Project
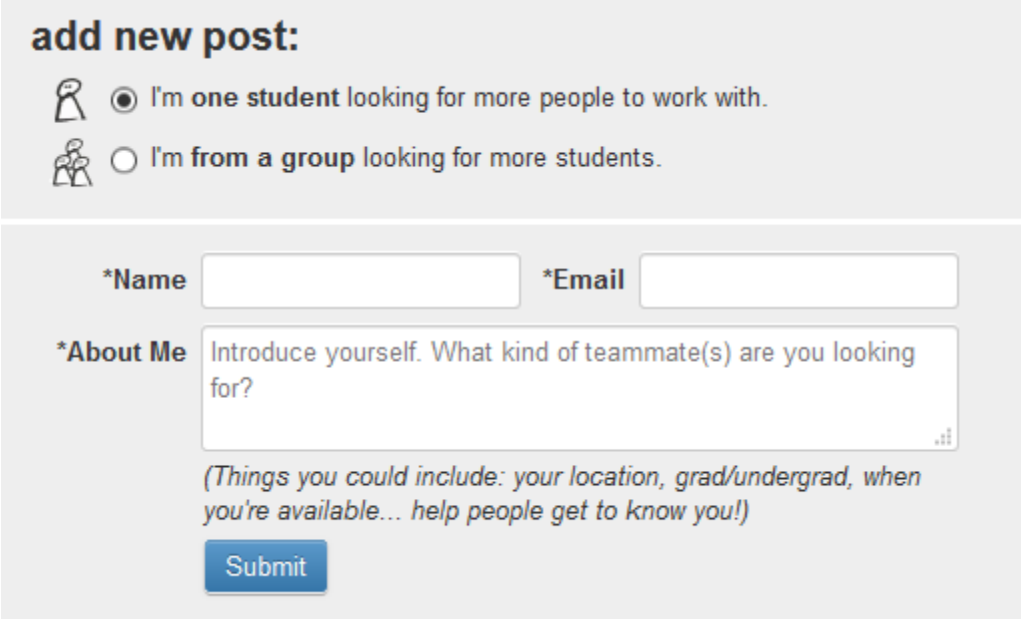
▸ Topic
  ▸ Use what you have learned in this course to solve a problem of your choice.
  ▸ We will release S18 slides of the remaining topics (see Blackboard → Project)
    ▸ Probabilistic temporal models
    ▸ Introduction to natural language processing
    ▸ Introduction to machine learning
    ▸ Markov decision processes
    ▸ Reinforcement learning

Project

- Group
  - 3-5 people in each group
  - You may use the Piazza "search for teammates" function
- Schedule
  - By late November: form groups
  - Dec. 14&16: proposal presentation
  - Jan. 7&8 (Week 18): final presentation, report submission

add new post:

- ○ I'm **one student** looking for more people to work with.
- ○ I'm **from a group** looking for more students.

| *Name | | *Email | |

*About Me — Introduce yourself. What kind of teammate(s) are you looking for?

(Things you could include: your location, grad/undergrad, when you're available... help people get to know you!)

Submit

Project

- Grading
  - 15% of the total grade
  - Criteria
    - relevance to this course
    - novelty, soundness, depth
    - quality of the report and presentation

Midterm Exam

- Time
  - in class (8:15-9:55am) on Nov. 2 (Mon)
- Location
  - 教学中心 101, 301   ←   Check 教务系统 for your seat arrangement
- Format
  - Closed-book. You can bring an A4-size cheat sheet and nothing else.
  - 10 multiple-choices, 4 problems
- Grade
  - 25% of the total grade

- F2018 midterm exam paper is available at:
  - Blackboard menu → Previous Exams → Fall 2018 Midterm Exam

Midterm Review

Disclaimer

▸ Topics covered in this review may not appear in the exam.

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Search

- Definitions
  - State space, successor function, start/goal states
  - Completeness, optimality
- Tree search
  - Uninformed Search
    - DFS, BFS, UCS
  - Informed Search
    - Heuristic, admissible heuristic
    - Greedy, A*
- Graph Search
  - A* with consistent heuristic

Constraint Satisfaction Problems

▶ CSP
  ▶ Find an assignment to a set of variables that satisfies a set of constraints
▶ Basic solution: backtracking search
▶ Speed-ups:
  ▶ Filtering
    ▶ Forward Checking, Arc Consistency
  ▶ Ordering
    ▶ Minimum Remaining Values, Least Constraining Value
  ▶ Structure
    ▶ Tree structured, Cutset conditioning
▶ Iterative min-conflicts (local search) is often effective in practice

▶

Adversarial Search

▸ Adversarial Search
  ▸ Game tree, Minimax
▸ Resource Limits
  ▸ Depth-limited search
  ▸ Limiting branching factor
▸ Game Tree Pruning (alpha-beta pruning)
  ▸ α: MAX's best option on path to root; prune if value of MIN $\leq$ α
  ▸ β: MIN's best option on path to root; prune if value of MAX $\geq$ β
▸ Uncertain Outcomes
  ▸ Expectimax

▸

Propositional logic

▸ Representation
  ▸ Syntax
    ▸ Proposition symbols, their compositions using connectives
  ▸ Semantics
    ▸ Each model specifies true/false for each proposition symbol
    ▸ Rules for evaluating truth with connectives
▸ Inference
  ▸ Resolution (for Conjunctive Normal Form)
▸ Concepts
  ▸ Validity, satisfiability, entailment, proof, soundness, completeness, etc.

▸

Propositional logic - Horn logic

- Representation
  - P1 $\wedge$ P2 $\wedge$ P3 ... $\wedge$ Pn $\rightarrow$ Q
- Inference
  - Modus Ponens
  - Forward chaining
  - Backward chaining

First-order logic

- Syntax
  - Constant, predicate, function, variable, connective, quantifier (universal, existential), equality
  - Atomic sentence, term
- Semantics
  - A model contains: objects, relations, interpretation
- Inference
  - Propositionalization (universal/existential instantiation)
  - Unification
  - Forward/backward chaining
  - Resolution

Bayesian networks

- Syntax
  - DAG + CPTs
- Semantics
  - Global semantics
  - Conditional independence semantics, Markov blanket
  - D-separation

- Markov networks
  - Undirected graph + potentials
  - Semantics

Bayesian networks: Inference

- Exact inference
  - Inference by enumeration
  - Variable elimination
    - Interleave join (pointwise product) and elimination (summing out)
  - Efficient inference on polytrees

- Approximation inference
  - Prior Sampling
  - Rejection Sampling
  - Likelihood Weighting
  - Gibbs Sampling

Good Luck!