BDI ARCHITECTURE

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BE4M36MAS - Multiagent systems

DISTANCE TEACHING

- If there is someone who cannot participate, tell us!
- Don't be afraid to ask
  - about things you don't understand,
  - about technical stuff – you can share your screen.
- Make use to it :)

MODEL-BASED GOAL-BASED AGENTS

Model-based goal-based agents

How to implement them and get actions from goals effectively?

BELIEF-DESIRE-INTENTION

What is it?

Model for programming autonomous agents using three concepts:

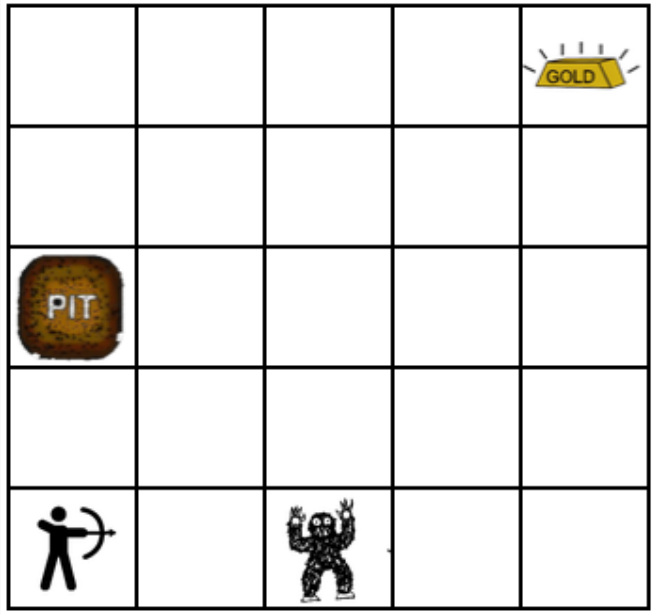
- **Beliefs**
- **Desires**
- **Intentions**

Beliefs

Beliefs

$\sim$ agent's model of the world (what he supposes to be true)

Example:



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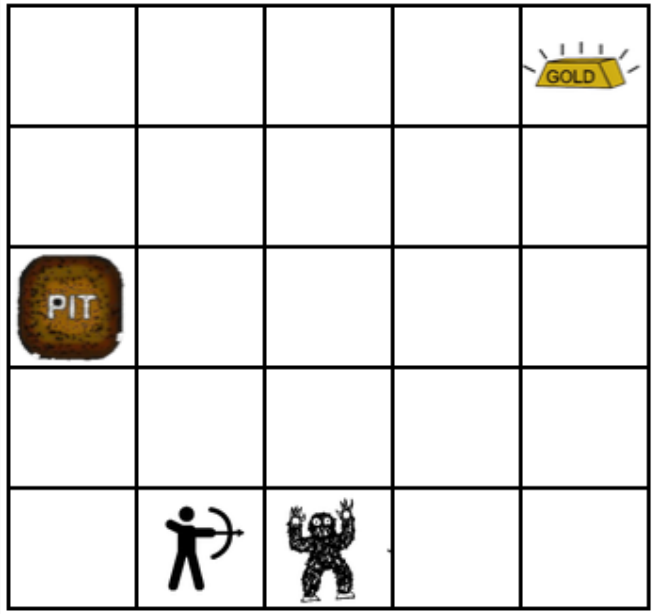

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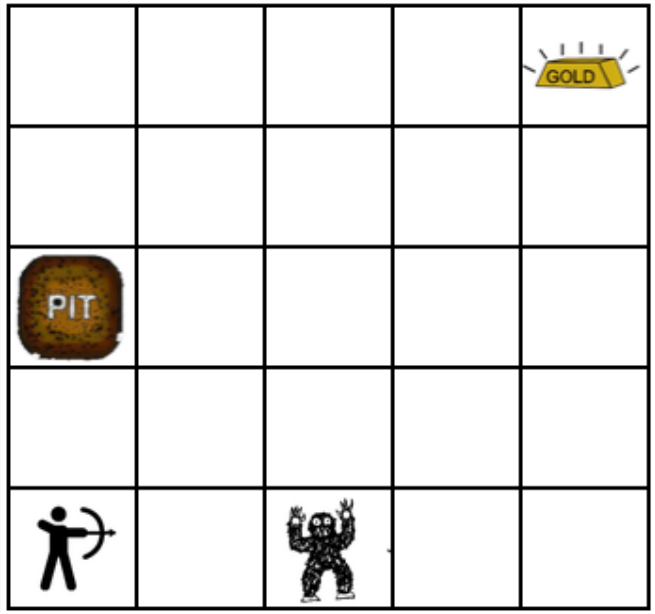

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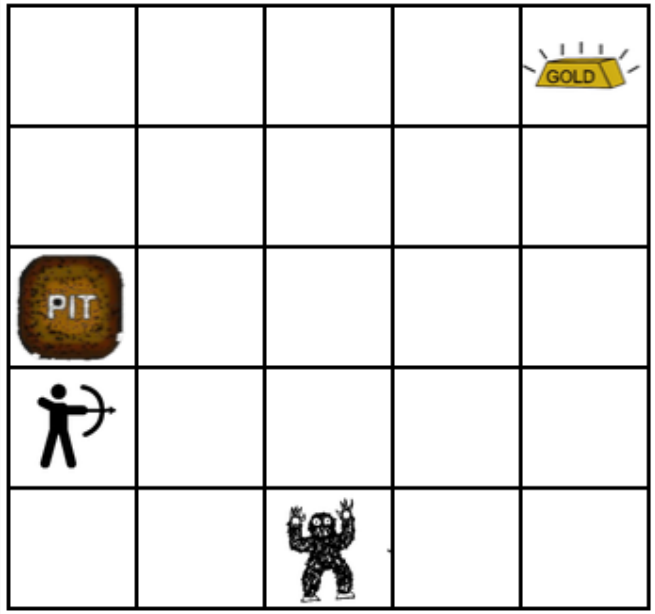

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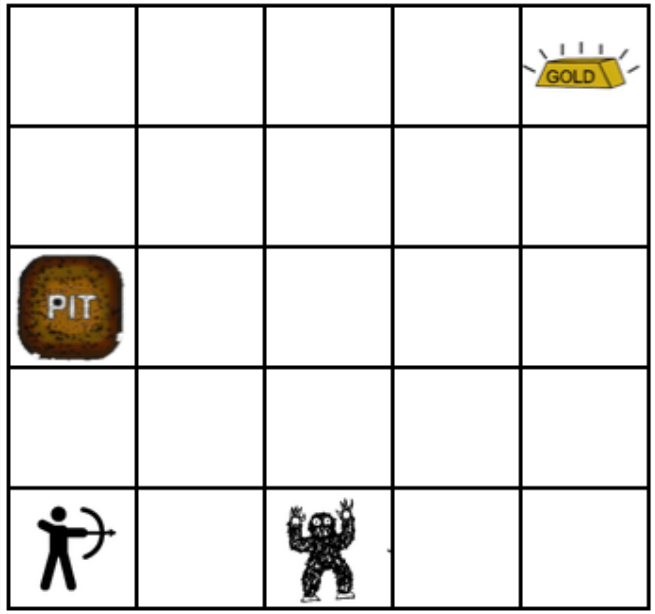

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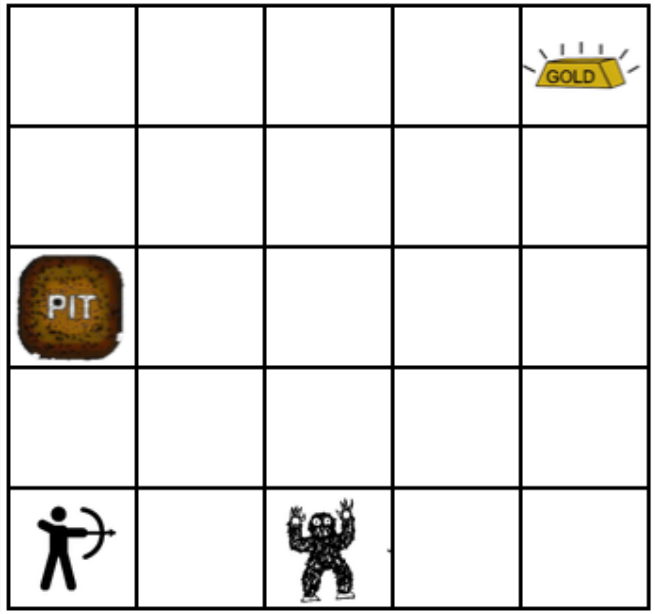

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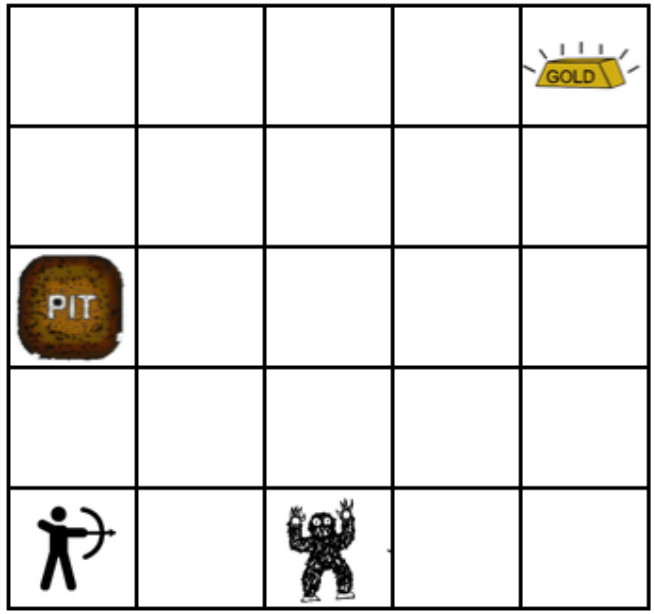

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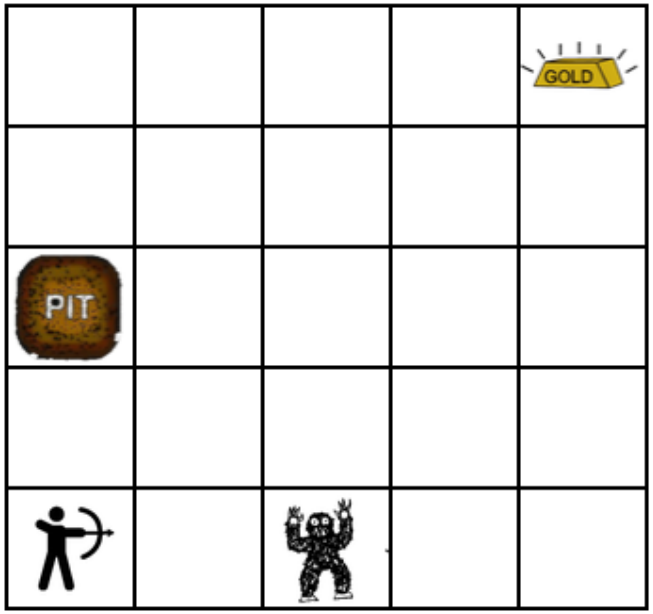
Poll

menti.com Code: 99 88 38 2



Belief = Knowledge?

Beliefs

Beliefs **are not** knowledge!

- An agent may **believe** facts that are **not true**.

Example:

Weather forecast announces nice weather for the weekend.

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→ You can believe that, but you cannot take it for granted.

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Example: Communication between agents

Desires

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$\sim$ state of the world agent is **dreaming** about

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Example: Vacuum cleaner — what desires does the agent have?

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- Intention do **persist**.
- Agent need **not intend** side effects

PRACTICAL REASONING

How do we turn **desires** into **actions** the agent performs?

Components of Practical Reasoning

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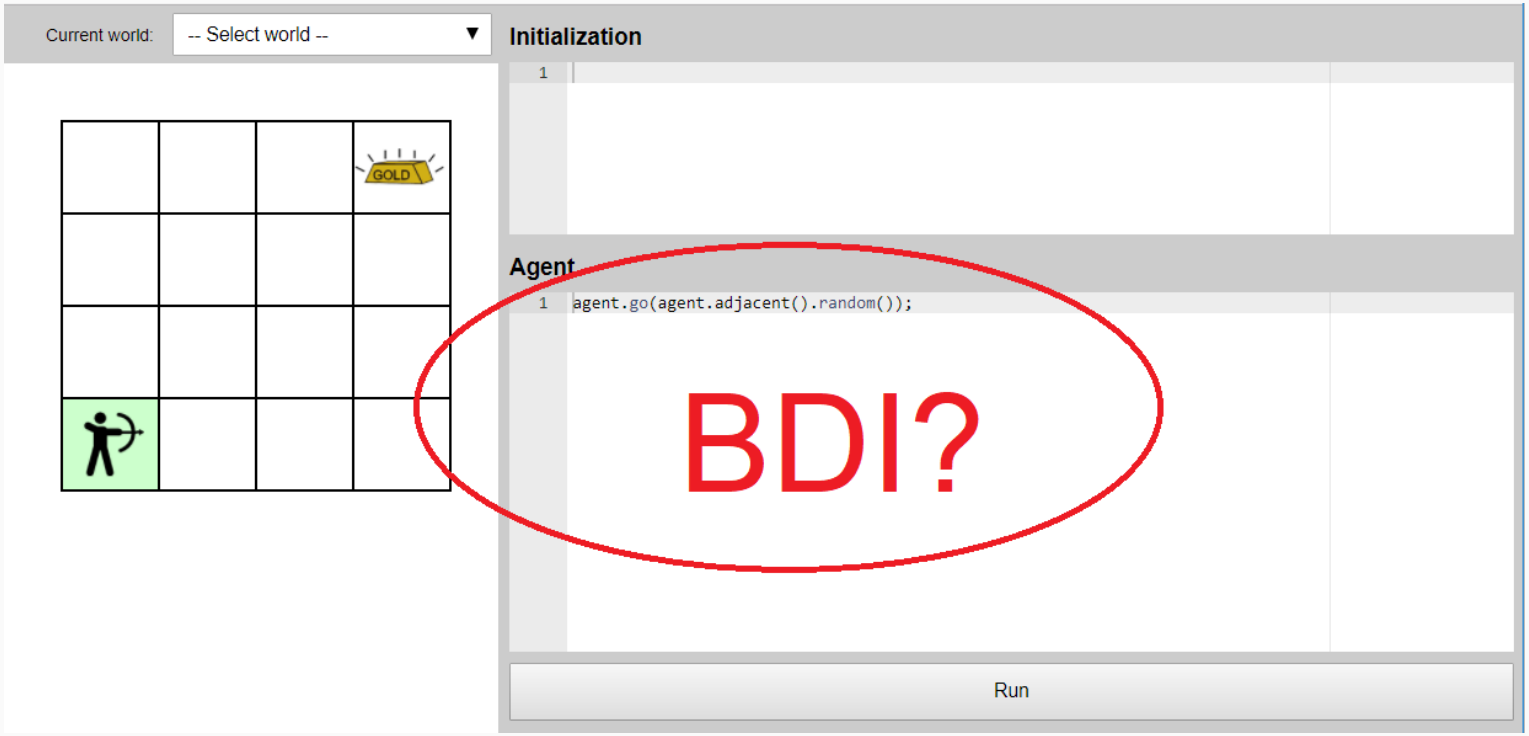

What if Roomba finds out that cables prevents it from going to another room?

Commitments

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$\sim$ indicate that an agent has **commited** to some intention

Optional: Situation in which an agent may forget about his intention (i.e. **decommit**)

- Individual commitments
- Social commitments

Individual commitments

- **Blind commitment** — the only way to decommit is to succeed
- **Single-minded commitment** — agent may decommit when he believes it is no longer possible to succeed
- **Open-minded commitment** — agent may decommit when he no longer believes it is possible to succeed

Individual commitments

Example:

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Picnic can be organized only in good weather conditions.

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- **Open-minded commitment** — Agent drops his intention as soon as the updated forecast is released.

Individual commitments

IMPLEMENTING BDI

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- Desires
- Intentions

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- Events
- Plans

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- **Events**
- **Plans**

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Agent responds to an event by executing appropriate **plan**
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Example: Think of a plan for realizing `!cleanup` intention of a Roomba.

CURRENT AGENT PROGRAMMING

Are MAS dead?

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Nope

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Then what is the difference?

Are MAS dead?

Nope

Then what is the difference?

before: Purist Approach
now: **Pragmatic Approach**

Strict vs Practical Agent Programming

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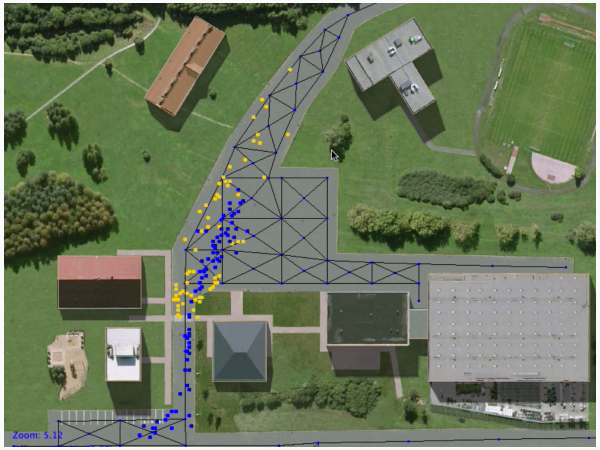
- **Languages**: Agent vs Standard
- **Sensors**: All Info form sensors vs Only meaningful sensors
- **Acting**: Everything is an Action vs Direct code execution

Multi-agent Examples

Multi-agent Traffic Simulation – **AgentPolis**

FPS bots – **Pogamut**

Crowd Simulation **AgentCrowd**



NEXT TUTORIAL

Assignment of the 1st semestral project

If possible, bring your computer with working Java environment (JDK + IDE), please