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Lecture 1: Welcome and Introduction

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- <http://www.cs.washington.edu/370>
- All the information you need for the class is there
- Sign up for the mailing list!!!

Propositional Logic Puzzle

- Jim has built up a \$800 gambling debt. He has to travel from New York to Las Vegas to pay it back, or face a mafia hit job. A round-trip plane ticket costs \$150, and a bus ticket costs \$75. Jim has \$1,000.
- What is the most flexible and accurate description of what Jim's options are, in order to avoid angering the mafia?

Possible Answers

- Jim can buy a bus ticket
- Jim can buy a plane ticket
- Jim can buy a bus ticket or a plane ticket
 - If he buys both, he's in trouble
- Jim can buy either a bus ticket or a plane ticket, but not both

Propositional Logic

- System for assigning truth values (true or false) to statements that include basic assumptions and logical connectives, like OR, AND, and IMPLIES
- Mathematical basis for the stateless part of digital hardware design

Encoding Information

- Alice and Bob are spies. Bob is driving a car with tinted windows and two foreign dignitaries in the back. He wants to let Alice know who is in the car by signaling her with his fingers. Before the operation they knew that in the left seat could only be Mr D, Ms E or Mr F, and in the right seat could only be Ms G, Mr H, Ms I, Mr J or Ms K.
- How few fingers can Bob get away with using?

Two Possible Encodings

- Use one finger on the right hand to represent each of the right seat possibilities G, H, I, J, K, and one finger on the left hand to represent each of the left seat possibilities: A, B, C
 - # of fingers: 8
- Recognize that there are 15 possible pairs of dignitaries: AG, AH, ..., BG, ..., CK
- Use a unique pattern of raised fingers to represent each possible pair
 - # of fingers: 4

Discrete Data

- Computers must encode all information (numbers, colors, tones, etc.) as sequences of 1's and 0's
- All discrete data can be so encoded
- Different encodings are more or less efficient, depending on what you want to do with the data

Finite Memory

- A mysterious government agency (MGA) puts Jill on top of a mountain and tells her to report back when she has observed four days in sequence that are rainy, rainy, sunny and cloudy
- Unfortunately, Jill can't remember the weather from day to day
- The only material Jill is given are 5 index cards on which she can write anything before she embarks on her mission
- Can she pull it off?

One Solution

- Jill can write down a prefix of the sequence she is looking for on each of the cards (None, R, RR, RRS, RRSC)
- On each day she observes the weather and the card that is currently on top of the pile, and puts a new card on top of the pile

Finite State Machines

- Computers use finite state machines, which can remember some fixed number of bits of data
- On receiving each new input, a finite state machine can look at the input, the data currently in its memory and update the memory to some new pattern

Thanks for your Attention

- Remember to sign up for the mailing list!
- Start reading the assigned sections from the book
- Start looking at homework 1