学术探讨

基于比例UKF的神经网络及其应用

黄冬民

西北工业大学，西安　710072

摘要　　提出了一种利用比例无轨迹卡尔曼滤波（Scaled-UKF）进行神经网络权值估计的算法，该算法可以克服BP算法存在的学习速率缓慢、计算量大、容易使学习陷入局部极小等缺点。以Mackey-Grass混沌时间序列作为神经网络输入，运用比例UKF算法、UKF算法、BP算法仿真神经网络。结果表明，比例UKF算法较之BP算法具有更快的训练速度和更高的预测精度，且可以避免网络学习陷入局部极小;而相对于UKF算法，其变量分布可不限定为高斯型且能保证状态方差半正定。

Neural network and its application based on the Scaled Unscented Kalman Filter（Scaled-UKF）

HUANG Dong-min

Northwestern Polytechnical University，Xi'an 710072，China

Abstract

　One algorithm based on the Scaled Unscented Kalman Filter（Scaled-UKF） is proposed to estimate the weights of the neural network，which can overcome the BP algorithm's weaknesses of slow learning speed，large computational complexity，and easy convergence to the local minimum points.Taking the Mackey-Grass chaos time sequences as its input，the neural network is simulated with the Scaled-UKF，UKF and BP algorithm.The result of the simulation indicates that the Scaled-UKF algorithm has the faster training speed and higher forecast precision than the BP algorithm，and may avoid the network's convergence to the local minimum points.Comparing with the UKF algorithm，the Scaled-UKF algorithm can guarantee positive semi-definiteness of the state covariance and its variable distribution may not be Gaussian-distributed.

通讯作者　黄冬民

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