

A comparative investigation of non-linear activation functions in neural controllers for search-based game AI engineering

Abstract

The creation of intelligent video game controllers has recently become one of the greatest challenges in game artificial intelligence research, and it is arguably one of the fastest-growing areas in game design and development. The learning process, a very important feature of intelligent methods, is the result of an intelligent game controller to determine and control the game objects behaviors' or actions autonomously. Our approach is to use a more efficient learning model in the form of artificial neural networks for training the controllers. We propose a Hill-Climbing Neural Network (HillClimbNet) that controls the movement of the Ms. Pac-man agent to travel around the maze, gobble all of the pills and escape from the ghosts in the maze. HillClimbNet combines the hill-climbing strategy with a simple, feed-forward artificial neural network architecture. The aim of this study is to analyze the performance of various activation functions for the purpose of generating neural-based controllers to play a video game. Each non-linear activation function is applied identically for all the nodes in the network, namely log-sigmoid, logarithmic, hyperbolic tangent-sigmoid and Gaussian. In general, the results shows an optimum configuration is achieved by using log-sigmoid, while Gaussian is the worst activation function.