**Required python modules**

The following python modules are needed to run the project:

\*pygame

\*neat-python

\*matplotlib

**Installing modules**

Please install these modules using Python PIP ---> pip install [module name]

pip install pygame

pip install neat-python

pip install matplotlib

**Running the project**

Use python to execute the main python file:

python main.py

The individual modules can also be executed if desired.

**Neural Network settings**

Most of the important settings related to the neural networks can be viewed and changed in the file config-feedforward.txt.

The codebase is extensively commented and I tried my best to keep the descriptions as simple as possible, so the remaining settings can all the other settings can be changed inside the main codebase.

**Project modules**

The entry point of the project is intended to be at main.py, even though I designed the modules to be individually executable too. Doing it through the main.py keeps the flow of execution as intended. I will include a brief description of the modules:

* main.py -> This module has the main-menu. It serves as the base from which the rest of the project runs
* button.py -> A simple module that enables me to tailor-fit buttons for the menu screen as needed.
* flappy\_bird.py -> This module does most of the heavy lifting. Everything from rendering the birds to configuring the neural networks and more.
* graph\_results.py -> This works with some of the statistical files spewed out from the program and condenses it into output.csv, which is then plotted on the screen with matplotlib.

**Documentation**

The neat-python module has a well-written documentation that can be found at:

https://neat-python.readthedocs.io/en/latest neat\_overview.html

Please look at the "NEAT Overview," "Configuration file description," and "Module summaries/statistics" for a quick read of the most important parts.

**Future improvements**

I’m currently working on two new modules for this project.

* Module 1 will be a predator-prey environment simulation where I will model both groups with movable on screen dots, attached NEAT networks to all of them and have them fight for survival!
* Module 2 will be a clone of the classic snake game where it will teach itself to play the game like in my flappy bird clone.

In addition to that, I want to add a visualizer for the neural network itself, so that we can see in a corner of a screen how the connections and nodes are being changed as the simulation develops. Python’s graphviz module makes that very doable – I just have to iron out the kinks in the upcoming days.