

Course title: Knowledge Storing and Reasoning Methods in Expert Systems	Neptun code: GEIAK433-a
Course coordinator: Dr. Samad Dadvandipour, PhD, associate professor	
type of lesson and number of lessons: lecture (2)	
method of evaluation: colloquium	
curriculum location of the subject: (autumn/spring semester): autumn and spring	
pre-study conditions (<i>if any</i>): -	
The task and purpose of the subject:	
<p>The subject makes researchers and practitioners create expert systems that emulate human expertise, providing valuable insights, recommendations, and solutions in various domains. This study not only advances the field of artificial intelligence but also has significant practical implications for improving decision-making processes in numerous industries.</p>	
Course description:	
<p>Expert systems are AI programs designed to emulate the decision-making processes of human experts. They store and utilize specialized knowledge to address problems within specific domains. Below is a concise summary of their methods for knowledge storage and reasoning:</p> <p>The knowledge base consists of two primary elements:</p> <ol style="list-style-type: none"> 1. Facts: These represent specific data about the domain, providing the foundational information upon which reasoning is based. 2. Rules: These are if-then statements that encapsulate the logic of the domain. For example, a rule might state, "If the engine won't start and the lights are dim, the battery is dead." This allows the system to make logical inferences based on given conditions. <p>Knowledge representation involves various methods to structure and organize the stored knowledge, making it easily accessible and usable by the inference engine:</p> <ol style="list-style-type: none"> 1. Frames are data structures that divide knowledge into substructures by representing stereotyped situations. They help organize information to reflect typical scenarios encountered in the domain. 2. Semantic Networks are graph structures representing knowledge through patterns of interconnected nodes and arcs. They illustrate how different pieces of knowledge are related, facilitating understanding and reasoning. 3. Ontologies: Ontologies formally represent the concepts within a domain and the relationships between those concepts. This method helps define the domain's vocabulary and the interconnections among various entities, supporting more complex and nuanced reasoning. <p>By combining these elements, expert systems can effectively store and manage specialized knowledge, mimicking the decision-making capabilities of human experts within specific domains.</p>	
Required literature:	
<ol style="list-style-type: none"> 1. Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig https://dl.ebooksworld.ir/books/Artificial.Intelligence.A.Modern.Approach.4th.Edition.Peter.Norvig.%20Stuart.Russell.Pearson.9780134610993.EBooksWorld.ir.pdf 2. KNOWLEDGE REPRESENTATION AND REASONING, by Ronald J. Brachman, Hector J. Levesque. https://www.cin.ufpe.br/~mtcfa/files/in1122/Knowledge%20Representation%20and%20Reason 	

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Recommended literature:

1. Artificial Intelligence Basics: A Non-Technical Introduction 1st ed. Edition, by Tom Taulli (Author). <https://www.amazon.com/Artificial-Intelligence-Basics-Non-Technical-Introduction/dp/1484250273>