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Design And Application of Experimental Schemes for Thermoelectricity Dataset

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This study focuses on intelligent data mining and knowledge discovery services, addressing the critical challenges researchers face in processing massive datasets and optimizing experimental schemes. We propose an innovative solution integrating knowledge graph and artificial intelligence technologies, with a specific application to thermoelectric domain through the development of a three-dimensional experimental scheme coordinate system.

Methodologically, this research first employs ontology modeling techniques to systematically construct a knowledge graph for thermoelectric experimental schemes, enabling structured representation of multivariate relationships among experimental entities. We then innovatively introduce a three-dimensional coordinate analysis model, establishing a visual evaluation framework based on key performance metrics including power conversion efficiency (PCE), short-circuit current density (Jsc), open-circuit voltage (Voc), and fill factor (FF).

The principal innovations of this work include: (1) proposing a novel research paradigm combining knowledge graph with multidimensional coordinate analysis; (2) developing a quantitative evaluation system specifically for thermoelectric experimental schemes; and (3) achieving data-driven decision support for scheme optimization. The research outcomes not only provide new analytical tools for experimental design in thermoelectric research but also offer a transferable methodological framework for intelligent data mining and knowledge discovery across other scientific disciplines.

This study holds practical value for advancing AI for Science initiatives and enhancing research innovation efficiency, demonstrating particular technical advantages and practical guidance in the field of energy materials development.

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