

## 625-600: Final Exam Review

- Final exam: 11/7 (Wed) 12:40pm-1:30pm, in HRBB 126.
- Final exam material: slide04 (page 46 and beyond), slide05, slide06 (up to and including page 43).
- This is a closed book exam.
- You may bring 1 sheet of notes (US letter), however small the fonts may be (obviously it should be legible to you). You may use both sides.
- You may bring a calculator, although you may not need it at all.

1

## Key Points: 2

- Uncertainty
- Decision theory example: how prob theory and decision theory are combined
- Probability basics: terminology, notations.
- Joint probability distribution: concept
- Conditional probability: definition, various ways of representing conditional prob.
- Axioms of probability: basic axioms, and using them to prove simple equalities.
- Bayes rule: definition and application.

3

## Key Points: 1

- First-order logic
- Prenex normal form, skolemization
- Substitution
- Unifiers
- Resolution

2

## Key Points: 3

- Why and when is Bayesian analysis useful?
- How to calculate priors from conditional distributions?
- How is subjective belief utilized in Bayesian analysis?
- What is the role of priors in Bayesian analysis?

4

## Key Points: 4

- How is subjective belief utilized in Bayesian analysis?
- Bayesian updating: why does that make probabilistic inference efficient when multiple evidence comes in?
- Belief network: definition, semantics, extracting probabilities of certain conjunction of events.

5

## Key Points: 6

- Types of learning
- Inductive learning (concept)
- Decision tree learning:
  - What is the embodied principle (or bias)?
  - How to choose the best attribute? Given a set of examples, choose the best attribute to test first.
  - What are the issues? noise, overfitting, etc.
  - Relationship between probability, degree of surprise, degree of uncertainty, entropy, and information (gain).

7

## Key Points: 5

- Constructing a belief network: what is the procedure? why does node ordering matter? how to order the nodes?
- Inference in belief networks: what are the kinds of inference? what is the general method? (causal, evidential, etc.)

6

## Key Points: 7

- Neural networks: basics
- The central nervous system: how it differs from conventional computers (no need to memorize numbers, anatomical names).
- Basic mechanism of synaptic information transfer (no need to memorize chemicals etc.)
- Types of neural networks: two ways of classifying, by feedback and by topology.
- Perceptrons: basic idea, and the geometric interpretation. What is the limitation? How to train?

8