A CAS implementation of a neural model to simulate car traffic

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Abstract

In this paper a neural model to simulate cars traffic behavior, implemented using a CAS (specifically DERIVE), is described. The theory of this neural model was introduced in ICANN 2010 by the same authors, where an application to traffic round simulation was shown. In this talk we present a more general implementation of the neural model developed in modules that can be used to generate applications for different traffic roads. Specifically, an application to traffic control in a motorway will be shown.

In order to visually describe the situation a graphical approach in Java has been developed. This type of integrating DERIVE and Java was previously explored in a talk presented in the "Non Standard Applications of Computer Algebra" session of ACA 2007, where an algorithm to compose counterpoints for a given melody was developed using Derive and played in a visual environment using Java.

This new implementation of the neural model made in Derive allows us not only to simulate rounds traffic like in the application shown in ICANN 2010 but also to simulate several types of motorways with different number of traffic lines. The new traffic rules considered allows the simulation of different traffic situations. This helps to take decisions about which is the best way of designing the motorway, exploring, for instance, the cases in which traffic jams are produced and, therefore, making improvements in the design in a very cheap way.

The graphic interface developed allows to show the actual state of the cars traffic simulation in the neural network. This facility produces important visual information about the present situation of the traffic in the motorway. Therefore, this graphical approach can be used to help in the process of designing the traffic control since the effects of making any change can be visually shown.

Keywords: Neural Model, CAS, traffic control.