



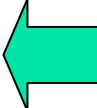
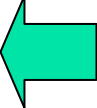
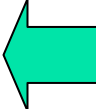
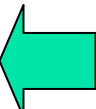
Development of Games

Lecture 15

AI techniques in Games

Some Subareas of AI



- Search 
- Planning 
- Natural language processing
- Machine learning 
- Case-based reasoning
- Robotics
- Computer vision
- Neural networks 



Roles of AI in Games

- Opponents
- Teammates
- Strategic Opponents
- Support Characters
- Autonomous Characters
- Commentators
- Camera Control
- Plot and Story Guides/Directors



Game Genres and AI

- Chess, Card, and Puzzle Games
- Action Games
- Role-Playing Games (RPGs)
- Adventure Games
- Strategy Games
- Simulation Games (God games)
- Sports Games
- A-Life



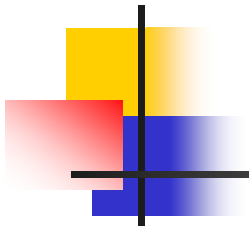
Chess, Card and Puzzle Games

- Role of AI:
 - Tactical opponents
- AI Techniques:
 - Game tree
 - Neural Network
- Examples:
 - Deep Blue
 - 20Q



Planning

- used with success in computer chess until c. 1980.
- The approach was hindered by the difficulty of extracting expert knowledge and encoding it as planning operators.
- Game tree state space search
 - dominant approach
 - view moves as decomposition operators
 - goal is to win
 - special search algorithm called *minimax*, and its optimised version, *alpha-beta*.

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- Planning and game-tree search work best for games with simple rules.
 - For games like *Doom*, *Quake III* need other approaches, mixtures of machine learning, rule-based systems, ...
 - AI is an important part of modern computer games.



Action Games

- Role of AI:
 - Real-Time Tactical opponents
 - Partners
- AI Techniques:
 - Path-finding
 - Flocking

Half-Life 2



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Role-Playing Games (RPGs)

- Role of AI:
 - Tactical Opponents
 - Partners/Pets
 - Support Characters
- AI Techniques:
 - Path-finding
 - Finite State Machine

Baldur's Gate II



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World of Warcraft



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Adventure Games

- Role of AI:
 - Support Characters
- AI Techniques:
 - Path-finding
 - Finite State Machine

Blade Runner



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Strategy Games

- Role of AI:
 - Units
 - Tactical Opponents
- AI Techniques:
 - Flocking
 - Path-finding
 - Finite State Machine
 - Bayesian Networks

Civilization IV



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Simulation Games

- Role of AI:
 - Units
 - Creatures
- AI Techniques:
 - Finite State Machine
 - Decision Tree
 - Path-finding
 - Flocking
 - Neural Network

Black & White



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Sports Games

- Role of AI:
 - Units
 - Strategic opponent
 - Commentator
- AI Techniques:
 - Flocking
 - Path-finding
 - Finite State Machine

Madden NFL '06





A-Life

- Role of AI:
 - Units
 - Creatures
- AI Techniques:
 - Flocking
 - Path-finding
 - Fuzzy Logic
 - Genetic Algorithms

