

DV

ANN

XAI

# Open Programme

Kaan G

CNN

AL NETWORKS

MRR  
drones

RL

BRAWLHALLA HACKING???



Jake Base



Jake Red

BANKING



ROCK  
GROUND  
FIGHTING

FAIRY  
PSYCHIC  
POISON

DARK  
FIGHTING  
DRAGON

FIRE  
FLYING  
DRAGON

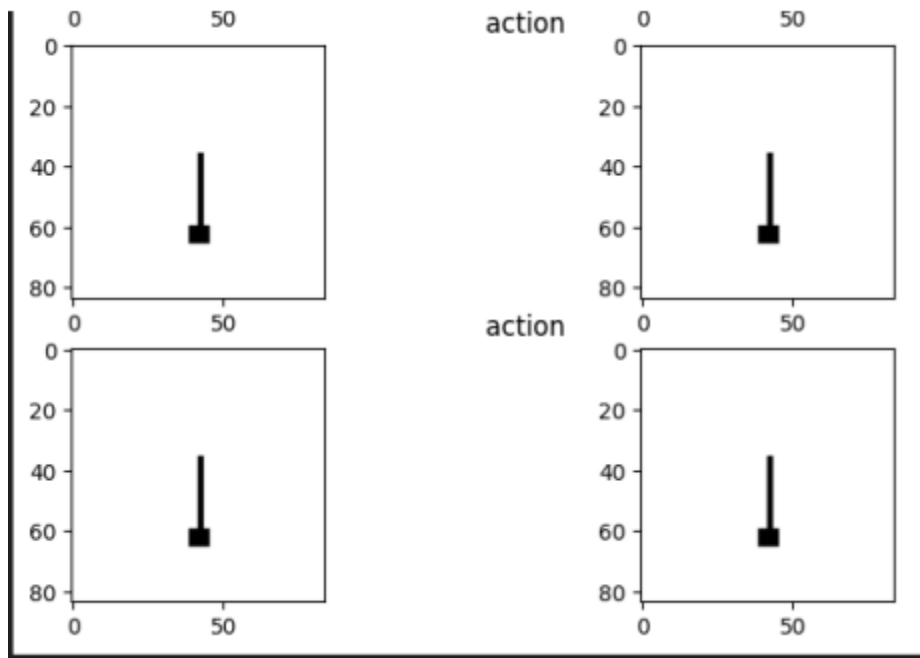
DEEP Q NETWORK  
TUTORIAL

# What did I do

- Experimenting with RL and CNNs
- Extracting Game Information (By Hacking)
- Extracting Game Information (Legal method)

# Experimenting with CNN

- Manually Labelling



## 1 Frame results

- Trained for 40 epochs (different data split each 10 epochs)
- Tested on 100 episodes
- Average Score: 24.89
- Max Score: 50

## Frame stack of 2 results

### First Attempt

- Trained for 40 epochs (different data split each 10 epochs)
- Tested on 100 episodes
- Average Score: 18.65
- Max Score: 56

### Second Attempt

- Trained for 60 epochs (different data split each 10 epochs)
- Tested on 100 episodes
- Average Score: 20.81
- Max Score: 55

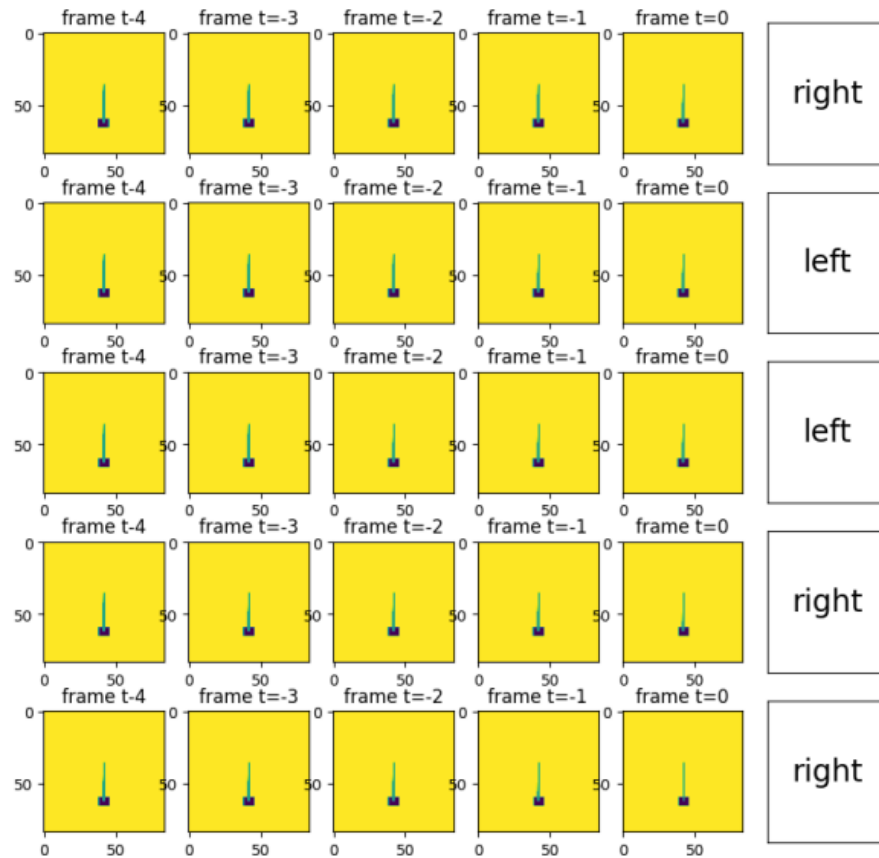
### Third Attempt

- Trained for 80 epochs (different data split each 10 epochs)
- Tested on 100 episodes
- Average Score: 29.24
- Max Score: 54



# Experimenting with CNN

- Automatic Labelling



## Second Attempt

- Trained for 682 epochs (episode data first 2 epochs per episode, later on 1 epoch per episode)
- Tested on 100 episodes
- Average Score: 9.3
- Max Score: 11

## Third Attempt

- Trained for 1576 epochs (episode data first 2 epochs per episode, later on 1 epoch per episode)
- Tested on 100 episodes
- Average Score: 9.4
- Max Score: 11

## Frame stack of 4 results

### First Attempt

- Trained for 91 epochs (episode data + all earlier episodes data -> 1 epoch after every episode)
- learning\_rate = 0.001
- batch\_size = 32
- Tested on 100 episodes
- Average Score: 9.3
- Max Score: 11

### Second Attempt

- Trained for 25 epochs (episode data + all earlier episodes data, but we take random stacks of data using train test split -> 1 epoch after every episode)
- learning\_rate = 0.001
- batch\_size = 32
- Tested on 100 episodes
- Average Score: 9.2
- Max Score: 11
- Note: more complex model

### Third Attempt

- Trained for 90 epochs (episode data + all earlier episodes data, but we take random stacks of data using train test split -> 5 epochs after every episode)
- Extra data collection without learning
- Trained for 35 epochs (episode data + all earlier episodes data, but we take random stacks of data using train test split -> 10 epochs after every episode (basically 1k+ framestacks per epoch))
- learning\_rate = 0.01
- batch\_size = 32
- Tested on 100 episodes
- Average Score: 9.5
- Max Score: 11
- Note: more complex model

# Experimenting with RL (DQN)

- DQN Agent
- Perfect Gameplay
- Unlimited Score

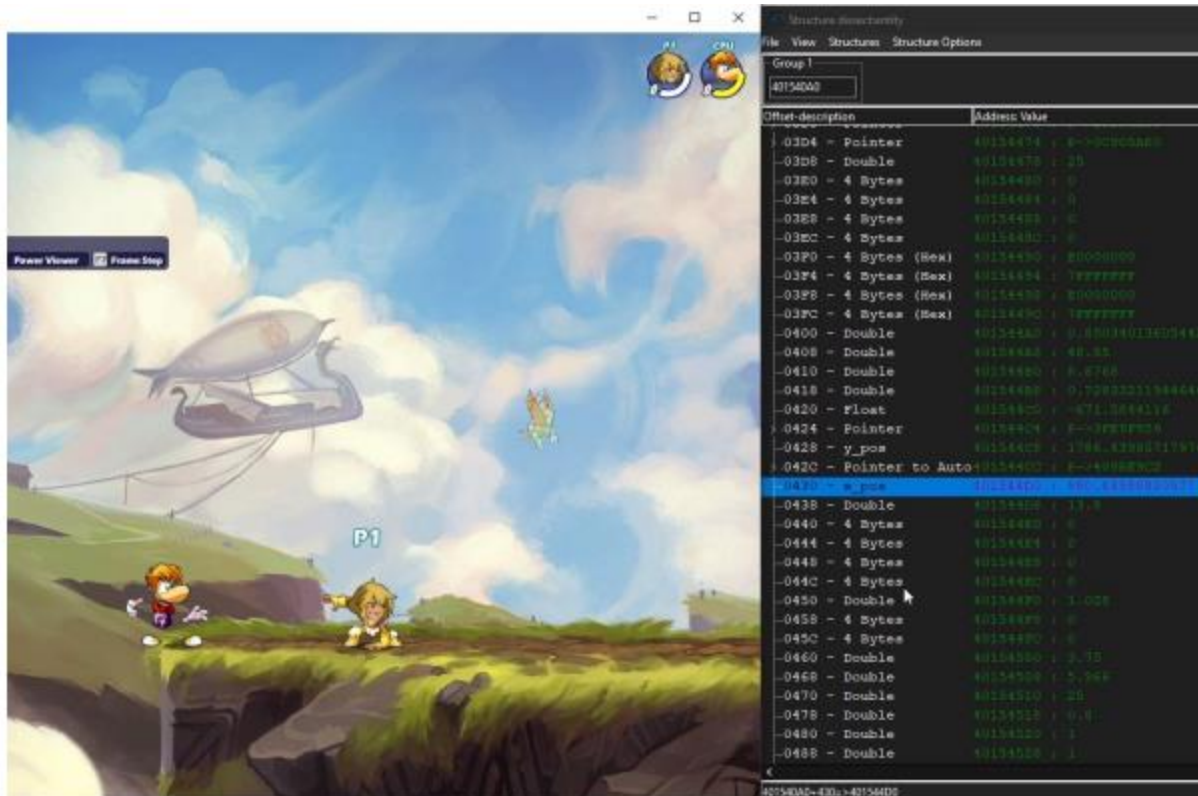
```
env._max_episode_steps=100000  
scores = dqn.test(env, nb_episodes=5, visualize=True)  
print(np.mean(scores.history['episode_reward']))  
env.close()
```

[34] 14m 15.7s

```
... Testing for 5 episodes ...  
Episode 1: reward: 100000.000, steps: 100000
```


# Learning to Hack Games

- Extract game state




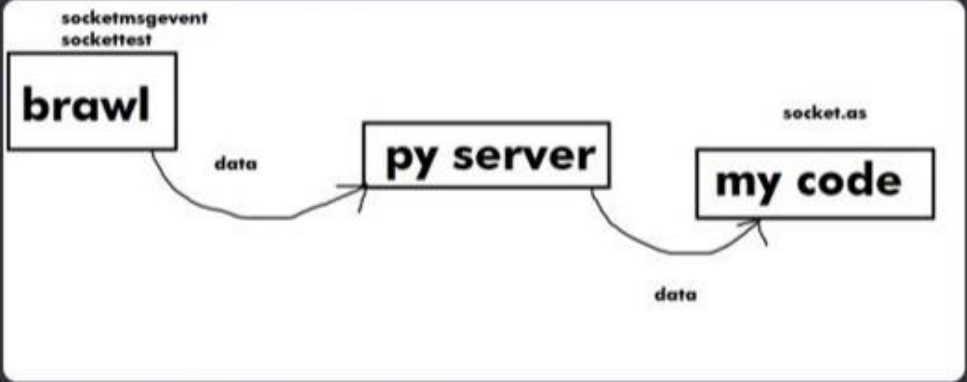
# Learning to Hack Games

- Socket between game and py server

 CrossyChainsaw 29/10/2023 12:09  
ohhhhhhhhhhhhhhhhh i think i start to get it  
let me try to explain to you to make sure


Ok

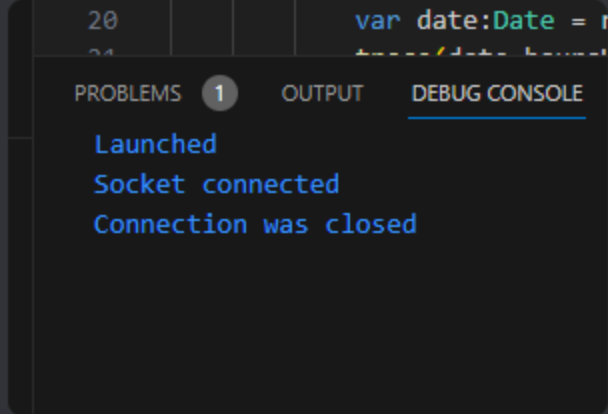
 CrossyChainsaw 29/10/2023 12:11



```
graph LR; subgraph "socketmsgevent sockettest"; brawl; end; brawl -- data --> py_server[py server]; py_server -- data --> my_code[my code]; subgraph "socket.as"; my_code; end;
```

and i suppose each frame data gets send  
and i dont really get how my python program will receive data with socket.as  
like where does it go or do i have to write a script  
should i learn more about tcp (i know nothing about it) (edited)

 CrossyChainsaw 29/10/2023 13:14  
oh  
also this just happened




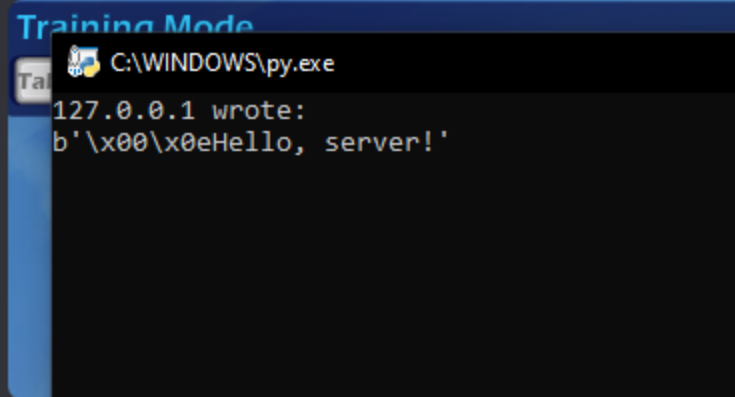
20  
21  
var date:Date = r  
+.../date.html

PROBLEMS 1 OUTPUT DEBUG CONSOLE

Launched  
Socket connected  
Connection was closed

nice

 CrossyChainsaw 29/10/2023 13:16  
oh and this in the server

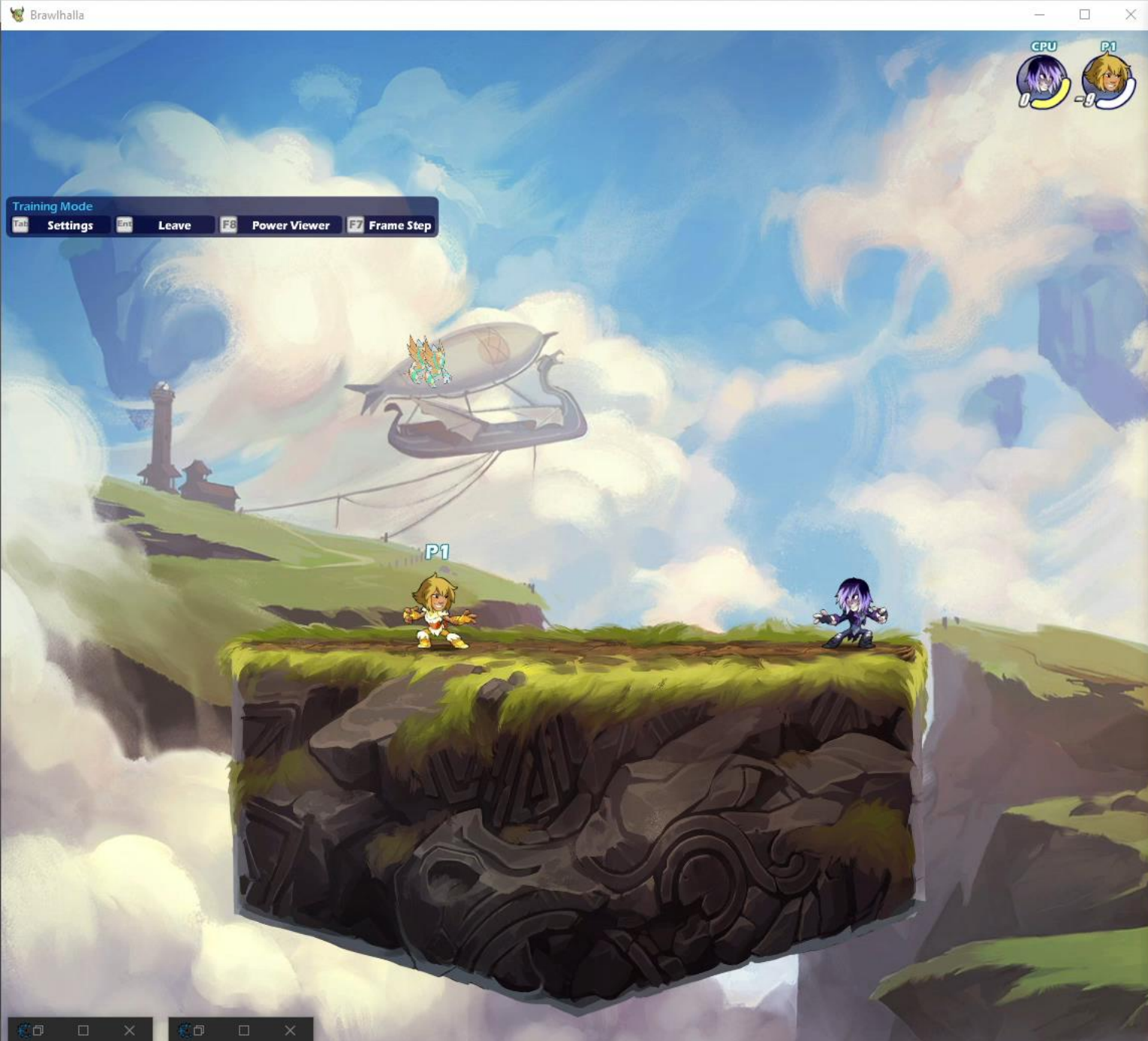


Training Mode

Ta C:\WINDOWS\py.exe

127.0.0.1 wrote:  
b'\x00\x0eHello, server!'





Cheat Engine 7.5

File Edit Table D3D Help

00004FAC-BrawlhallaGame.exe

New Scan Next Scan Undo Scan

Found: 38

Address	Value	Previous	First
36C4408C:s	0	3.448...	2.809...
36C4408C:d	1	1.215...	9.904...
36C440D0:d	1.79443...	-1.87...	8.063...
36C440D4:4	84	37154...	94341...
36C440D4:s	1.17709...	-1.10...	0.060...
36C440D4:d	4.15015...	2.039...	1.661...
36C440D8:4	0	9612	7831
36C440D8:s	0	1.346...	1.097...
36C440D8:d	1	4.748...	3.869...
36C44128:d	4.57552...	-1.26...	5.685...
36C4412C:4	5541992	41539...	18903...
36C4412C:s	7.76592...	-6.19...	4.273...
36C4412C:d	2.73808...	8.328...	2.580...
36C44130:4	0	62998...	51322...
36C44130:s	0	2.443...	1.601...
36C44130:d	1	3.112...	2.545...
36C441B0:d	4.59374...	1.813...	2.206...
36C441B4:4	21648	19791...	99723...
36C441B4:s	3.03353...	6.277...	0.083...

Scan Type: Changed value

Value Type: All

Simple values only

Compare to first scan

Memory Scan Options

All

Start: 0000000000000000

Stop: 00007fffffffffffffff

Writable

Executable

CopyOnWrite

Active memory only

Fast Scan: 1

Alignment

Last Digits

Pause the game while scanning

Add Address Manually

Memory View

Active	Description	Address	Type	Value
	x_pos	36C441B0	Double	4.5937495381764E-310

Advanced Options

Table Extras



# Legally extracting game information

- Object Tracking



# Legally extracting game information

- Object Tracking, Filtering on colors (Red)



# Legally extracting game information

- Gameplan



# Goals / What now?

- 1. Beat an Easy-Bot in a 1v1 match in the game Brawlhalla – (30-12-2021)
- 2. Beat a Medium-Bot in a 1v1 match in the game Brawlhalla – (06-10-2023)
- 3. Beat a Hard-Bot in a 1v1 match in the game Brawlhalla

Result

<https://www.youtube.com/watch?v=4esckiZkZu8>