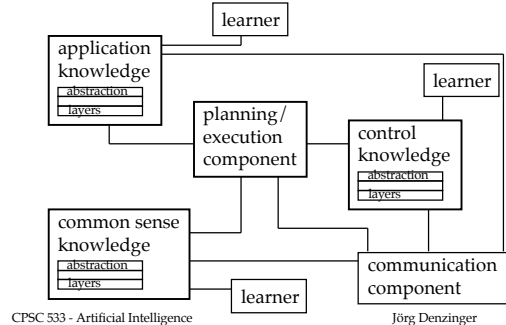


## Section 2: Knowledge Processing A very general AI system



## Knowledge Processing in general

- Task: use knowledge represented in system plus new knowledge and produce a result:
  - Add knowledge to knowledge base
  - Find inconsistencies in knowledge base
  - Answer user question
  - ☞ make implicit knowledge explicit
- Approaches:
  - Search (certain result or new consistent knowledge base)
  - Apply procedural knowledge (computation)

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## General Problems

- What parts of the knowledge base are needed?
- What parts of the knowledge base have to be changed (frame problem)?
- What pieces of knowledge are applicable?
- What concrete piece of knowledge to choose next?

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## 2.1 Search versus Computation

- Deep down in our computers everything is a computation
- On higher levels, there are different computation processes:
  - Processes where each step is always necessary to achieve their goals
    - ☞ computation
  - Processes where after they finished you can identify steps that did not contribute to achieving the goals
    - ☞ search

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## Why is difference of importance?

- In AI we deal with knowledge
- More or better knowledge can be used to improve almost all search processes (even without totally new algorithm)
- Better knowledge only very seldomly can be used to improve computation (except if developing new algorithm)
- Also: due to unnecessary steps searches often take much longer
  - ☞ improvements very often needed
- But: there are different definitions of "necessary"
  - ☞ some searches can be made into computations (examples: PROLOG, local search; see later)

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## 2.2 Computation: Applying procedural knowledge

Computation used in

- Many rule-based systems
- Neural networks
- Truth Maintenance Systems, when updating the labels
- Lower levels of search systems:
  - Procedures in frame based systems
  - Weights/measures in search controls
  - Determining mgu or matches
- ☞ See later sections!

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## What does computation offer?

- ✦ Usually run time is predictable
- ✦ No dealing with choices
- ✦ No unnecessary steps
- Implicit knowledge representation
  - ☞ difficult to know what is going on
- Not always possible to achieve
  - ☞ Nice to have, but in AI systems often not possible