

南京信息工程大学本科生毕业论文任务书

学 院	数学与统计学院			专 业	信息与计算科学
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指导教师	李顺杰				
论文题目	大规模时空数据辨识与预测理论及其应用				
论文性质	<input checked="" type="checkbox"/> 毕业论文 <input type="checkbox"/> 毕业设计				
选题类型	<input checked="" type="checkbox"/> 理论研究型 <input type="checkbox"/> 实验研究型 <input type="checkbox"/> 软件设计型 <input type="checkbox"/> 工程设计型 <input type="checkbox"/> 艺术设计型 <input type="checkbox"/> 其他				
选题来源	<input type="checkbox"/> 结合教师科研 <input type="checkbox"/> 结合教育教学 <input type="checkbox"/> 结合实验室建设 <input checked="" type="checkbox"/> 结合生产实际 <input type="checkbox"/> 自拟				
工作量	<input checked="" type="checkbox"/> 大 <input type="checkbox"/> 中 <input type="checkbox"/> 小	难易度		<input checked="" type="checkbox"/> 较难 <input type="checkbox"/> 中等 <input type="checkbox"/> 简单	
论文（设计） 目标	<p>本课题旨利用稀疏辨识与复杂网络相结合的方法解决较为复杂的时空预测问题。在稀疏辨识方面，将考虑采取稀疏贝叶斯方法、LASSO、阈值最小二乘等方法进行辨识；而在复杂网络方面，我采取时空卷积神经网络（如：CNN, VGG, ResNet 等）进行拟合。该预测方法旨在将稀疏辨识和复杂网络方法耦合，以达到将其优点相结合，使得对于时空数据的预测既有精度，也不乏可解释性。</p>				
论文（设计） 内容	<ol style="list-style-type: none"> 1. 当下研究时空数据的背景介绍，阐明当下时空预测的问题和瓶颈所在； 2. 稀疏辨识方法的阐述与应用（包括正交匹配追踪、稀疏贝叶斯方法、LASSO、阈值最小二乘等方法）； 3. 复杂卷积神经网络算法的基本介绍和应用（包括空间卷积网络 CNN, VGG, ResNet 以及时间循环网络 RNN, LSTM, GRU 等）； 4. 阐明将辨识方法与复杂网络方法相耦合的过程； 5. 基于理论，用于实际数据，基于全球基站往年温度记录，对于今后温度进行评估与预测。 				
指定参考文献	<p>[1] Krizhevsky A, Sutskever I, Hinton G E. ImageNet classification with deep convolutional neural networks[C] International Conference on Neural Information Processing Systems. Curran Associates Inc. 2012:1097-1105.</p> <p>[2] Vaswani A, Shazeer N, Parmar N, et al. Attention Is All You Need[J]. arXiv, 2017: 1706.03762.</p> <p>[3] Silver D, Schrittwieser J, Simonyan K, et al. Mastering the game of Go without human knowledge[J]. Nature, 2017, 550(7676):354-359.</p> <p>[4] Zhang K, Zuo W, Chen Y, et al. Beyond a Gaussian Denoiser: Residual</p>				

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备注	