CS 550 Final Study Guide

Roch's website

IMPORTANT INFO:

- Non-cumulative
- 1 cheat sheet front and back
- No calculators needed
- Only solve **5 out of the 6** problems provided
- One of the problems will be similar #5 of Assignment #5

Wishlist and Questions:

- Have a question? Put it here!
- Did anybody take notes last Thursday? If so, could you please post them?
- Office Hours:
    - **May 8th, Tuesday 1:00pm - 1:50pm**

Red means not on the final*

Alpha-Beta Pruning
Chapter 1: Introduction
Chapter 2: Search
Chapter 3: Local Search
Chapter 4: Adversarial Search
Chapter 5: Constraint Satisfaction
Chapter 6: Learning
Chapter 7: Logical Agents

Chapter 5-7 Notes:
https://docs.google.com/document/d/1VlcxYd8Ap8L7_zonA448SLdHoqNflsEl-rpqBGzoSLo/edit?usp=sharing

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Class Discussion (May 1st)

- Resolution Rule/Theorem
    - Using a set of predicates where all predicates are true (on the bottom side)
    - No AND's, we are looking for Conjunctive Normal Form
    - Allows us to combine a set of prepositional phrases and prove entailment
    - Look for positive and negative examples to find contradictions
    - Continuously finds alternate iptorforms of a sentence until we can prove by contradiction
- "The Wumpus problem from homework 5 is tougher than a question I would ask"
    - Slides contain an example of applying enough rules to solve the wumpus problem
    - Slide 22: "Return to Wumpus World"

        - Two entailments to check using all possibilities
        - A1 = no pit at [1,2]
        - A1 includes the knowledge base,
            - Aka: the possibilities are a subset of the knowledge base and therefore there is entailment
            - KB |= A1
        - A2 = no pit at [2,2]
        - A2 does not include the knowledge base
            - A contradiction is shown here and therefore no entailment
- Entropy does not have be to from 0 - 1
    - $Entropy\ (binary)\ =\ B(q)\ =\ E[I(P(X))]\ =\ -qlog_2q-(1-q)log_2(1-q)$
        - Q being the first probability
        - 1-Q being the second probability
    - The numbers of bits that would be required to encode the information
    - It is the expected amount of information
    - For each of the variables we will find the probability of that happening
        - Probability * Log (1/Probability)
        - Find the sum
    - Information tells us how surprising the result is
- Information Gain
    - Goal: reduce the amount of information needed to represent the problem
    - Remainder:
        - Compute the entropy for each subset and figure out how important each subset to the entire picture
    - Gain:
        - Overall entropy minus remainder

Problem Ideas

1. Diagram Problems
    a. Chapter 5:
        i. Construct a hyper-graph
        ii. Map out domains of variables in CSV scenario
        iii. Binarize a set of variables and global constraints into binary/unary constraints and an encapsulated variable and domain
    b. Chapter 6:
    c. Chapter 7:
        i. Wumpus Problem
            1. Solve by contradiction
2. Pseudocode Problems
    a. Chapter 5:
        i. Backtracking Search

    b. Chapter 6:
        i. Decision Tree Learner
    c. Chapter 7:
3. Theory Knowledge Questions
    a. Chapter 5:
        i. Node/Arc/Path/K-Consistency
            1. Showing consistency after introducing constraint
    b. Chapter 6:
        i. Entropy
        ii. Information Gain
        iii. Decision Tree Learner
        iv. Neural Net Learner
    c. Chapter 7:

Study Guide
Q:
A: