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论文与报告

基于Nu-支持向量回归的网格资源监控与预测系统

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摘要
为实现智能任务调度与提供可接受的服务质量, 需要建立分布式系统对计算网格资源及网络环境进行监控与预测. 本文设计并实现了网格资源监控与预测系统, 其可用性来源于它的鲁棒性, 可扩放性, 可扩展性与用户友好性. 引入Nu-支持向量回归作为未来多步预测的建模方法, 提出一个混合优化算法以联合优化预测模型的特征选择过程与参数选择过程. 使用基准数据对预测方法进行性能评估, 对比实验结果表明Nu-支持向量回归模型具有较高预测精度, 且组合优化算法能够有效提高预测性能, 这两种方法适用于在线监控与预测系统.

关键词 Nu-支持向量回归 资源监控 资源预测 模型优化 网格服务

分类号

A Nu-support Vector Regression Based System for Grid Resource Monitoring and Prediction

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Abstract
In order to realize intelligent scheduling of incoming tasks and provide acceptable quality of service, a distributed system for monitoring and prediction of computing grid resources and network conditions becomes inevitable. In this paper, we propose the design and implementation of computing grid resource monitoring and prediction system. The system is applicable in that it is robust, scalable, extensible, and user-friendly. Nu-support vector regression (Nu-SVR) is employed as modeling method of multi-step-ahead prediction, and a combinational optimization algorithm is proposed to jointly optimize feature selection and hyperparameter selection for prediction model. Performance evaluation on prediction methods is performed with benchmark data sets, whereas comparative results show that the Nu-SVR model has high prediction accuracy, and the combinational optimization algorithm can improve prediction performance efficiently; hence these two methods are suitable for online monitoring and prediction system.

Key words Nu-support vector regression resource monitoring resource prediction model optimization grid service

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