A New Neural Network Architecture For Time Series Classification

S. Incardona[1,2*], G. Tripodo[1,2], M. Buscemi[1,2], M. Pourmohammad Shahvar[1,2] and G. Marsella[1,2]

[1] Dipartimento di Fisica e Chimica "E. Segre", Università degli studi di Palermo, Viale delle Scienze, 90128, Palermo, Italy, [2]INFN sezione di Catania, 95123, Catania, Italy

*simone.incardona@unipa.it

Time Series Classification (TSC) has been considered as one of the most challenging problems in data mining. TSC finds application in different fields, such as finance, medicine, robotics and physics, and it can be used mainly for: Failure prediction, Anomaly detection, Pattern recognition and Alert generation. Here we present a new neural network architecture to solve these type of problems with the same computational power but with a better accuracy.

Convolutional Neural Network

Echo State Network

Tested with *SisFall*, *ECG200* & *ECG500* dataset

Model accuracy for ECG200 dataset
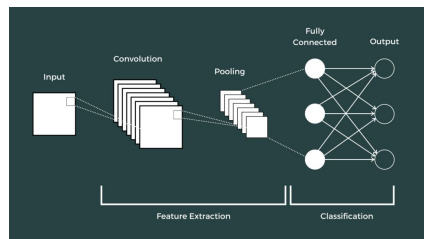
Model loss for ECG200 dataset
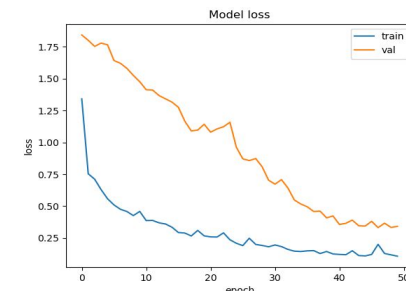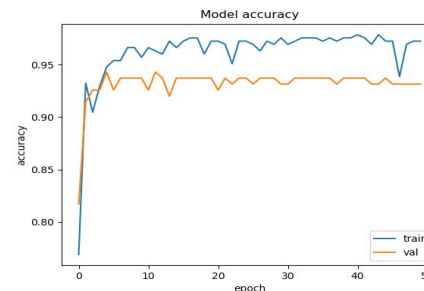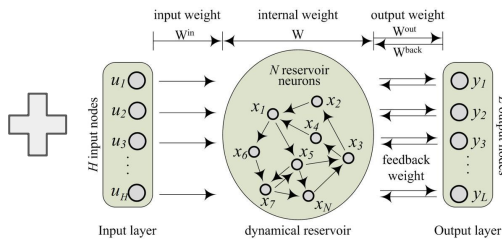
New Neural Network Architecture: *Convolutional Echo State Network - CESN*
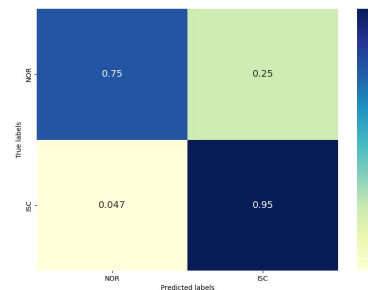
Confusion matrix for the two classes of ECG200 dataset
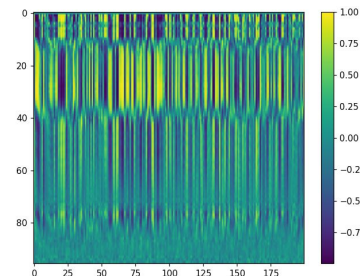
Reservoir states before the convolution