

MMC Agent: Artificial Neural Network for target selection on Angry Birds Domain

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This AIBirds agent is an intelligent agent capable to operate autonomously in the Angry Birds digital game domain, through the development of a Multi-Layer Perceptron Artificial Neural Network used as a decision making tool on the target selection process. It was proposed for the target region a delimitation in 98 launch zones. The trained system is able to identify, from a game scene, a numerical advantage value for each created zone to become the target of a launch, and finally select the most promising zone for the highest possible score. The agent was develop from Naive Agent Structure v1.32 [Ge et al. 2014].

The Neural Network was implemented in Python v3.6.2, through the open source library Keras v2.2.2, running under Tensorflow v1.10.0.

The network has 2070 inputs, two fully connected hidden layers: 800 neurons in the first, 500 neurons in the second and 98 neurons on output layer. It was trained with supervised learning method using: ADADELTA as the learning algorithm method, linear activation function and Least Square Method for loss function calculation.

The input data was obtained from agent screenshot method where a 840x480 pixels RGB image is made available to the agent. From this image, the agent is able to locate every object in the scenario. The objects are identified and their type, position and dimension are used to produce a new simplified image.

This new image is cropped, resized to a 90x23 pixels RGB image, and saved on a file directory to be used on future training and network inference. For training and inference needs, this new image is loaded, changed to gray scale format, converted on a 2070 integer vector and used as the network input data.

To set the output layer size, it was identified a default position where the targets of a shot are mostly placed, as shown in Figure 2.

This region was subdivided in 98 32x32 pixels zones. Each zone is considered a possible target of a shot, as represented in Figure 3.

To set up a training data set, an agent was prepared to play uninterruptedly some specific levels and shot randomly on any of those 98 zones. After each shot, the agent save the simplified image of the game scene before the shot on a directory and it image name, the shot target coordinates and the obtained score on a text file.

The network was trained from 36.000 examples collected from levels: 3, 5, 7, 9, 10, 11 13, 15, 17 of “Poached Eggs” episode of Angry Birds Classic game.

Being an early version, MMC Agent is configured to perform only low shots and birds special abilities are configured to be activated always at a fixed trajectory point for

each bird. Besides that, MMC Agent was not trained in levels having TNTs, white and black birds.

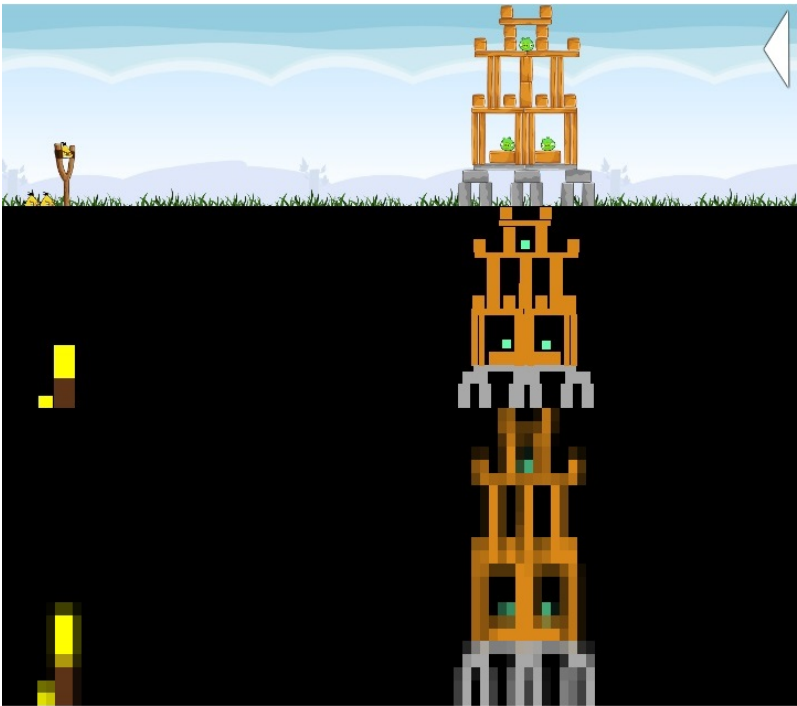


Figura 1. Image Segmentation Process.



Figura 2. Targets default position region.

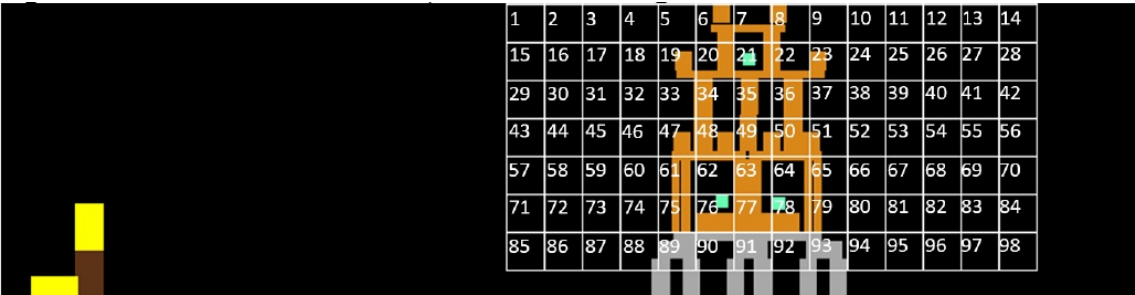


Figura 3. Shot zones delimitation.

Referências

Ge, X., Gould, S., Renz, J., Abeyasinghe, S., Keys, J., Wang, A., Varma, R., and Zhang, P. (2014). Aibirds competitive track software version 1.32. Disponível em: <http://aibirds.org/basic-game-playing-software.html>. Online; Acessado em: 28 Ago. 2018.