On a First Attempt to Modelling Creativity Learning by Means of Artificial Neural Networks

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Abstract

The contribution presents some first results concerning the usability of neural network, obtained from field based study that dealt with children's creativity learning in games. The first question was whether the time series of learning success could be analysed using conventional Kohonen Feature Maps (KFM) in order to find and distinct types of time-dependent learning patterns. The second question was whether the neural network could be used for simulating those learning processes – in order to eventually schedule and optimize those processes individually. The first problem could be solved using Dynamically Controlled Networks (DyCoN: Perl, 2004), which is a KFM-derivate that is able to learn continuously. A number of types of learning patterns could be found which seem to be characteristic for specific learning behaviours. In order to solve the second problem, the concept of DyCoN had to be completed by some properties of "natural" learning: One aspect was to dynamically adapt the capacity of the network to the requirements of the learning process. This could be done by integrating the concept of Growing Neural Gas (GNG: Fritzke, 1995).

Another aspect was to take care of seldom events of high relevance – as creative activities are –which are neglected by all known net approaches. The result is the Dynamically Controlled Neural Gas (DyCoNG: Bischof, 2006; Gerharz, 2006) the concept of which completes the combination of DyCoN and GNG by quality neurons that reflect the quality of information and therefore can measure the creativity of a recorded activity. Initially results from DyCoNG-based simulation show that the network is able to reproduce recorded learning processes and separate main process types.

KEYWORDS: LEARNING, CREATIVITY, NEURAL NETWORKS, SIMULATION