

北京邮电大学本科毕业设计（论文）任务书

Project Specification Form

Part 1 - Supervisor

论文题目 Project Title	Network Analysis of the Chinese High-Speed Railway System
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应用领域 Application Area	Data Science
主要内容 Project description	<p>China's high-speed railway system is the most extensive in the world, spanning 48,000 km in 2024, with plans to reach 60,000 km by 2030. While most cities are connected, the system's density varies widely, ranging from a highly interconnected web in the prosperous East to more limited connections in the sparsely populated West.</p> <p>This project studies the Chinese railway system as a complex spatial network, where stations serve as nodes and railway segments as links. It involves developing a model of the system and designing and implementing a computational methodology to address one or more of the following questions. How have the network properties of the system evolved over time? How robust is the system against random and targeted disruptions, in terms of connectivity, travel-time, and affected proportion of the population? What network expansions or adjustments could improve overall system performance (e.g., robustness to disruptions, reduced congestion, shorter travel time)?</p>
关键词 Keywords	railways, spatial network analysis, network robustness, spatial interaction models, traffic estimation
主要任务 Main tasks	<ol style="list-style-type: none"> 1. Review relevant literature and software on transportation networks. 2. Design, assemble, and provide documentation for coherent datasets of the population of major Chinese cities and high-speed railways, either at the national or provincial level. 3. Design a methodology inspired by existing transport models. 4. Develop a rigorous, legible, and reproducible computational implementation of the methodology.
主要成果 Measurable outcomes	<ol style="list-style-type: none"> 1. A well-designed network model of the Chinese high-speed railway system, for the whole country or a specific area. It should be accurate, logically structured, internally consistent, properly documented, and appropriate for its scope. 2. A robust mathematical methodology tailored to the selected research question. 3. Well-designed, fully documented, and reproducible algorithms to implement the methodology (e.g., in Jupyter notebook, R Markdown, or similar format).