首 页 ｜ 期刊介绍 ｜ 编委会 ｜ 编辑部介绍 ｜ 投稿指南 ｜ 期刊订阅 ｜ 广告合作 ｜ 留言板 ｜ 联系我们 ｜

论文　　　　　　　　　最新目录 ｜ 下期目录 ｜ 过刊浏览 ｜ 高级检索　　　　<< Previous Articles ｜ Next Articles >>

基于可变区间权重的中期用电量半参数预测模型

邵臻[1,2], 杨善林[1,2], 高飞[1,2], 王晓佳[1,2]

1. 合肥工业大学管理学院, 安徽 合肥 230009;
2. 过程优化与智能决策教育部重点实验室, 安徽 合肥 230009

Mid-term load Forecasting Semi-Parametric Model Based on Time-variant Interval Weights

SHAO Zhen[1,2], YANG Shan-lin[1,2], GAO Fei[1,2], WANG Xiao-jia[1,2]

1. School of Management, Hefei University of Technology, Hefei 230009, China;
2. Key Laboratory of Process Optimization and Intelligent Decision-making, Ministry of Education, Hefei 230009, China

- 摘要
- 参考文献
- 相关文章

Download: PDF (1979KB)　HTML (1KB)　**Export:** BibTeX or EndNote (RIS)　　**Supporting Info**

摘要 由于数据变化规律的多样性,中期电力负荷的波动有着不同于短期、长期负荷的特点。基于电力系统复杂性的研究视角,重点讨论了中期负荷预测过程中模型的不确定性、参数的时变特性以及负荷波动的周期性规律。根据中期负荷的数据特性,建立了基于非参数修匀的半参数模型,定义了函数区间的划分粒度以及模型权重的求解方法,提出了基于可变区间权重的动态预测方法,给出了基于经验模态分解和波动能量分析的噪声序列提取、检验方法。试验研究结果表明,气候因素对用电消耗的影响最大,经济因素次之;从选取的指标来看,不同时期的影响因素对于模型的解释能力是时变的;所提方法能够对电力负荷进行精确的多粒度、多维度分析,进而掌握其局部变化规律,可有效用于电力系统中期负荷预测。

关键词 :　半参数模型　可变区间权重　动态预测　集合经验模态分解　中期负荷预测

Abstract : Due to the diversity of data variation, the fluctuations characteristic of the medium-term power load is different from short-term and long-term power load. Based on the view of electric power system complexity, the mid-term power load forecasting problem is discussed, including the forecasting model uncertainty, parameter time-varying characteristics and the periodic law of load fluctuation. According to the features of mid-term power load, a semi-parametric model based on nonparametric smoothing is built, and the division of the function interval is defined. After that, a new dynamic prediction method is put forward based on variable interval. Combined with the ensemble empirical mode decomposition algorithm and wave energy test, the noise sequence analysis and separation method is presented. The study shows that, climatic factor have the greatest impact on the electricity consumption, while economic factor has less impact on it. In different forecast periods, the explanatory of factors to the forecasting model varies over time. As the proposed semi-parametric model can be used for accurate multi-dimensional and multi-granularity analysis of electricity load, then grasp the variation, it can be efficiently used for mid-term load forecasting.

作者简介: 邵臻(1986-),男(汉族),江苏泗洪人,合肥工业大学管理学院,博士研究生,研究方向:预测、决策科学与技术.

引用本文:

.基于可变区间权重的中期用电量半参数预测模型[J] 中国管理科学, 2015,V23(3): 123-129

Service

把本文推荐给朋友

加入我的书架

加入引用管理器

Email Alert

RSS

作者相关文章

[1]　康重庆,夏清,张伯明.电力系统负荷预测研究综述与发展方向的探讨[J].电力系统自动化,2004,28(17):1-11.

[2]　McSharry P E, Bouwman S, Bloemhof G. Probabilistic forecast of the magnitude and timing of peak electricity demand[J]. IEEE Transactions on Power Systems, 2005,20(2):1166-1172.

[3]　王晓佳,杨善林.基于组合差值的GM(1,1)模型预测方法的改进与应用[J].中国管理科学,2012,20(2):129-134.

[4]　史会峰,牛东晓,卢艳霞.基于贝叶斯神经网络短期负荷预测模型[J].中国管理科学,2012,20(4):118-124.

[5]　Hippert H S,Pedreira C E,Souza R C.Neural networks for short-term load forecasting: a review and evaluation[J]. IEEE Transactions on Power Systems,2001,16(1):44-55.

[6]　张宜阳,卢继平,孟洋洋,等.基于经验模式分解和混沌相空间重构的风电功率短期预测[J].电力系统自动化,2012,36(5):24-28.

[7] 李瑾,刘金朋,王建军.采用支持向量机和模拟退火算法的中长期负荷预测方法[J].中国电机工程学报,2011,31(16):63-66.

[8] 邰能灵,侯志俭,李涛,等.基于小波分析的电力系统短期负荷预测方法[J].中国电机工程学报,2003,23(1):45-50.

[9] Ruppert D, Wand M P, Carroll R J.Semiparametric regression[M].Cambridge:Cambridge University Press,2003.

[10] Hamilton J D. Time series analysis[M].Princeton:Priceton University Press,1994.

[11] Engle R F, Granger C W J, Rice J. Semi-parametric estimates of the relation between weather and electricity sales[J].Journal of the American Statistical Association,1986,81(394):310-320. cross ref

[12] Charytoniuk W, Chen M S, Van Olinda P. Nonparametric regression based short-term load forecasting[J]. IEEE Transac-tions on Power Systems,1998,13(3):725-730. cross ref

[13] Baccini M, Biggeri A, Lagazio C. Parametric and semi-parametric approaches in the analysis of short-term effects of air pollution on health[J].Computational Statistics & Data Analysis,2007,51(9):4324-4336. cross ref

[14] Fan Shu, Hyndman R J.Short-term load forecasting based on a semi-parametric additive model[J]. IEEE Transac-tions on Power Systems,2012,27(1):134-141. cross ref

[15] Stone C J.Consistent nonparametric regression[J].Applied Statistical Society 1977,5(4):595-635.

[16] Heckman N E. Spline smoothing in partial linear models[J].Journal of the Royal Statistical Society, Series B,1986,48(2):244-258.

[17] Green P J.On Use of the EM for penalized likelihood estimation[J].Journal of the Royal Statistical Society, Series B(Methodological),1990,52(3):443-452.

[18] Huang N E,Shen Zheng,Long S R.The empirical mode decomposition and the Hilbert spectrum for nonlinear and nonstationary time series analysis[J].Proceedings of the Royal Society A, 1998,454(1971):903-995. cross ref

[19] Wu Zhaohua, Huang N E. Ensemble empirical mode decomposition: A noise-assisted data analysis method[J]. Advances in Adaptive Data Analysis,2009,1(1):1-41. cross ref

[1]   许冰, 章上峰.经济转型时期中国的非线性菲利普斯曲线[J]. 中国管理科学, 2008,16(5): 37-41