

A faint, dark green background image showing a hand holding a pen, positioned as if writing. The image is centered and serves as a watermark or background for the text.

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Artificial Intelligence in Games

Stuttgart Media University
8th GamesDay

Artificial Intelligence in Games

What? Where? Why?

AI Methods and Assistance AI

In almost all modern games as part of their game mechanics: path finding, automatization, balancing, ...

Situational AI

The foundation of any player-level-AI: decision-making based on variable scripts

Tactical AI

The vast majority of AIs we encounter today: decision-making based on memories following predefined patterns

Strategic AI

The future (?): dynamic AIs managing and creating their own memory-domain

will talk about that

Situational AI



Situational AI

Straight forward decision-making:

Game (AI) Cycle



Am I still on track



Is a wall right ahead of me



Is there an opponent to overtake



Is there an opponent to ram



...



...



Decision: AVOID!

Situational AI

What do we need?



World Knowledge

Precompiled information of the environment to answer questions about the current world state

Situational AI

What do we need?



Entity Classifications

Capability descriptions and labels for relevant game objects to answer questions about their state, relations or interaction possibilities

Situational AI

Fast processing

Most stuff is precompiled either way

No memory allocation

No memories -> no memory allocation

Control over AI players

Scripts are easily predictable

Development speed

Scripts may be tailored to a certain situation

Compiletime Overhead

... and many logical errors won't be visible at compile time

Repeating Errors

No memories lead to artificial stupidity

Static Behavior

Very static AI with predictable reactions

Only know scenarios

New content requires adaption of the AI scripts

Let's try something else!

Tactical AI



Tactical AI

The basic idea:

adapt situational AI scripts with memories during a game session

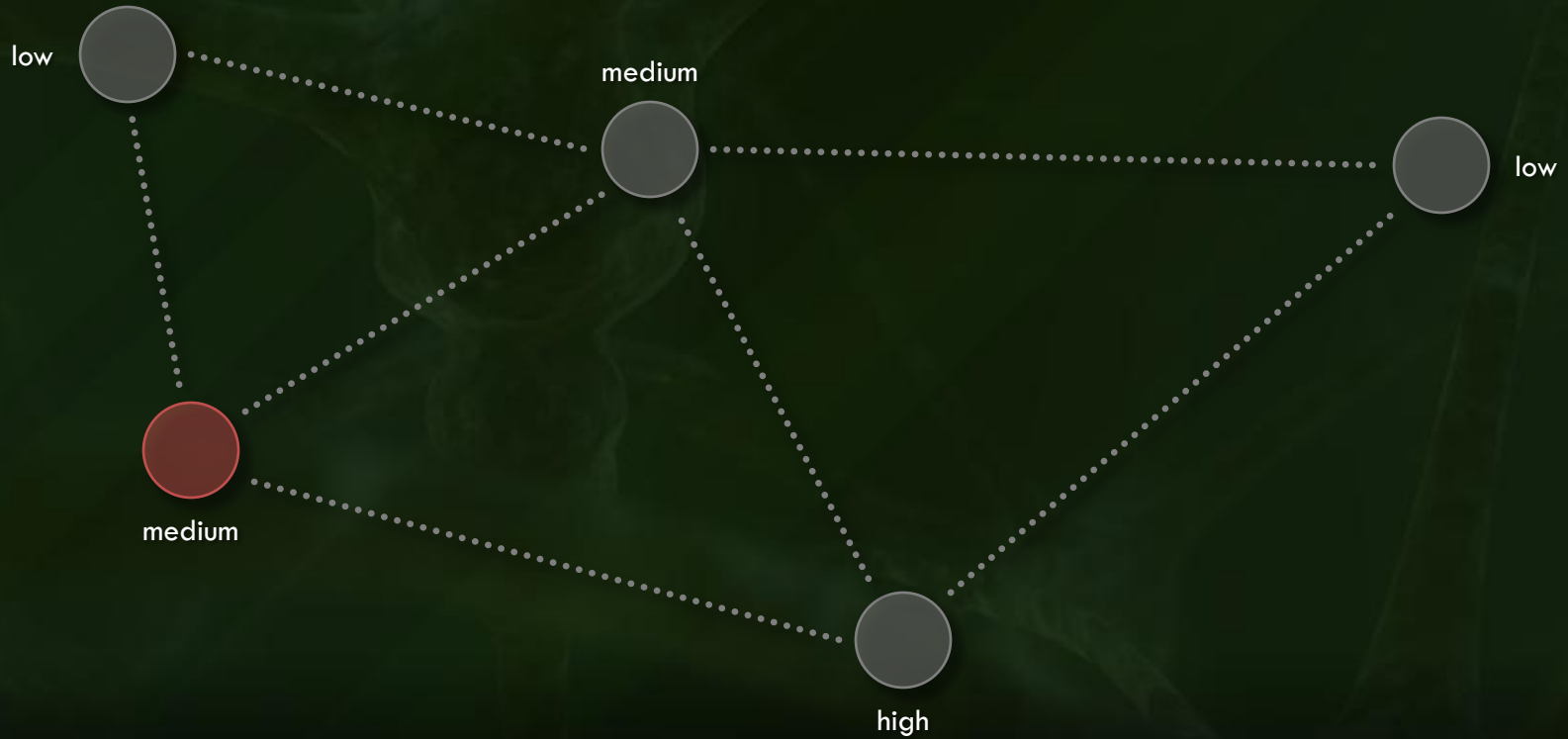
The advanced idea:

separate the AI from game content

Now it's getting fun!

Tactical AI - Basic

Building a threat-map



Tactical AI - Basic

Building a threat-map



Tactical AI - Advanced

Separating the AI runtime from game content.

Hot topics:

AI world and AI extractors

Input Handling

Performance (as always)

*But first, let's see how
humans think
... or how we think we think*

Human Intelligence



Human Intelligence



How do we percept our environment?

Abstraction

Human Intelligence

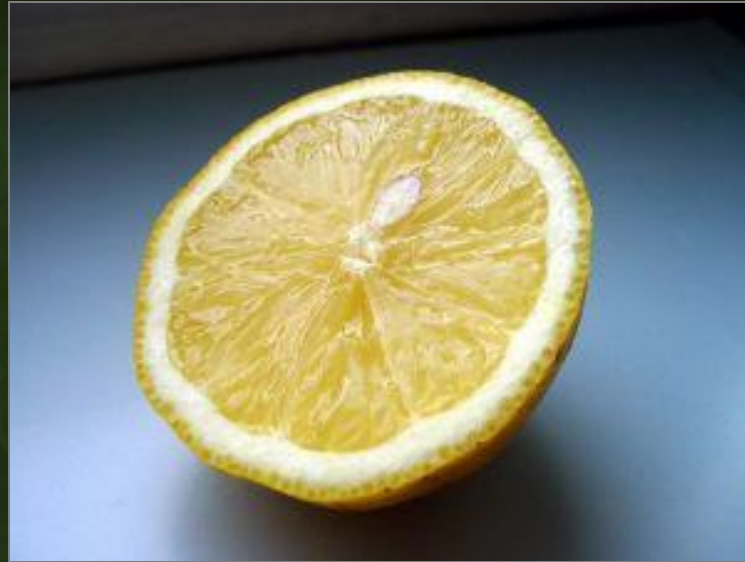
SHADOW

How do we percept our environment?

Abstraction

Patternmatching

Human Intelligence



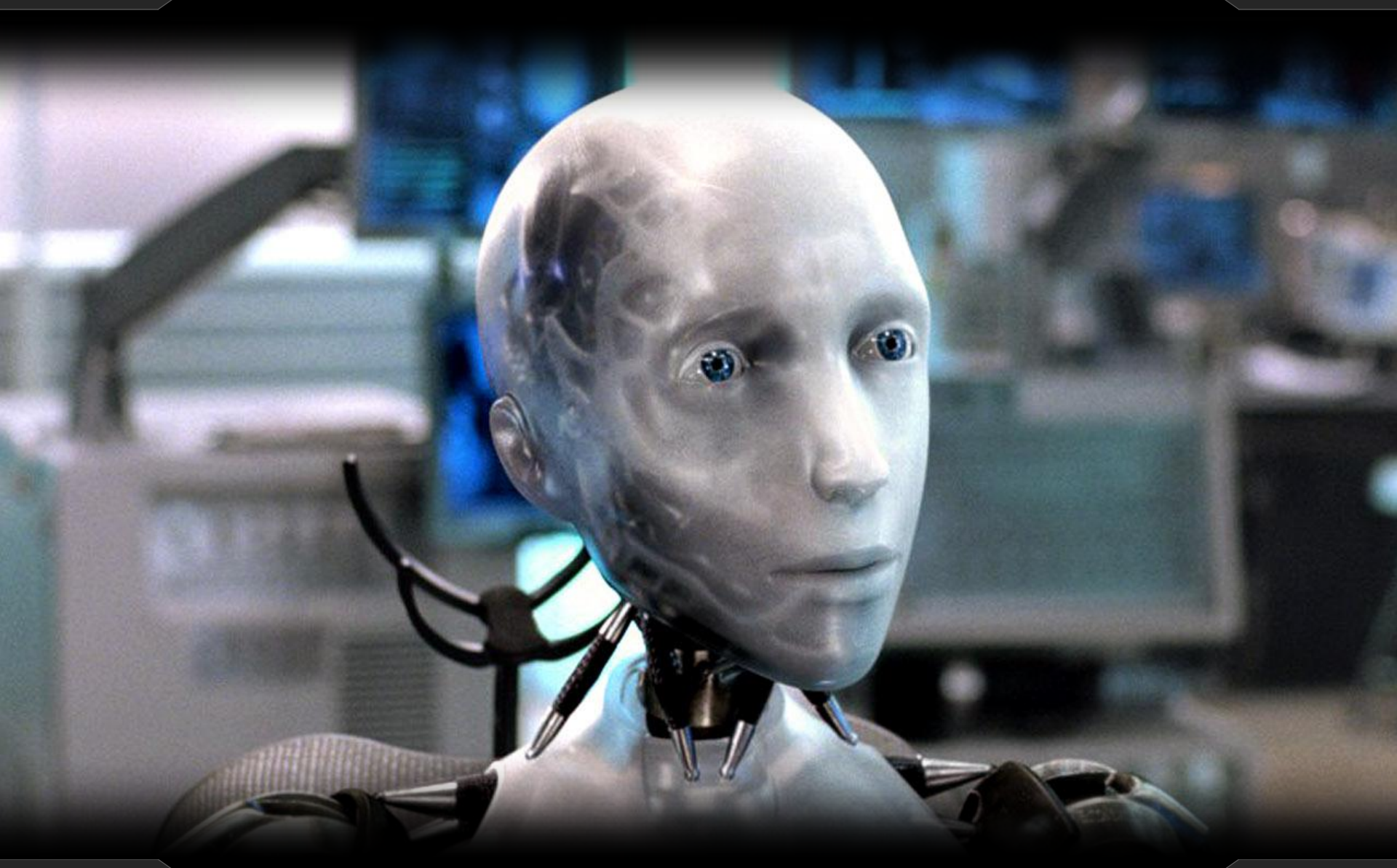
How do we percept our environment?

Abstraction

Patternmatching

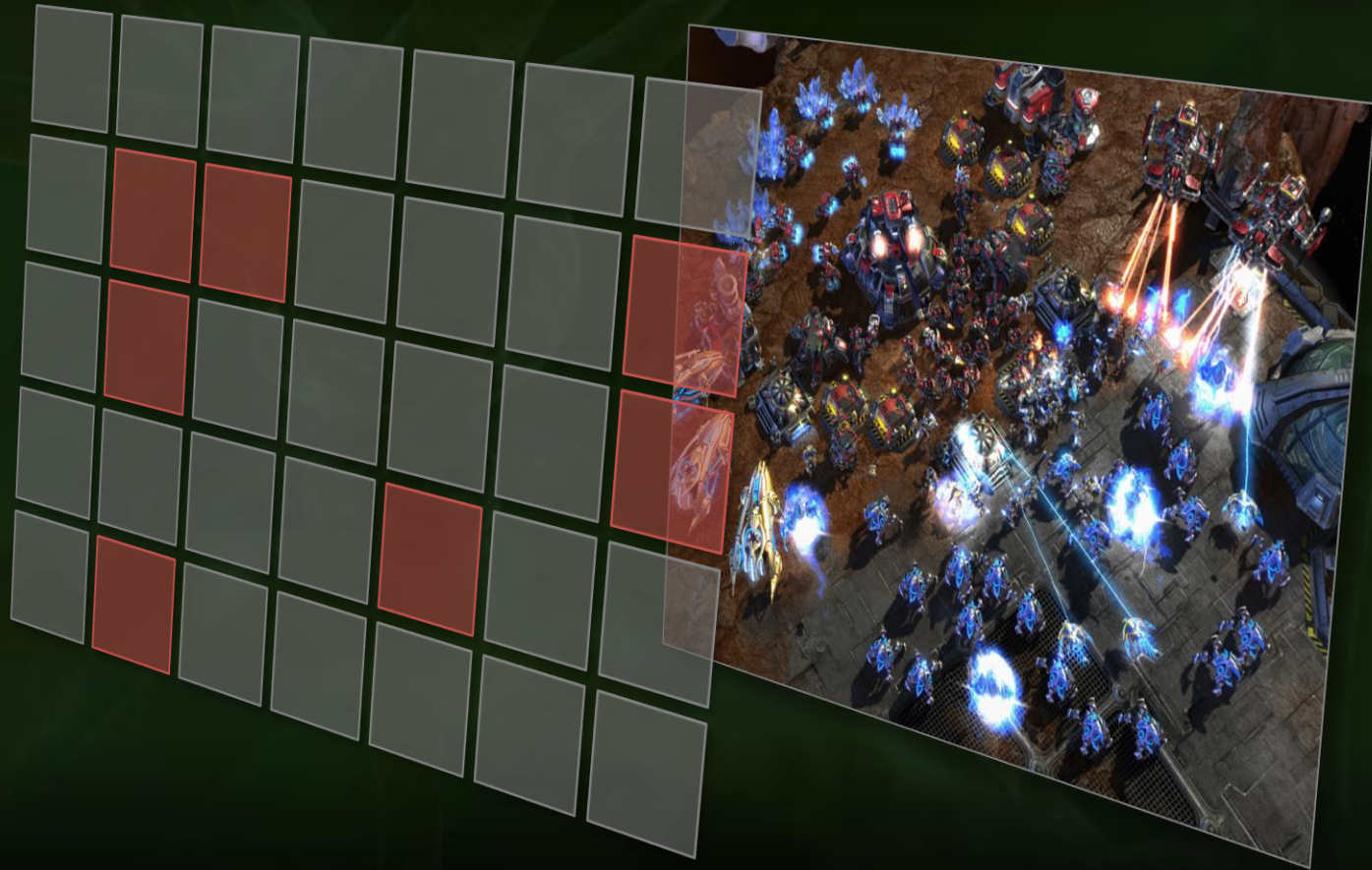
lots-of-magic

Artificial Intelligence



Artificial Intelligence

A lot of effort just to cut down the “dimension of possibilities”



Artificial Intelligence

The AI perception chain

Human: camera, game objects, render data

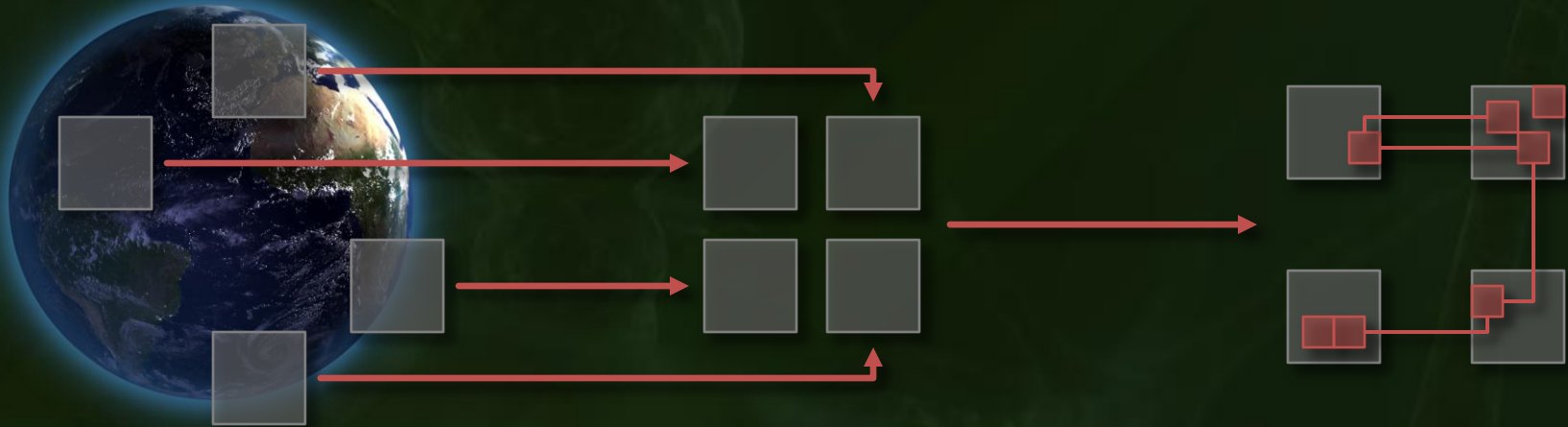
AI: game objects, AI descriptions

Human: render objects

AI: AI objects

Human: a picture (frame)

AI: inference space



“Ingame Universe”

AI Extractor

AI World

Strategic AI



Strategic AI

Long-Term Memories

Information is accumulated throughout the whole game session

Look Ahead

Algorithms are used to predict the gain of possible actions before their execution

Knowledge Base

As only few precompiled scripts are used, the AI requires a database to build up relations between entities

No Rules

The AI should built a scout because it features a large line of sight and fast movement speed, not because it is marked as a unit for scouting

Strategic AI

A 3D graphic of a character, resembling a Tetris piece, constructed from glowing red and gold blocks. The character is positioned in the center of the slide, set against a dark, starry space background. Several other Tetris pieces are scattered around the main character, appearing to be in motion or having just been placed. The lighting is dramatic, with a bright light source from the right creating a lens flare effect.

More about that at the **Winter Games University 2010**
Stuttgart Media University - February 28th

Offline AIs

Using non-real-time strategic AIs to built real-time tactical AIs.



Clustering AIs

Small demo: Fleet Operations

Unit Movement

Situational

Ability Automatization

Simple tactical – dynamic scripts

Goal evaluation

Simple strategic – strategic grid

Goal execution

Tactical

Construction

Just a plain script

Economy

Situational

Thanks! Any Questions?



Hey, might still be a bright future!