

ART 2-A ON T-NODE MACHINE APPLICATION TO AUTOMATIC CLASSIFICATION OF ALL-NIGHT SLEEP STAGES

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Abstract

This article presents the parallelization on parallel computer of training sequences of ART 2-A neural network. It is applied to the automation of the classification of human sleep stages. We show that the computation time is reduced by a speed-up factor of 10. The results obtained were 92% of correct classification on the training set and 75.5% on the testing set.

Keywords : parallelism, neural networks, pattern recognition, ART.

I INTRODUCTION

The study of human sleep consists in monitoring different physiological activities simultaneously and continuously during the night. The modifications of these signals during the night define 6 states of vigilance described in a standard manual [1]. Each sleep stage, characterised by specific shapes of the polygraph curve, is visually labelled by an expert over 30-second periods during the whole night. Automation of the sleep analysis was necessary because of the amount of information to be analysed (about 1000 30-second pages per night). An automatic sleep analysis system was processed on the basis of an ART 2-A neural network applied to parameters extracted from digitized signals. These parameters are estimated on a 30-

configured this system in a pipeline architecture. The first processor of this pipeline is called master and the others are called slaves.

IV PARALLELIZATION OF ART-2A

The parallelization method is the following:

First of all, a simulation table to be tested is constituted with different networks configurations parameters.

~~The Master processor performs the following tasks:~~

Figure 1 (a) shows the computation time function of the number of processors and of the among of simulations. The computation time of each simulation is different for each threshold. The sequential computation time