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边坡角设计的支持向量机建模与精度影响因素研究

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摘要 运用人工智能领域最新的基于结构风险最小化原理的机器学习算法——支持向量机(SVM)算法，采用线性Linear和径向基函数RBF两种核函数以及e 不敏感和Quadratic两种损失函数，并且考虑惩罚参数C的不同，编写了相应的程序对影响边坡角设计的诸多因素进行了机器学习，经过反复调整相关参数和计算对比，找到了拟合精度很高的支持向量机网络，并以此网络对测试样本作预测检验模型的可靠性；对影响支持向量机建模精度的各种影响因素作了计算和分析，在此基础上，初步确定了各参数对SVM模型精度影响大小的顺序，为SVM在类似工程上的应用提供了借鉴。

关键词 边坡工程；边坡角设计；支持向量机建模；机器学习与预测；参数分析

分类号

RESEARCH ON MODEL CONSTRUCTION OF SUPPORT VECTOR MACHINE AND PRECISION-INFLUEUCING FACTORS OF SLOPE ANGLE DESIGN

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Abstract

Based on the structural risk minimization principle，a support vector machine(SVM) algorithm，the best machine learning algorithm in the artificial intelligence field today，is introduced. Two kinds of kernel functions(linear and radial basis function) and two kinds of loss functions (e -insensitive and quadratic) and different penalty parameter C are adopted to program a SVM routine in Matlab. Using the developed SVM model，many influencing factors of slope angle design are analyzed. With continued parameter modification and comparative calculations，a SVM network model with high accuracy of fitting was established. The reliability of this SVM network

model is verified by sample testing，where many kinds of accuracy influencing factors of the SVM model are considered. The precision influencing sequence of these parameters is confirmed based on the calculation results，providing reference for similar engineering applications.

Key words slope engineering；slope angle design；model construction of SVM；machine learning and forecast；parameter analysis

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