

# Neural Networks

2007 SPECIAL ISSUE  
CALL FOR PAPERS

## ***Echo State Networks and Liquid State Machines***

*Guest Co-Editors :*

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A new approach to analyzing and training recurrent neural network (RNNs) has emerged over the last few years. The central idea is to regard a RNN as a nonlinear, excitable medium, which is driven by input signals or fed-back output signals. From the excited response signals inside the medium, simple (typically linear), trainable readout mechanisms distil the desired output signals. The medium consists of a large, randomly connected network, which is not adapted during learning. It is variously referred to as a dynamical reservoir or liquid. There are currently two main flavours of such networks. Echo state networks were developed from a mathematical and engineering background and are composed of simple sigmoid units, updated in discrete time. Liquid state machines were conceived from a mathematical and computational neuroscience perspective and usually are made of biologically more plausible, spiking neurons with a continuous-time dynamics. These approaches have quickly gained popularity because of their simplicity, expressiveness, ease of training and biological appeal.

This Special Issue aims at establishing a first comprehensive overview of this newly emerging area, demonstrating the versatility of the approach, its mathematical foundations and also its limitations. Submissions are solicited that contribute to this area of research with respect to

- mathematical and algorithmic analysis,
- biological and cognitive modelling,
- engineering applications,
- toolboxes and hardware implementations.

One of the main questions in current research in this field concerns the structure of the dynamical reservoir / liquid. Submissions are especially welcome which investigate the relationship between the excitable medium topology and algebraic properties and the resulting modeling capacity, or methods for pre-adapting the medium by unsupervised or evolutionary mechanisms, or including special-purpose sub networks (as for instance, feature detectors) into the medium.

### **Submission of Manuscript**

The manuscripts should be prepared according to the format of the Neural Networks and electronically submitted to one of the Guest Editors. The review will take place within 3 months and only very minor revisions will be accepted. For any further question, please contact the Guest Editors.

**DEADLINE FOR SUBMISSION : June 1, 2006.**