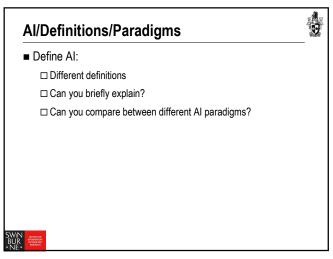


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Intelligent Agents

■ IA = AI systems that act rationally

■ What does rationality mean?

■ Performance measure?

■ PEAS

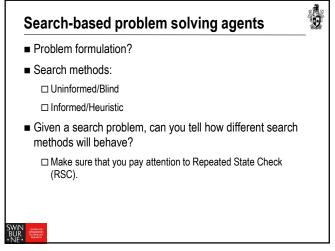
■ Task environment analysis?

■ Agent structures?

□ Basic ones?

□ Advanced ones?

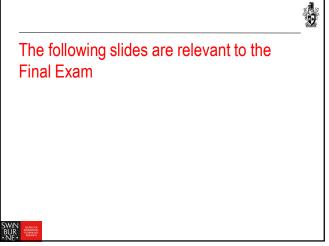
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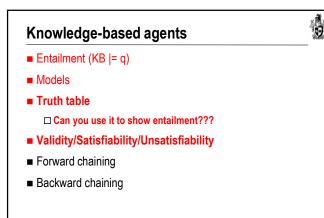


Adversarial search/Al game playing

Game tree
Minimax
Alpha-Beta pruning
Expectiminimax

5

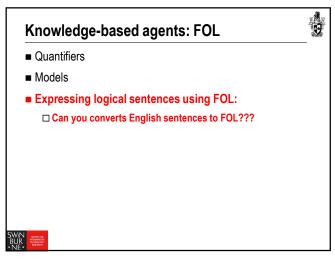




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Al Planning

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

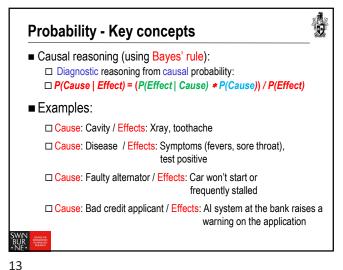
■ Definition of Conditional Probability:

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

■ "Learning Problem: A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E." - Tom Mitchell (1998)

## ■ Types of learning:

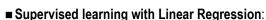
- ☐ Supervised (inductive) learning
- ☐ Unsupervised learning
- ☐ Semi-supervised learning
- □ Reinforcement learning



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1.3

Machine Learning - Key concepts



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



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