

Scott Lee
The Game

100
The Game

100

pig heads

dice
The Game

100
The Game

**Pig Out:** If any of the dice outcomes is a 1, the current player's score for the turn is the number of 1's rolled.

**Free Bacon:** A player who chooses to roll zero dice scores one more than the largest digit in the opponent's total score.

**Hogtimus Prime:** If a player's score for the turn is a prime number, then the turn score is increased to the next larger prime number.

**When Pigs Fly:** The score for a turn is limited to 25 points minus the number of dice rolled.
**The Game**

**Hog Wild:** If the sum of both players' total scores is a multiple of seven (e.g., 0, 7, 14, 21, 35), then the current player rolls special re-rolling dice. When re-rolling dice are rolled and the outcome is odd, they are rolled again exactly once.

**Swine Swap:** After the turn score is added, if one of the scores is double the other, then the two scores are swapped.

**Pork Chop:** A player may choose to roll -1 dice, which scores 1 point for the turn, but swaps the normal six-sided dice with four-sided dice for all subsequent turns. Subsequent rolls of -1 dice will continue swapping the dice back and forth.
Strategies vs. AI

**Base Strategy:** Always roll 4 dice
Strategies vs. AI

**Improvement 1: Invoke Pork Chop**
Strategies vs. AI

Improvement 1: Invoke Pork Chop

0.21
Strategies vs. AI

Improvement 2: Force a Swine Swap.
- Free Bacon (Roll 0)
- Pork Chop (Guaranteed 1 point)
Strategies vs. AI

Improvement 2: Force a Swine Swap.

- Free Bacon (Roll 0)
- Pork Chop (Guaranteed 1 point)
Strategies vs. AI

**Improvement 2:** Force a Swine Swap.
- Free Bacon (Roll 0)
- Pork Chop (Guaranteed 1 point)

**Improvement 3:** Prevent a Swine Swap.
- Free Bacon (Roll 0)
- Roll extra dice
Strategies vs. AI

**Improvement 2:** Force a Swine Swap.
- Free Bacon (Roll 0)
- Pork Chop (Guaranteed 1 point)

**Improvement 3:** Prevent a Swine Swap.
- Free Bacon (Roll 0)
- Roll extra dice
Strategies vs. AI

0.8873

vs. always rolling 4 dice
Strategies vs. Humans

???

vs. unknown strategy
Strategies vs. Humans

Issue 1: Unpredictable Pork Chop

- Turns into a mind game
Strategies vs. Humans

**Issue 1:** Unpredictable Pork Chop
- Turns into a mind game

**Issue 2:** Cannot predict opponent rolls
- Harder to trigger/prevent Swine Swaps
- Harder to trigger/prevent Hog Wild
Hog Contest

“A submission scores a match point each time it has an expected win rate above 50.0001%... Ties count as losses.”
Hog Contest

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“All strategies must be deterministic, pure functions of the current player scores... strategies based on the history of the game will be disqualified.”
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?? 13
?? 37
Hog Contest

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?? 13 ??    ?? 37 ??
Strategies vs. Humans

some hardcoded strategy
Strategies vs. Humans

some hardcoded strategy
Strategies vs. Humans

some hardcoded strategy
Strategies vs. Humans

some hardcoded strategy

winning strategy
Strategies vs. Humans

some hardcoded strategy

winning strategy
Strategies vs. Humans

some hardcoded strategy

winning strategy

final strategy
Strategies vs. Humans

Moves = [[5, 5, -1, 5, 0, 6, 5, 5, 0, 8, 6, 5, 4, 0, 4, 0, 0, 0, 0, 3, 5, 2, -1, 4, 5, 0, 4, 4, 4, 10, 5, 9, -1, 8, 7, 7, 6, 5, 5, 5, 4, 0, 0, 0, 0, 0, 4, 5, 5, 2, 0, 4, 0, 4, 0, 4, -1, 3, 0, 4, 0, 4, 0, 4, 0, 4, 6, 3, 5, 5, 7, 4, 5, 4, 5, 6, 5, -1, 4, 5, 4, -1, 4, 5, 4, 4, 2, -1, -1, -1, -1, -1, -1, -1, -1, -1],
[6, 4, 4, 4, 4, 5, 6, 6, 6, 0, 3, 5, 0, 5, 6, 4, 5, 5, 5, 4, 5, 6, 3, 0, 2, 5, 3...], ...]
Strategies vs. Humans

117 teams
114 wins
2 losses
0.9828 win rate
More About Hog

http://cs61a.org/proj/hog/