



THE UNIVERSITY OF ARIZONA
COLLEGE OF SOCIAL & BEHAVIORAL SCIENCES
School of Information

Final Ph.D. Examination

Of

Zeyu Zhang

**“Exploring the Effects of Multi-Sensory
Extraneous Load on Attention and Task
Performance in Virtual Reality”**

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Harvill 460

**“Improving Geocoding by Incorporating
Geographical Hierarchy and Attributes Into
Transformers Networks”**

Abstract:

With the development of artificial intelligence, machines are empowering all aspects of people's lives. However, there are still many shortcomings in AI. For example, AI robots cannot accurately determine the place names in articles like humans. After all, there are too many places with the same name in the world. Therefore, Geocoding, the task of converting location mentions in text to structured spatial data, has recently seen progress thanks to a variety of new datasets, evaluation metrics, and machine-learning algorithms.

In this dissertation, I present empirical studies to explore four research questions: 1. Are classic information retrieval techniques competitive with modern neural approaches for toponym resolution? 2. Can transformer-based reranking improve over a strong candidate retrieval baseline? 3. Which kind of context is most effective for toponym resolution? 4. Is it better to approach toponym resolution as an ontology entry ranking paradigm or a geographic attribute prediction paradigm? Based on these questions, this dissertation contains four research projects, in which we first show that leveraging the better candidate generation, transformer-based reranking, and two-stage resolution can improve toponym resolution performance, and then introduce a new efficient paradigm for toponym resolution, which achieves a new state-of-the-art.