

Intelligent Agents

■ IA = AI systems that act rationally

■ What does rationality mean?

■ Performance measure?

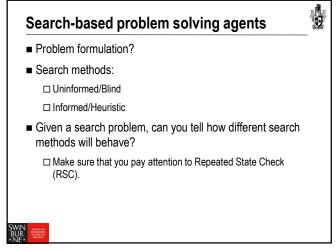
■ PEAS

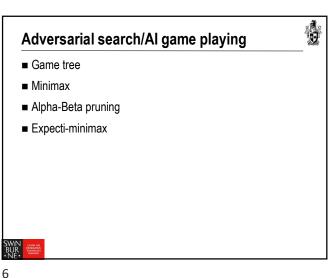
■ Task environment analysis?

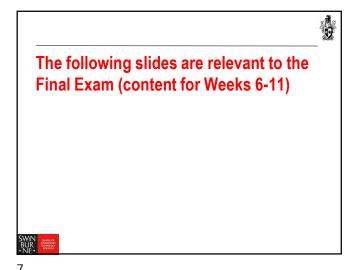
■ Agent structures?

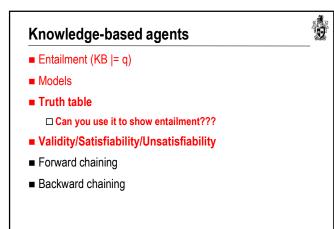
□ Basic ones?

□ Advanced ones?









Knowledge-based agents: FOL

■ Quantifiers
■ Models
■ Expressing logical sentences using FOL:
□ Can you converts English sentences to FOL???

Al Planning

Planning languages?

STRIPS, ADL, PDDL???

Formulate a planning problem (initial state, goals, action descriptions)

State-space search

Progression planning

Regression planning

Plan-space search

Partial Order Planning (POP)

Can you use an Al planning technique to manually find a plan for a planning problem?

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Probability/Reasoning with Uncertainty

The problem of reasoning with uncertainty

Probability from first principles
Basic axioms
Definitions (e.g., conditional probability, Independence, conditional independence, etc.)
Conditioning

Bayes rule
Can you use Bayes rule to perform inference with probability?
Can you answer questions from the tutorials/Practice Exam?

Probability - Key concepts

■ Prior probability, e.g. P(A<sub>90</sub>) = 0.92

■ Conditional probability, e.g. P(A<sub>90</sub>|accident on freeway) = 0.74

■ P(a) + P(¬a) = 1

■ P(a | b) + P(¬a | b) = 1

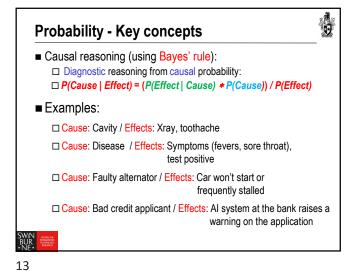
■ Definition of Conditional Probability:

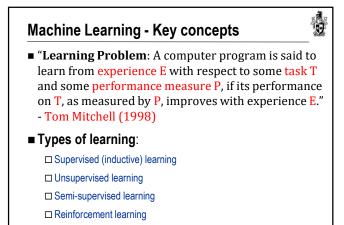
P(A | B) = P(A ∧ B)/P(B) = P(B | A)\*P(A)/P(B)

■ Conditioning:

P(A) = P(A ∧ B) + P(A ∧ ¬B) = P(A|B) \* P(B) + P(A | ¬B) \* P(¬B)

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Machine Learning - Key concepts

- Supervised learning with Linear Regression:
  - $\hfill\square$  A statistical regression method used for predictive analysis
  - $\Box$  Computing the best-fit line:  $y = h_{\beta}(x) = \beta_0 + \beta_1 x$
  - $\square$  Cost function (to measure the errors of the hypothesis  $h_{\beta}$ ), e.g. MSE
  - $\hfill\Box$  Gradient descent for optimization
- Design a learning systems:
  - □ A ML algorithm consisting of 3 major components: Representation, Optimization, and Evaluation



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