CS267A Midterm Topic List

November 3, 2018

1 Description

The midterm will be on Wednesday November 7 in the usual course classroom at the usual time. You will have the entire class period to take the midterm. It will consist of multiple-choice and short-answer questions, similar in style and difficulty to the homework. You will not be allowed any external material – such as notes, electronic devices, or textbooks – while taking the exam.

This document gives a list of topics for review. The exam will include material up to and including the lecture on Monday Nov. 5 and the first 4 homeworks. Your best source for material are the lecture slides. You will be expected to know the material from each of these topics, including important definitions, results, and algorithms. Expect questions similar to those on the homework and from class.

2 Basic Probability & Bayesian Networks

- Axioms of Probability
- Independence
- Inclusion-Exclusion
- Conditioning
- Bayes Rule
- Naive bayes assumption
- Bayesian network independence, markov blanket, conditional probability tables (CPT)
3 Logic

3.1 Propositional Logic
- Semantic operations/relations between sentences (implication, entailment, equality, etc.)
- Models, truth tables, semantics
- Monotonicity of logic
- Model counting
- Resolution
- DPLL, unit propagation
- Probability of satisfaction (i.e. Hw2 programming question)
- Normal forms (CNF, DNF, PP2CNF) and complexity of basic reasoning
- Proof by refutation and the deduction theorem

3.2 First-Order Logic
- Syntax and semantics
- First-order resolution
- Grounding
- Simplifying assumptions (domain closure, unique names, closed-world)
- Substitutions, unifiers, most general unifier
- Skolemization

4 Probabilistic Databases
- Definition of a PDB, marginally independent PDB, tuple independent PDB
- Conjunctive query, union of conjunctive query
- Data complexity, query complexity
- Lifted and non-lifted query evaluation
- Inclusion-exclusion and cancellations
- Complexity reductions
- Identifying hard queries
- Separator variable, hierarchical vs. non-hierarchical queries
4.1 Markov Logic Networks

- Semantics
- Model counting, weighted model counting