# Ares – Pacman AI

Ares is an Artificial intelligence that uses the Keras library to play Pacman.

## The logic

Ares takes the ram data of the game (128 integers ranging from 0 to 255) and the executed action as an input (array with 129 integers) and predicts the reward.

Firstly, the AI will play 100 games with random moves. Afterwards, it tries each of the 8 unique actions and executes the one with the highest predicted reward. It will keep playing games and retrains the neural network after every tenth match. In order to prevent the AI from getting stuck, every 7th game is based completely on random moves, which helps Ares to discover new opportunities.

Since the game memory of each match is added to the training\_data array, it is necessary to reset it after 3000 games, which is done automatically.

Lastly, the label is not equal to the reward, since did not turn out to be of great use, because after some time, Pacman kept going in the same direction, which is due to the fact the prediction for all 8 moves was either 0 or 10. I solved this problem by using the overall match score as the label and only rewarding 25 points for eating a ghost, instead of the usual 100. I changed the reward for eating a ghost, because, after a while, Ares became a ghost-hunter and lost the focus on eating the dots.

## Installation

In order to be able to meaningfully execute the code, various libraries are required.

* h5py
* keras
* tensorflow
* Numpy
* os
* Gym

The easiest way to install those libraries is with the help of the scientific programming tool called anaconda (<https://www.anaconda.com/download/>):

1. Simply set-up a new environment:

*conda create -n newEnv python=3.7 anaconda*

1. Activate the create environment:

*activate newEnv*

1. Use conda to install the remaining packages

*conda install numpy*

*conda install tensorflow*

*pip install h5py*

*pip install gym*

*pip install keras*

*pip install os*

1. Lastly, you will be required to install the openai package that allows the code to interact with Atari games:

*pip install cmake*

*pip install gym[Atari]*

In case this didn’t work, try:

*pip install --no-index -f https://github.com/Kojoley/atari-py/releases atari\_py*

1. Since the environment is already active, you only need to open the code or text editor:

*atom -new--initialize*