

53rd IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE  
ACTIVITIES (D5)

Knowledge management for space activities in the digital transformation age (2)

Author: Mr. Zhanji Wei

Space Engineering University (Beijing), China, weizhanji@163.com

Prof. Gang Wan

Space Engineering University (Beijing), China, casper\_51@163.com

RESEARCH ON THE CONSTRUCTION OF SPACE ENVIRONMENT KNOWLEDGE GRAPH  
BASED ON KNOWLEDGE REPRESENTATION LEARNING

**Abstract**

With vigorous development of human space activities study of space environment is becoming increasingly important. Construction of space environment knowledge graph has a chance of making computers truly “understand” knowledge about space environment, through which computers can offer many intelligentized services such as evolutionary forecast of space environment based on powerful human-computer interaction and natural language processing, early warning of catastrophic space weather. Knowledge representation and learning focus on studying how to represent human knowledge in a form that computers can also understand, compute and reason, which is key to knowledge graph construction. In this paper, we pay close attention to the problem of knowledge representation and learning in the construction process of space environment knowledge graph. First, we study method of representing knowledge of space environment based on the ontology. Second, knowledge representation learning of space environment is conducted. Third, entities and relationships in the domain of space environment are embedded in low-dimensional vector spaces through training. Finally, we integrate the ontology and knowledge representation learning to attain a knowledge graph about the space environment. Through our study, mapping between space environmental ontology framework and entity vector space obtained from knowledge representation learning will be established to improve the explainability of knowledge representation learning, contributing to reduction of difficulty and complexity of space environment knowledge graph construction.