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RESEARCH NOTES

基于支持向量机回归的天然气负荷预测研究

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摘要 Natural gas load forecasting is a key process to the efficient operation of pipeline network. An accurate forecast is required to guarantee a balanced network operation and ensure safe gas supply at a minimum cost. Machine learning techniques have been increasingly applied to load forecasting. A novel regression technique based on the statistical learning theory, support vector machines (SVM), is investigated in this paper for natural gas short-term load forecasting. SVM is based on the principle of structure risk minimization as opposed to the principle of empirical risk minimization in conventional regression techniques. Using a data set with 2 years load values we developed prediction model using SVM to obtain 31 days load predictions. The results on city natural gas short-term load forecasting show that SVM provides better prediction accuracy than neural network. The software package natural gas pipeline networks simulation and load forecasting (NGPNSLF) based on support vector regression prediction has been developed, which has also been applied in practice.

关键词 负荷预测 支持向量机 回归 自然天然气

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Research on Natural Gas Short-Term Load Forecasting Based on Support Vector Regression

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Abstract Natural gas load forecasting is a key process to the efficient operation of pipeline network. An accurate forecast is required to guarantee a balanced network operation and ensure safe gas supply at a minimum cost. Machine learning techniques have been increasingly applied to load forecasting. A novel regression technique based on the statistical learning theory, support vector machines (SVM), is investigated in this paper for natural gas short-term load forecasting. SVM is based on the principle of structure risk minimization as opposed to the principle of empirical risk minimization in conventional regression techniques. Using a data set with 2 years load values we developed prediction model using SVM to obtain 31 days load predictions. The results on city natural gas short-term load forecasting show that SVM provides better prediction accuracy than neural network. The software package natural gas pipeline networks simulation and load forecasting (NGPNSLF) based on support vector regression prediction has been developed, which has also been applied in practice.

Key words support vector machines; support vector regression; load forecasting; natural gas

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本期目录

欢迎浏览

- Supporting media
- TOP(5-TODAY)
- Most Read(MR)
- Most Cited(MC)
- Most Downloaded(MD)
- 本刊最新录用文章
- 本刊最新出版文章
- 本刊最新在线文章
- Journals
- Conferences
- Journals
- Conferences
- 搜索本刊
- 搜索全站
- 搜索
- 搜索