ng Backpropagation with Temporal Windows to Learn the Dynamics of the CMU Direct-Driv

Authors: Kenneth Goldberg, Barak Pearlmutter

Abstract: Computing the inverse dynamics of a robot ann is an active area of research in the control literature. We hope to learn the inverse dynamics by training a neural network on the measured response of a physical ann. The input to the network is a temporal window of measured positions; output is a vector of torques. We train the network on data measured from the first two joints of the CMU Direct-Drive Arm II as it moves through a randomly-generated sample of "pick-and-place" trajectories. We then test generalization with a new trajectory and compare its output with the torque measured at the physical arm. The network is shown to generalize with a root mean square error/standard deviation (RMSS) of 0.10. We interpreted the weights of the network in tenns of the velocity and acceleration filters used in conventional control theory.