



RANDOM NEURAL NETWORK MODEL FOR SUPERVISED LEARNING PROBLEMS

S. Basterrech^{*}, *G. Rubino*[†]

tutorial

Abstract: Random Neural Networks (RNNs) are a class of Neural Networks (NNs) that can also be seen as a specific type of queuing network. They have been successfully used in several domains during the last 25 years, as queuing networks to analyze the performance of resource sharing in many engineering areas, as learning tools and in combinatorial optimization, where they are seen as neural systems, and also as models of neurological aspects of living beings. In this article we focus on their learning capabilities, and more specifically, we present a practical guide for using the RNN to solve supervised learning problems. We give a general description of these models using almost indistinctly the terminology of Queuing Theory and the neural one. We present the standard learning procedures used by RNNs, adapted from similar well-established improvements in the standard NN field. We describe in particular a set of learning algorithms covering techniques based on the use of first order and, then, of second order derivatives. We also discuss some issues related to these objects and present new perspectives about their use in supervised learning problems. The tutorial describes their most relevant applications, and also provides a large bibliography.

Key words: *neural networks, random neural networks, supervised learning, pattern recognition, G-networks*

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1. Introduction

Supervised Learning is an area of the Machine Learning field that refers to a set of problems wherein the information is presented according to an outcome measurement associated with a set of input features. The information is presented as a dataset of labeled samples. The aim is “*to learn*” the relationship between input and output features. This learning process is done based on a set of examples in order to generate a learning model with the power of “*generalising*”, this is to make

^{*}Sebastián Basterrech – Corresponding author, National Supercomputing Center, VŠB-Technical University of Ostrava, IT 453, Studentská 1, Ostrava-Poruba, Czech Republic, E-mail: Sebastian.Basterrech.Tiscordio@vsb.cz

[†]Gerardo Rubino, INRIA – Rennes, Beaulieu university campus, 35042 Rennes Cedex, France, E-mail: Gerardo.Rubino@inria.fr