UC Berkeley EECS
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CS10 The Beauty and Joy of Computing

Lecture #19 Higher Order Functions II

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SELF-DRIVING CARS

PRO

- Fewer accidents – 90% of accidents caused by human error
- Efficient travel since can create convoys
- Huge efficiency gains if you can work + drive

CON

- Who gets sued when there's an accident?
- Handing control back to driver takes ~5 sec
- Very expensive
- Could be dangerous if they can't handle case

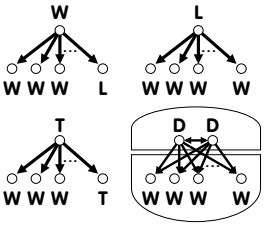
www.technologyreview.com/featuredstory/520431/driverless-cars-are-further-away-than-you-think/

I do research on Board Games…

- No chance, such as dice or shuffled cards
- Both players have complete information
  - No hidden information, as in Stratego & Magic
- Two players (Left & Right) usually alternate moves
  - Repeat & skip moves ok
  - Simultaneous moves not ok
- The game can end in a pattern, capture, by the absence of moves, or …

A Strong Solution visits every position

- For every position
  - Assuming alternating play
  - Value … (for player whose turn it is)
    - Winning (∃ losing child)
    - Losing (All children winning)
    - Tieing (!∃ losing child, but ∃ tieing child)
    - Drawing (can't force a win or be forced to lose)
  - Remoteness
    - How long before game ends?



Strong Solving Example: 1,2,…,10

- Rules (on your turn):
  - Running total = 0
- Rules (on your turn):
  - Add 1 or 2 to running total
- Goal
  - Be the FIRST to get to 10
- Example
  - Ana: "2 to make it 2"
  - Bob: "1 to make it 3"
  - Ana: "2 to make it 5"
  - Bob: "2 to make it 7" → photo
  - Ana: "1 to make it 8"
  - Bob: "2 to make it 10" I WIN!

7 ducks (out of 10)

Let's write code to determine value!

- 0 = Win
- 1 = Lose
- 2 = Win
- 3 = Win
- 4 = Lose
- 5 = Win
- 6 = Win
- 7 = Lose
- 8 = Win
- 9 = Win
- 10 = Lose

- P = Position
- M = Move
- We only need 3 blocks to define a game
  - Do Move M on Position P
    - → a new Position
  - Generate Moves from Position P
    - → list of Moves
  - Primitive Value of Position P
    - → {win, lose, tie, undecided}
- Let's write Value of Position P

Answer