

UNIVERSITY of WISCONSIN-MADISON
Computer Sciences Department

CS 202: Introduction to Computation Professor Andrea Arpaci-Dusseau

How can computation... help you make decisions?



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TV Series Recommendation System

TV Series Recommendation

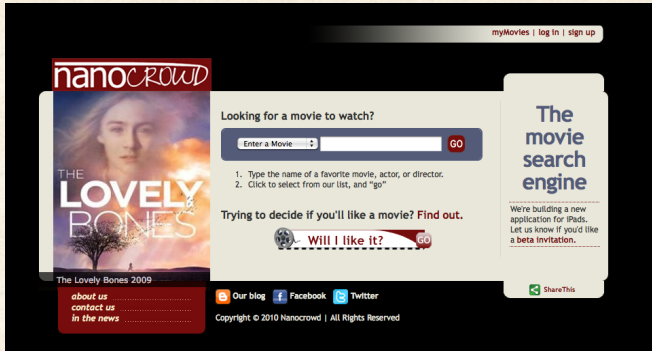
Imagine: You're bored and need a recommendation
for a TV series to start watching

Netflix Prize



\$1 million prize awarded in 2009
training set included 100 million ratings for 480,000 users and 18,000 movies
Reading for Homework 3: "If You Liked..."

www.nanocrowd.com



Looking for a movie to watch?

Enter a Movie: GO

1. Type the name of a favorite movie, actor, or director.
2. Click to select from our list, and "go"

Trying to decide if you'll like a movie? Find out.

Will I like it? GO

The movie search engine

We're building a new application for #fids. Let us know if you'd like a beta invitation.

ShareThis

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www.tastekid.com



www.jinni.com



Rotten Tomatoes

Movies [Follow](#) [Like](#) 163k

TOP BOX OFFICE

🍅 30%	Resident Evil: Retribut...	\$21.1M
🍅 99%	Finding Nemo 3D	\$16.7M
🍅 38%	The Possession	\$5.8M
🍅 65%	Lawless	\$4.3M
🍅 65%	The Expendables 2	\$3.1M
🍅 87%	ParaNorman	\$3.1M
🍅 18%	The Words	\$2.9M
🍅 55%	The Bourne Legacy	\$2.9M
🍅 40%	The Odd Life of Timoth...	\$2.6M
🍅 67%	The Campaign	\$2.4M

[In Theaters](#) | [Top 50](#)

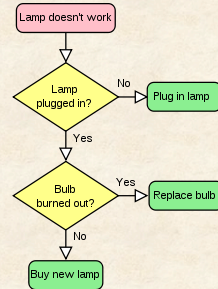
How does this program work?



Flowcharts and Decision Trees: Informal

Flowchart:

- Visual representation of steps of algorithm
- Summarizes how algorithm behaves given specific answers

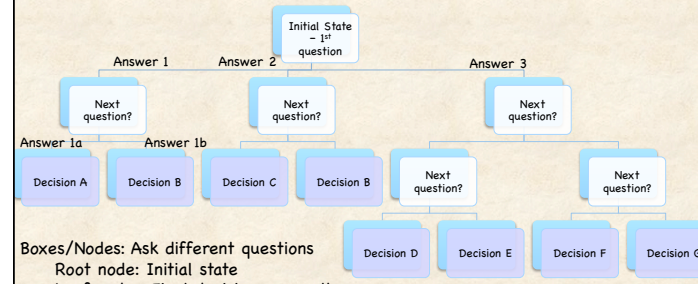


Decision Tree:

- Flowchart with no actions, just questions
- Shows final decision based on previous answers

Boxes: Represent states (or actions)
 Arrows (or edges): Show transitions (or decisions) between states

Decision Trees

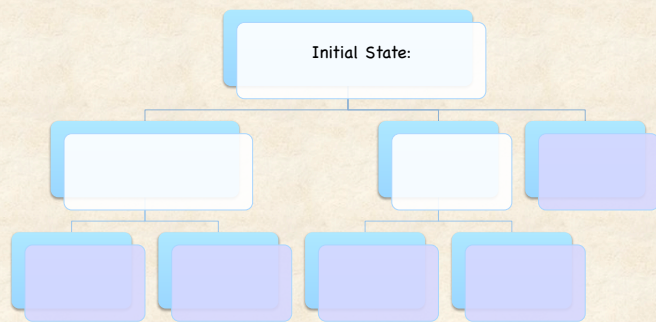


Boxes/Nodes: Ask different questions
 Root node: Initial state
 Leaf nodes: Final decision or result

Edges/Arrow: Labeled with different answers
 Arrive at later "internal" nodes depending upon previous answers

Different branches can have different # possible answers, depth

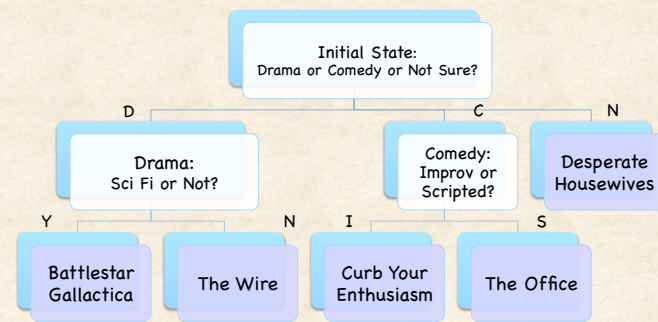
Can we recreate TV decision tree?

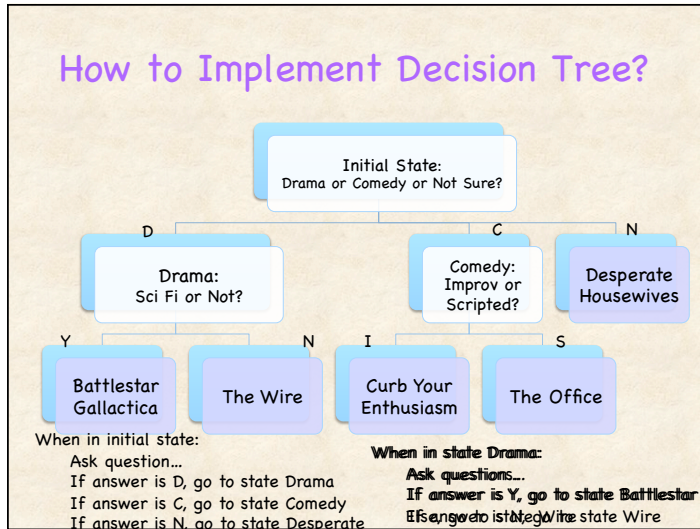


Boxes/nodes:
 Name each something descriptive
 Specify question

Lines/edges:
 Specify answer to move to state

Can we recreate TV decision tree?





Essential Control Constructs: If then else

Snippet 1: A 'forever' loop containing an 'if score > 10' block. The 'if' block has a 'say You Win!' block attached to it. Text to the right says 'keep checking: if this is true then do this'.

Snippet 2: An 'if then else' block. The 'if' part has a 'touching color' block and a 'say We found water!' block. The 'else' part has a 'say ' block. Text to the right says 'keep checking: if this is true ... then do this ... and if it is not true then do this'.

How to Use If-Then (Else)

Cat Sprite

- Moves with arrow keys
- Meow when mouse is down (not when cat clicked)
- Weird color when on edge of stage; otherwise orange

Implement the Decision Tree?

Design your own Design Tree?



Challenge: Construct a decision tree with only yes/no questions leading to one tv show
Find the smallest number of questions to choose between 8 movies

Some questions are much better than others!

Poor Questions: Need to ask a lot



- 1) Do you like musicals?
- 2) Vampires?
- 3) Shows in real time?
- 4) Superheros?
- 5) Mysterious Islands?
- 6) Patrick Dempsey?
- 7) Misanthropic medical genuises?

Very poor if thousands of tv shows to pick from!

Good Questions: Need to ask only very few!



- 1) Some great yes/no question...
- 2) Some great yes/no question...
- 3) Some great yes/no question...

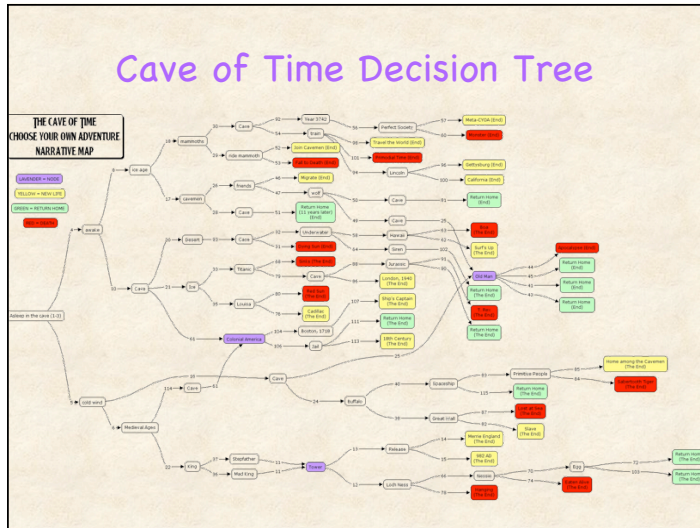
Goal: Find questions that divide choices into two equal-sized groups

Decision Trees Everywhere

Decision trees represent many activities
Choose Your Own Adventure

In paperback book:

- Pages in book represent different states (Nodes)
- Turn to different page for different decisions (Edges)



Decision Trees: Straight-forward to Specify

Easy to implement in many frameworks

Basic format:

- State X:
 - if (decision A) goto state Y
 - if (decision B) goto state Z

Structure web pages to form tree

- Current page is current state
- Click on different links to bring you to different pages

Example:
http://editthis.info/choose_your_own_adventure/Paladin

Programming Concepts

General advice

- Divide high-level functionality into logical units (e.g., scenes)
- Use descriptive names (messages)
- Specify initial state (what program looks like when started)
- Incrementally test code as you go
- Make "non-fragile" code

Control flow

- Scripts must be activated to run
 - When flag clicked; When receive message
- Execution within script proceeds sequentially
- forever, repeat, repeat until, if <expr> then <action1> else <action2>

Data Types: Strings (list of characters, words)

- Ask questions: User types string stored in variable "answer"
- String manipulation: letter <x> of <string>

Check-Up

Can you draw the corresponding decision tree for these scripts?

Announcements

HW 3 due Monday

- Create: Interactive story (see example)
- Draw corresponding decision tree
- Explore: Movie recommendation systems

Thursday: BYOL (Laptop) Day

- How to make your program remember - Variables!