

Intrinsic Plasticity for Online Reservoir Optimization

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We show that a biologically motivated learning rule based on neural intrinsic plasticity can optimize reservoirs of analog neurons. The rule, based on an information maximisation principle, is local in time and space, completely unsupervised, and thus computationally efficient. The results indicate improvement and regularization of online LMS and BPDC learning as well as improvement for classical echo-state regression, enabling the latter to solve the MSO problem very conveniently. The efficiency of the approach is further demonstrated for several benchmark problems in time-series prediction and learning of high-dimensional redundant inverse kinematics of a PA10 robot arm and the Honda ASIMO full body motion.