NOTTINGHAM TRENT UNIVERSITY

BRIEFING:

PROGRMMING PROJECT

(Flappy bird game with

NEAT algorithm)

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Overview

For the programming project of this year, I chose to remake an old game I used to play when I was a child, It Is **FLAPPY BIRD**! Basically, a game of a bird who needs to pass pipes by flying into them with precision, each pipe passed will add a point to the score, it requires only a single tap on screen so the bird can jump, and a sharp eye to know when exactly to jump, because if the bird touches either the bottom pipe, the top pipe, the base or the top of the screen, the game will be over and u can replay it again.

The game was previously designed and created by DotGEARS founded by Dong Nguyen, it was a successful game until it got shut down by its creator because of personal reasons.

I personally want to add something creative to this game, for example and AI who can play it. I searched online and I found some good algorithms to use, NEAT algorithm was an easy and sufficient algorithm to start, I watched some online videos and read the original documents, and by chance and dedication, I managed to make a robot who plays the game by itself.

Analysis of the requirements of the program

The code is split to two parts, The first for the game and graphics, and the second one for NEAT algorithm. First, I started to import the images (Background, base, pipe, and 3 bird pictures each one has a different state of wings). I imported Pygame, os, random, and neat.

I made 3 classes: Bird, Pipe and Base.

For the bird class I defined its position, movement, jumping, rotating, switching between the 3 pictures and finally a get mask function to know if the bird has touched the pipe.

For the pipe class I defined its position, created the top pipe by rotating the image, set the height, movement and colliding with bird by the previous get mask function in Bird class

The base class was only dedicated for drawing the base and moving both the pipe and base towards the left screen as the bird is flying.

I then started on drawing the window, birds, pipes, base and the score.

For the main function, I chose it to make the physics of the game, the neat configuration, birth of generations for the next game, error handling and quit function, and finally drawing all components.

NEAT algorithm needs an activator function, I used Tanh function because it worked the best with my code. With fifty birds in each generation, I can achieve good results in only the first generation.

Design

Diagram

Description automatically generated

Testing

The program is stable and do not encounter any problems nor an expected game quit due to its purpose (AI playing a game)

Below are some of the outputs of the project:

Chart

Description automatically generated

Text

Description automatically generated

Critique

For a beginner project, and a newbie programmer, I did not make the code straight from my brain. I watched a lot of videos and read documents about pygame and neat. The worst thing I encountered is where to place every variable and every function. As soon as I figured it out, a next challenge come up, it is how to implement the NEAT algorithm and make the birds play by themselves.

I wanted to make a way which the user can play the game by himself, but I really focused on the AI playing the game as it is a wonderful thing in computer science.

Overall, everything is working well, with good dedication and debugging, the code is perfectly working to see it and the algorithm.