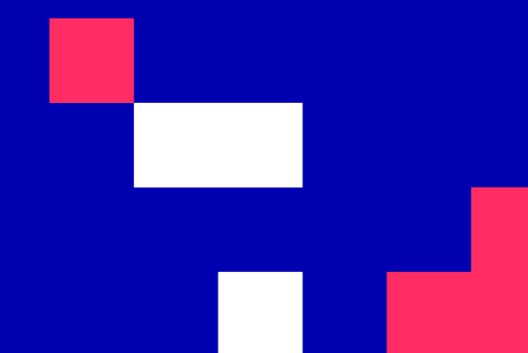**MAI4CAREU**

Master programmes in Artificial Intelligence 4 Careers in Europe

University of Ruse

INTELLIGENT COMPUTER SYSTEMS

Svetlana Stefanova
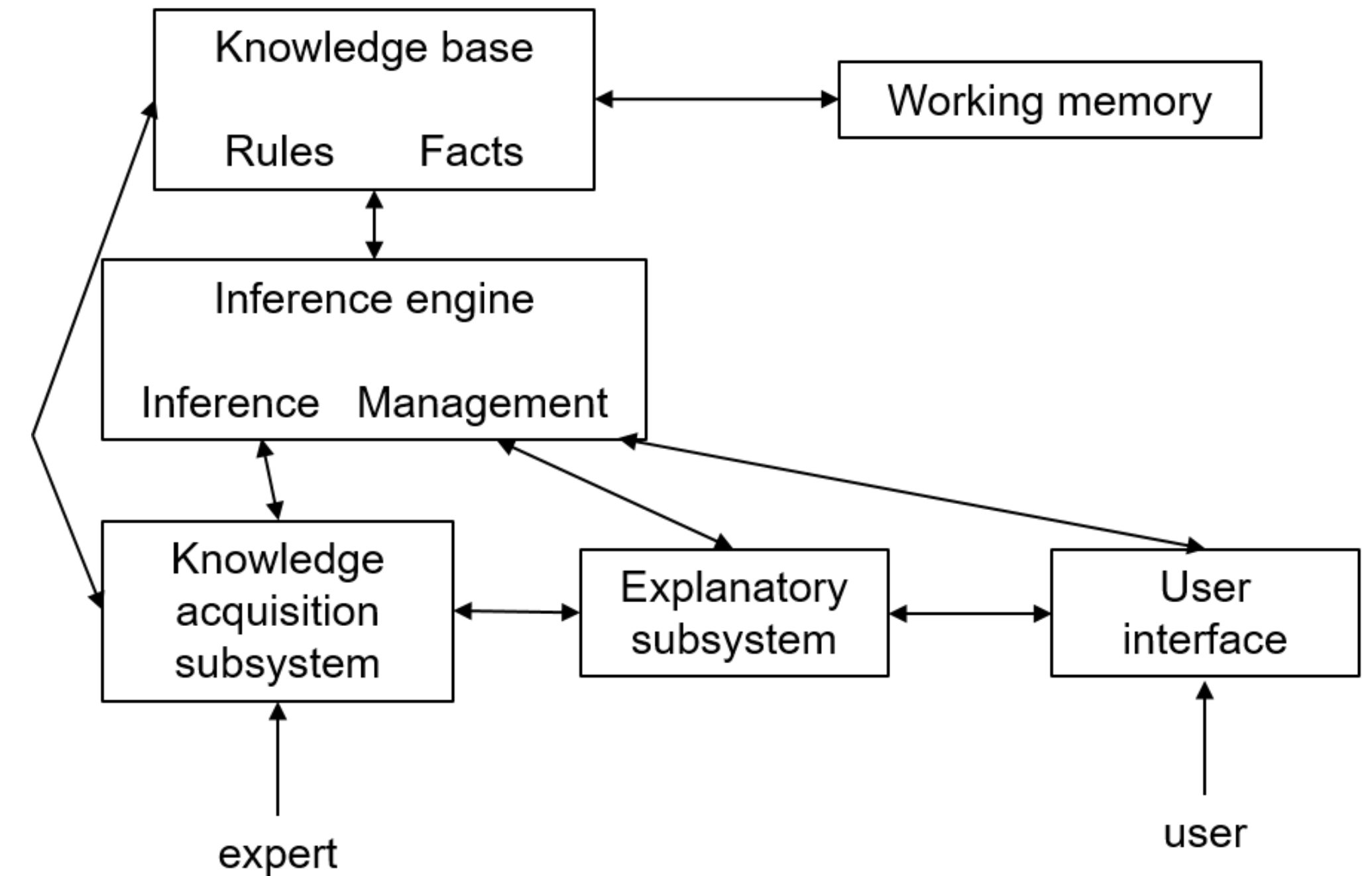
September, 2022

MAI4CAREU

Master programmes in Artificial
Intelligence 4 Careers in Europe

LECTURE 7

EXPLANATORY MECHANISMS

1. Introduction

2. Types of queries

3. Explanatory module specifics

4. Explanatory module structure

Explanatory subsystem

CONTENT 1

Explanatory module

Uses a methodology to explain the inferences made (i.e. how it has gotten to G).

If we use production rules of the type:

IF A THEN G

the system must be able to explain from which conditions it started (i.e. from condition A).

Types of queries

- **Static queries to KB;**

- **Dynamic queries about the path of reasoning.**

Types of queries: static to KB

An understanding of what the KB contains at any given time is required.
Using the system effectively depends on assessing what it knows and what
it doesn't.

Example:

What does "meningitis" mean?

The system should return the definition for "meningitis".

Types of queries: dynamic about the path of reasoning

As the ES collects data and draws interim conclusions, the user must be
able to ask questions to follow the line of reasoning.

Example:

How did you assume that the organism was bacterial in nature?.

The system should return the rule used:

IF (1) the infection is primary bacteremia, AND

(2) the place from which the culture was taken is sterile, AND

*(3) this organism is assumed to have penetrated through the
gastrointestinal tract,*

THEN it can be assumed (0.7) that this organism is bacterial in nature.

CONTENT 3

Explanatory module: what does it need?

- **knowledge about the ES:**

  •static knowledge;

  •dynamic knowledge;

- **knowledge about the history of the consultation** – which means a record of any conclusion that has been reached during consultations;

- **procedural knowledge:**

  •knowledge about the production rules;

  •knowledge about the interpretation of the rules;

- **problem-oriented knowledge:**

  •set theory;

  •logic;

  •arithmetic.

CONTENT 3

Rule interpreter

To provide explanations for system actions, the Explanatory module must also understand how the rule interpreter works:

- when a rule is tested;

- when a rule will fail;

- why one rule is tested and not another.

A scheme of how or why certain rules are used, together with a full record of the specific actions taken, can be used as a basis for explaining the results of the consultation.

Explanatory module - design

- To decide what basic questions the system will answer;

- To provide for the possibility of supplementing;

- The format and organization of the KB to allow and facilitate a
  consultative mode of work, i.e. knowledge to be easily accessible;

- The module to "understand" the semantics of the rules - it can be done
  by including a description of the semantics of each rule in the system KB.

Co-financed by the European Union
Connecting Europe Facility

10

This Master is run under the context of Action
No 2020-EU-IA-0087, co-financed by the EU CEF Telecom
under GA nr. INEA/CEF/ICT/A2020/2267423

CONTENT 4

Explanatory module - structure

The basic functions of the EM are executed by the corresponding submodules:

- **frequently asked questions answering module (FAQM);**

- **module for reasoning status check (RSCM)**.

| FAQM | RSCM |

CONTENT 4

Frequently asked questions answering module

Used:

- during consultation;

- after the system has printed the results.

Answers questions:

- about the static knowledge of the subject area;

Example: *What does „meningitis" mean?.*

- about facts, gathered during the consultation.

Example: *What is the value of hemoglobin?*

CONTENT 4

Module for reasoning status check

Used: during the consultation.

Answers questions: about the reasoning process of the system.

Example: *How did you assume that the organism was bacterial in nature?*

CONTENT 4

Modes of consultation

- **Dialogic** - the system periodically requests additional information. This allows for the user to ask for clarifications while the consultation is taking place.

- **Non-interactive** - the user has no opportunity to interact with the system until it has printed its deductions. It is possible to:

  - Insert a mechanism for the interruption of the reasoning process and question asking;

  - Limit to questions about the final state of the system knowledge - in this case there will be no RSCM.

MAI4CAREU

Master programmes in Artificial
Intelligence 4 Careers in Europe