

Knowledge Graph-Based Intelligent Question Answering for Intangible Cultural Heritage Resources in the Yellow River Basin: A Post-print(p) WHERE n.name=‘川劇’ RETURN n, r, p” retrieves results, displaying all inheritors and relationships on the front-end, with image resources returned for nodes that have them, enabling multimodal information retrieval, as shown in Figure 7 [FIGURE:7].

3.5.3 System Evaluation

Performance evaluation is crucial for understanding a Q&A system’s feasibility and practicality. The test environment uses Ubuntu 20.04, Python 3.6, Neo4j_{Desktop} 1.5.8, and Flask 2.0.3. To verify system performance, accuracy (Precision) is used as the evaluation metric, calculated using formula (2):

$$\text{Precision} = \frac{x}{y} \times 100\%$$

where x represents the number of correctly answered questions and y represents the total number of questions. This study collected over 500 popular questions about Yellow River Basin ICH resources through questionnaires, manually verified and annotated them into four categories (basic ICH information, person social relationships, ICH-related events, ICH-related resources), creating 400 test question pairs (100 per category). Experimental testing achieved 91.5% accuracy, verifying the system’s effectiveness and accuracy in meeting ordinary users’ needs, as detailed in Table 3 .

The results show higher accuracy for basic ICH information and person social relationship questions, while accuracy for ICH-related events and resources needs improvement. This is because basic information and social relationships are more clearly defined with higher matching accuracy between node and relationship names, causing less ambiguity. In contrast, questions about events and

resources vary significantly, making it difficult to match node names with user queries and custom dictionaries, thereby affecting answer accuracy.

Conclusion

From a digital humanities perspective, this study constructs a knowledge graph of ICH resources from nine Yellow River Basin provinces using a top-down approach and designs an intelligent Q&A prototype system, providing new ideas and methods for the digital construction of these resources. The system basically achieves deep mining and revelation of ICH resources across the nine provinces and can provide digital reference and support for other ICH resource protection and inheritance efforts.

The theoretical and practical value lies in: (1) Reorganizing Yellow River Basin ICH resource knowledge in graph form to connect discrete resources visually; (2) Employing semantic parsing-based Q&A to ensure accuracy while avoiding large-scale data requirements of deep learning; and (3) Using front-end/back-end interaction to enable natural language retrieval. Future work will improve front-end/back-end interaction efficiency for high-load, high-concurrency Internet environments.

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