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# A Robust and Scalable Framework for Question-Answering in Physics

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Over the past two decades, research has shown that students who experience academic difficulties and actively seek help achieve academic success. This finding has resulted in the development of various adaptive help seeking components for adaptive learning environments. However, the existing question-answering systems are designed based on specific templates. Thus, it is not robust enough to cover other learning topics, often providing unrelated answers to questions outside the defined template. In this paper, we tackle this issue by proposing a more scalable architecture which is not restricted by a rigid template. Our proposed framework consists of various modules developed using several artificial intelligence and NLP techniques including semantic network, domain classification, entity recognition, inference engines and reusable ontologies. Using classification and entity recognition techniques, relationships between topics, principles, concepts and equations are automatically represented in a semantic network. This provides knowledge about the superclass-subclass relationships within the domain. Ontology is used to represent the description and properties of each concept in the semantic network. The main purpose of representing this knowledge is to support a system in reasoning about provided information and making inferences. Our proposed framework is envisioned to provide assistance to students, while solving problems.

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