论文与报告

基于状态延迟动态递归神经网络的机器人动态自适应跟踪辨识

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摘要
对一种在Elman动态递归网络基础上发展而来的复合输入动态递归网络(CIDRNN)作了改进,提出一种新的动态递归神经网络结构,称为状态延迟动态递归神经网络(State Delay Input Dynamical Recurrent Neural Network).具有这种新的拓扑结构和学习规则的动态递归网络,不仅明确了各权值矩阵的意义,而且使权值的训练过程更为简洁,意义更为明确.仿真实验表明,这种结构的网络由于增加了网络输入输出的前一步信息,提高了收敛速度,增强了实时控制的可能性.然后将该网络用于机器人未知非线性动力学的辨识中,使用辨识实际输出与机理模型输出之间的偏差,来识别机理模型或简化模型所丢失的信息,既利用了机器人现有的建模方法,又可以减小网络运算量,提高辨识速度.仿真结果表明了这种改进的有效性.

关键词　动态递归网络　跟踪辨识　机器人

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SDIDRNN Based Dynamical Adaptive Tracking Identification of Robot Manipulators

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Abstract
A new neural network model named state delay input dynamical recurrent neural network is presented. The model with new topological structure and learning algorithm has significance for weight matrices and makes training process of weights become more distinct and straightforward. Simulation shows that the speed of learning and convergence is improved by input of the priori input-output state knowledge. The new neural network is then applied to identification of robotic dynamics through strategy of combining information obtained from simplified model with identification of unknown nonlinear dynamical information. This method reduces computing time and accelerate the identification speed. Simulation results show the efficiency of the new neural network and the strategy.

Key words　Dynamical recurrent neural network　tracking identification　robot manipulators

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