

Knowledge representation (KR) refers to the methods used to symbolize information about the world in a form that a computer system can utilize to solve complex tasks such as diagnosing a medical condition or enabling a robot to navigate an environment. It involves representing facts, relationships, and concepts that make up the knowledge, often using specific languages or data structures (Davis et al., 1992).

Contrary to the assertion that knowledge representation is a recent phenomenon, various forms of KR have existed throughout history. Ancient civilizations, such as the Sumerians and Egyptians, developed writing systems to document and convey knowledge (Weststeijn, 2011). Similarly, Greek philosophers used logical structures to explore philosophical concepts, Mesoamerican and Chinese civilizations used pictograms as formal language systems, and the Scientific Revolution brought systematic approaches to documenting scientific knowledge. Despite these longstanding practices, the digital era has amplified the importance of KR due to need for systems that are formal, accurate, and scalable to handle massive data volumes efficiently and in increasingly complex and widespread applications. Modern computing facilitates KR development by offering advanced computational power and flexible programming capabilities, allowing for optimization and adaptation within diverse settings (Brachman & Levesque, 2004; Nilsson, 1998).

Reasoning and knowledge representation are fundamentally interconnected. Reasoning typically depends on KR to derive new insights from existing information through logical processes. For instance, logical axioms in a knowledge base can help infer conclusions and solve problems. Nonetheless, KR retains its utility even without formal reasoning systems. It aids in the storage and organization of information, enabling retrieval and informal reasoning by human agents. By systematizing complex information, KR allows human users to engage with data meaningfully and make informed decisions even without algorithmic reasoning frameworks (Davis et al., 1992; Russell & Norvig, 2010).

In conclusion, while modern computing has significantly advanced KR, its fundamental principles have been inherent in human knowledge representation throughout history. Reasoning enriches KR by adding layers of inferential processing, yet KR continues to serve valuable roles in storing and organizing information independently.

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