

# Personal Development Report

Kaan Gögcay





## Version History

Version	Date of submission	Changes
PDR_v1	23/09/2022	Major - Structure of the document
PDR_v2	19/10/2022	Major - Add self assessment 1 on each learning outcome - Restructure the document
PDR_v3	23/11/2022	Major - Add self assessment 2 on each learning outcome Minor - Rename "Preface" to "Introduction" - Add "Preface" - Every header on a new page - Give the document a theme
PDR_v3.0.1 (Current)	-	Minor - Remove the empty page - Version history on a new page
PDR_v4.0	-	Major - Add self assessment 3 on a few learning outcomes Minor - Add "Projects" - Edit "Learning Outcomes" - Resize all feedback images from self assessments 1 and 2.
PDR_v4.1	31/12/2022	Major - Add self assessment 3 on each learning outcome Minor - Remove subheaders from TOC - Added image descriptions to all images inside of self assessment 3.
PDR_v4.2	15/01/2023	Minor - Add "Open Program" section to Learning Outcome 4
PDR_v4.3	19/01/2023	Minor - Add "Open Program" section to Projects



		and to Learning Outcomes 2, 3 and 6
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## Preface

After reading a small introduction about myself and AI, you will read a self-assessment per learning outcome. In this self assessment I explain with feedback-screenshots how I believe I deserve the corresponding grade.

## Introduction

Starting this semester I had basically 0 experience with AI. It always looked so interesting to me but I have never done anything with it. Previous semesters I have followed software demand based. I mainly have been making games in my semesters, keeping in mind I have to touch all learning outcomes. For if you're wondering why I didn't choose game design. Game design would look like the perfect specialisation to me, it would probably be really fun but I don't think the future in game design is too big.

## Projects

Here I will briefly explain the projects I worked on this semester. More details about my projects inside of the learning outcomes.

### Brawlhalla AI

#### Reinforcement Learning

The idea was to create an application that would be able to play the 2d platform fighting game Brawlhalla. I did research to figure out how I could create the AI and what resources were necessary. This brought me to Reinforcement Learning. Reinforcement learning is a training method that learns by itself how to act, when some kind of input is provided. For example, in my case, reinforcement learning would help my fighting-game-AI how to knock out its opponent, if I would give it some game-related-information. But the problem with reinforcement learning was that I had no game-related-information for it to base decisions off. There is of course the code of the game somewhere running in the background wherein all live game information is running, but it was nearly impossible to reach. So I had to find a way to obtain game-related-information in some way, so I have input for my AI. This is where the second part of the project came into play.

#### Object Detection

After some more thinking and researching, I came up with the idea to generate my own game-related-information. This was possible using Object Detection. Object detection is a technique to scan for objects on your screen. You might have seen object detection in your life before. It's the same technology China uses to identify humans and track them. So object detection looked like the way to go. Sadly after trying for 2 weeks straight. It just wasn't working out. But while trying to get object detection working. I ended up finding something pretty useful by accident.

#### Object Tracking

Whilst trying to find out how to get object detection working, I found a tutorial on object tracking. Object tracking is a technique that checks for moving pixels on your screen. You could also tune it, for example the minimum area of moving pixels. So doing some tuning, Everything I wanted to detect got detected: legends- moving, attacking, getting damage, giving damage and weapons spawning. All important factors were being tracked so it looked perfect. But the problem here was that there was almost no data involved in the project. And that would mean I had to do another project. So the thing I feared but already saw coming finally happened. I decided to drop the project.

## Brawlhalla Legend Classification

After dropping my initial project, I was left with a very wide domain understanding. Since I didn't want to throw my domain understanding away and do everything all over again, I decided to do something else involving the topic Brawlhalla. I looked on our school website for machine learning exercises, took an easy pokemon-classification exercise, and shaped it like my own application. I realised I could do the exact same thing for the playable characters in Brawlhalla plus this way I would touch all the learning outcomes so it looked like a safe move. School was already using a machine learning algorithm (Support Vector Machines) in their pokemon-classification. But to expand the application, I tried out a different machine learning algorithm as well (Nearest Neighbours).

## JUGO Project

The JUGO project is the group project I worked on this semester. Inside this project, we show the fastest route from point A to point B. For better visualisation you can compare it to google maps. Next, we would also make predictions if there is a traffic jam on the roads you pass. And if there was a traffic jam, it would also tell you till when. We accomplished this by using a dataset containing traffic jam information, like when there is a traffic jam, the cause of the traffic jam, and so on.

Predicting when there would be a traffic jam was kind of a problem. That is because our dataset is full of when there is a traffic jam, not when there isn't. To solve this we created a script that would generate the data of when there isn't a traffic jam. But this only solved half the problem. The other problem was that we wanted to predict how long a traffic jam would last, but we didn't have the required data for it. To solve this we used a second dataset. By combining the 2 datasets into one dataset, we solved the biggest problems of our project.

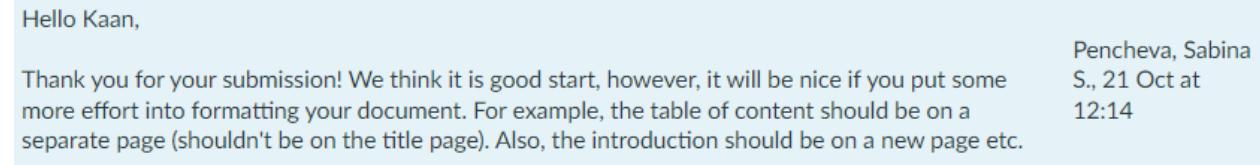
## Open Program

For my open program I explored the field of Reinforcement Learning. In short, I wrote my own self-learning algorithm that can learn how to play the game called Cart Pole. I also tried using code from the internet with Deep Q-Learning but I couldn't get it to work.

I explored what I could do with my own self-learning algorithm and tried to expand, and improve it. I have also tried different reward systems. Later on you will see what reward system worked best.

## Learning Outcomes

Per learning outcome I wrote a self-assessment and gave myself a grade. Also do I show evidence from my teachers that help explain why I think I deserve a certain grade. This evidence is usually a screenshot of feedback from canvas. See the image below.



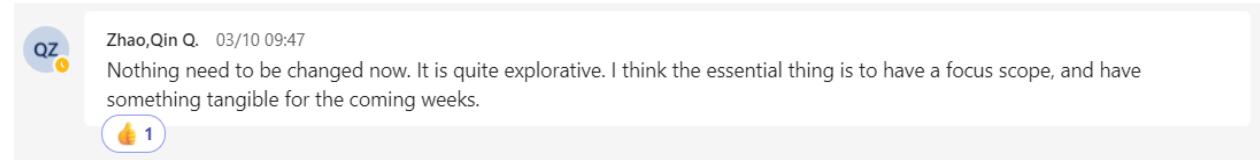
Hello Kaan,

Thank you for your submission! We think it is good start, however, it will be nice if you put some more effort into formatting your document. For example, the table of content should be on a separate page (shouldn't be on the title page). Also, the introduction should be on a new page etc.

Pencheva, Sabina  
S., 21 Oct at  
12:14

*Image 1: Screenshot from canvas where you can see feedback on my first PDR submission.*

You might also encounter a screenshot from Teams. That would look like the following,



Zhao,Qin Q. 03/10 09:47

Nothing need to be changed now. It is quite explorative. I think the essential thing is to have a focus scope, and have something tangible for the coming weeks.

1

*Image 2: Screenshot from Teams where you can see feedback on my initial personal project, Brawlhalla AI.*

You might see the learning outcome divided into multiple projects, since the steps I took differ too much per project so it wouldn't look as clean.

## Learning Outcome 1: Data preparation

### Self Assessment 3

I have prepared data on both of my personal projects.

#### Brawlhalla AI with Object Detection

In this project I needed quite unique data. As you might know, I wanted to generate game-related-information, so I can feed it to my reinforcement learning bot. My solution was to train an object detection model to detect brawlhalla legends. If Brawlhalla legends could get detected, I could export the locations of where they would get detected and like that we would have our first pieces of game information. This process went as follows.

1. Play a game of Brawlhalla
2. Record the entire match
3. Choose 100 frames
4. Label each image one by one

All steps speak for itself, except step 4. So let me show you how that went. [I would suggest pressing here to see footage of what it looks like to label images](#), just so you have an idea of what I'm explaining.

In every frame I chose, I would put a so-called boundary box around the object that should be detected, included with information about the object that is seen inside the box. By putting these boxes around the objects with information. I could train a model with this data. This means that my model should be able to detect terms like "Koji" and "Volkov" in live footage. And that's perfect since I could get the locations for where they are detected in real time, basically giving me the locations of the legends in real time. Sadly I didn't get that far. After labelling all my images I got error after error, leaving me with data that is worth gold. But I just couldn't figure out how to use it. I realised I was wasting too much time so I stopped trying and kept looking for ways to generate game related information.

Also adding this real quick. I did deliver this to my DAIA teacher. Here is her feedback, don't mind the first sentence.

I would advice you to stick to one and the same submission for all of us. I am missing the technical part of your submission, for example, the justification for data preparation is very good, however, I am missing the proof (python code) of how you did it and whether you actually did it.

Pencheva,  
Sabina S., 15  
Nov at 11:05

*Image 3: Feedback from my DAIA teacher on my Brawlhalla AI project.*

## Brawlhalla AI with Object Tracking

I found an alternative that skips the entire labelling process, and just gives me the locations of the legends. Perfect! Right? [Click here to see what I am talking about to get a quick idea of what I will be talking about.](#)

So the application puts boundary boxes around the legends in real time. This was what I was trying to do with Object Detection. There is a micro downside, my application doesn't know that the legend Koji is actually Koji. It just sees pixels moving. This will make the reinforcement learning take more time since it has to learn what is exactly happening. But that doesn't matter too much.

You might be thinking now, THIS IS AWESOME, WHY AREN'T YOU USING IT? Well, the issue here is that there isn't really enough data involved in the process for my learning outcomes. The only data I'm using is the footage of the match for object tracking. Object tracking exports boundary boxes as locations and gives this to reinforcement learning. That's all the data in play. So to take the safer bet, I dropped this and chose a project where I can touch my data learning outcome for sure.

## Brawlhalla Legend Classification

In this project I had a few steps again on how to prepare data. The end goal is to have an image dataset splitted up into multiple classes, so we can use them to train a model and test it. I started off by collecting images of the internet. I used websites like reddit, twitter, deviantart, pinterest, brawlhalla wiki, and I even collected images from the game itself by just running the game and making screenshots. I wrote out what I did and delivered it to my DAIA teacher and got the following feedback,

Thank you for your submission! Overall, you did good job. It is really nice that you worked upon all the given rubrics.

Here are some points you can improve on:

1. Data requirements --> there you could be way more elaborate and convincing
2. Data visualisation --> every time you have a graph describe the choice of a particular visualisation.

Pencheva,  
Sabina S., 8 Nov  
at 9:27

*Image 4: My DAIA teacher giving me feedback on my first iteration through the AI project methodology provided by school.*

Whilst looking for images I did have a small set of requirements to choose images that would make it easier for my model, but I didn't specifically mention them in my document nor did I show the data. Here are the data requirements,

- Only pick images where the legend is using the classic skin.
- Only pick images where the legend is using the classic colours.
- Only pick images where the legend is the only one on the image.

By sticking to these requirements here's an example of what the data looks like.

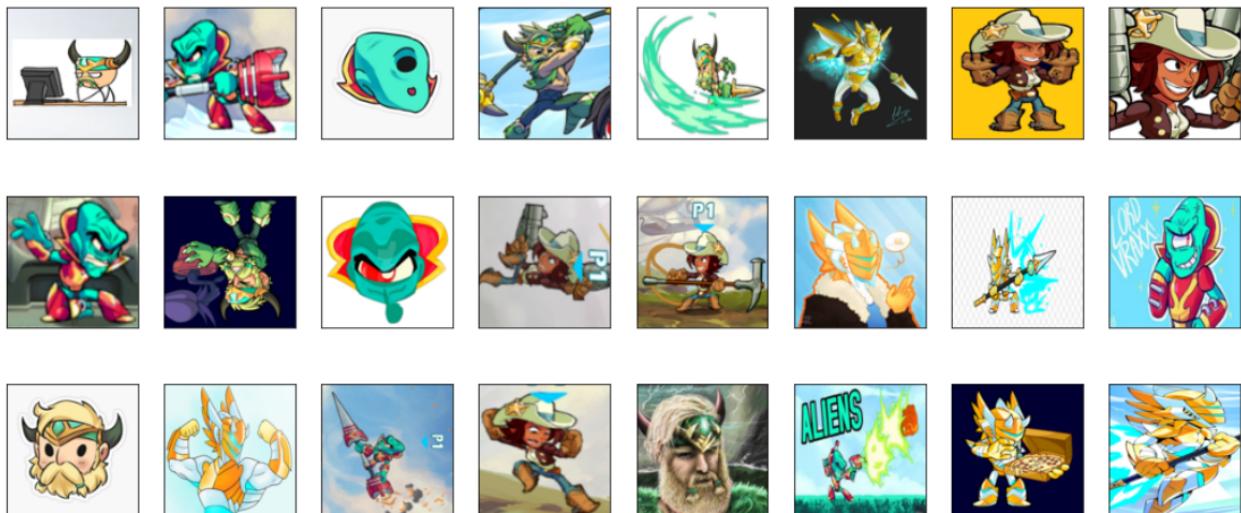


*Images 5, 6, 7, 8: Data for my classification project. The images have the same colour, skin, and are the only legend on the image making it easier for the model to classify.*

But the data isn't useful yet. To prepare the data for my model, I followed a few steps again.

- Convert all images to JPG
  - Change the bit-depth to 24
  - Resize all images to 2048x2048 (This wasn't necessary I found out later on)

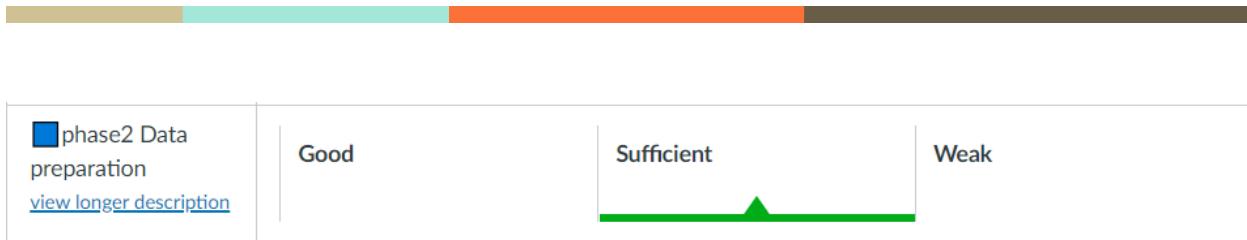
When these steps are also followed, you'll end up with something like this,



*Image 9: The result of cleaning all images in all classes. Again you see that the legend has the same colour, skin and is the only one on the image.*

*Note: You might notice that I'm using legend images from the game mixed with legend art. The reason I did this is to make the project a bit interesting. If I would do game images only it would be a breeze for the model.*

So after I collected evidence of me actually doing what I documented. I delivered it again. Without any remark from my teacher I got back a grade for data preparation.



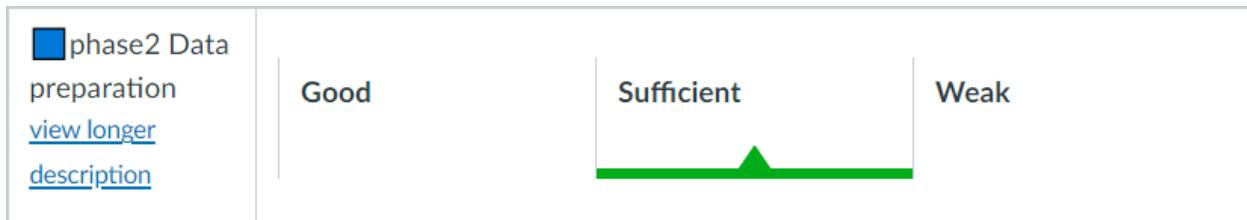
*Image 10: Because of the data preparation I did and documented in my Brawlhalla Classification Project I got back a sufficient grade.*

### Grade - Advanced

If we look at what I've done in total for data preparation, I would say I've experienced quite a hard and unique journey. Even though most of it was for nothing. The way I prepared my data looked really solid. Even though my teacher graded my data preparation sufficiently. I feel like if we look at everything I've done till now concerning data preparation, I definitely deserve an advance for this learning outcome.

## Self Assessment 2

In my challenge I have prepared a dataset of images. I have shown my work to the teacher and my teacher graded the data preparation part *sufficient*. Therefore I believe I deserve a *proficient* for this learning outcome.



*Grade - Proficient*

## Self Assessment 1

Until now I have prepared an image dataset that I collected myself. To clean the data I have made a small checklist for myself. The steps were as follows, Collect Data -> Convert to JPG 24 bit-depth -> Resize to 2048x2048. These aren't just random steps, I have found out what to do in a lengthy trial and error process and with some help from Qin (my machine learning teacher).

About storing the dataset. Right now it's just stored on my pc. Since this didn't give any problems I don't think it's necessary to make use of any additional cloud storage.

So in the end, I would say I can clean a dataset but in my opinion I'd say I have to do it at least one more time on an actual dataset (not with an image dataset) just to prove the teachers I can really clean a dataset. but what i have done till now isn't bad.

*Grade - Beginning*

## Learning Outcome 2: Data analysis & model engineering

### Self Assessment 3

#### Brawlhalla Legend Classification (SVM)

*Note: I'm explaining everything from the start. So instead of 4 data classes, I had 2 data classes in the beginning. This is important because fewer data classes give a better accuracy-result no matter what, because there is a bigger chance to get lucky guesses.*

Now that the data is prepared, we can start modelling. Since most of my project is a copy paste of the pokemon-classification-exercise provided by school. I also copy pasted the model they used. That's why I chose for Support-Vector- Machines. After doing this I delivered my project to my machine learning teacher. As if right now my project is just a copy paste of the pokemon exercise but with my own data, the only thing I changed is that I did some minimal hyperparameter tuning.

The way I did this was, I basically wrote a script that would find the best C value by trial and error. It would create a classification report with a different C value all the time and output the accuracy. This was a very inefficient way of working, since grid search basically does the same thing, and at the same time it's more reliable as well. My teacher gave me the following feedback.

You have an average accuracy of 64% of SVM after you have tried searching the best C value. Did you try the different kernel parameter? Maybe you can discuss why the accuracy is not very high? One reason could be related to the resolution of the image. Another reason could be the number of images that you have collected. As the last step, if you still cannot improve the accuracy, you can try CNN.

Zhao, Qin Q., 3  
Nov at 9:39

*Image 11: My Machine Learning teacher giving me feedback on my first iteration.*

So to improve the accuracy I tried out different kernels. Again, I didn't use grid search so I wrote a trial and error script that took over an hour and tested lots of possible combinations between hyperparameters. After waiting for a while I found the best kernel and this improved the accuracy of the project all the way up to 73%. I delivered this to my teacher and got the following feedback,

Good to see that with some further tuning on image resolution and C value, you bring the accuracy up to 73%. You can try some other models, e.g. random forest, to prove the reliability of your models. Another approach would be trying more advanced algorithms, e.g. CNN for image classification.

Zhao, Qin Q., 8  
Nov at 21:30

*Image 12: I delivered my project to my Machine Learning teacher after I got an accuracy of 73%. Here she suggests trying out different models to prove the reliability.*

## Brawlhalla Legend Classification (kNN)

So I chose another algorithm, kNN this time. This was really easy to execute, since the only thing I had to change is line 2 where you define the model.

```
def generate_report_knn(rnd):
    X_train, X_test, y_train, y_test = train_test_split(images, labels, test_size=.3, random_state=rnd)
    model = KNN()
    model.fit(X_train, y_train)
    pred = model.predict(X_test)
    report = classification_report(y_test, pred, zero_division=0)
    #print(report)
    acc = accuracy_score(pred, y_test)
    return acc
```

*Image 13: As I said, line 2 is the only line I had to change to change the model making it really easy to change models.*

Since it was so easy, I tried optimising the hyperparameters as well before delivering it to my teacher. I did this by looking up the sklearn-documentation and checking what hyperparameters exist. Again, I didn't use grid search so it became a mess again. In image 14/15 you see a screenshot from my notebook. This time I took it a bit more seriously and took all the hyperparameters I felt like actually changed something.

```
array_algorithm = ['auto', 'ball_tree', 'kd_tree', 'brute']
array_n_neighbors = ['uniform', 'distance', 'callable']
array_leaf_size = [-1000, 30, 40000]
array_p = [-500, 1, 5, 500]
n_jobs = [-1, 0, 1, 2]

avg = 0
count = 0
for algorithm in array_algorithm:
    for n_neighbors in array_n_neighbors:
        for leaf_size in array_leaf_size:
            for p in array_p:
                for jobs in n_jobs:
                    for i in range(0, 100):
                        acc = generate_report_knn(i)
                        avg+=acc
                        count+=1
                    print("Average Accuracy: " + str(avg/count) + " (" + str(algorithm) + ', ' + str(n_neighbors) + ', ' + str(leaf_size) + ', ' + str(p) + ', ' + str(jobs))
```

Average Accuracy: 0.6175000000000002 (auto, uniform, -1000, -500, -1)  
 Average Accuracy: 0.6175 (auto, uniform, -1000, -500, 0)  
 Average Accuracy: 0.6175000000000002 (auto, uniform, -1000, -500, 1)  
 Average Accuracy: 0.6175000000000002 (auto, uniform, -1000, -500, 2)

```
Average Accuracy: 0.6175000000000002 (auto, uniform, -1000, -500, 2)
Average Accuracy: 0.6175 (auto, uniform, -1000, 1, -1)
Average Accuracy: 0.6174999999999999 (auto, uniform, -1000, 1, 0)
Average Accuracy: 0.6174999999999998 (auto, uniform, -1000, 1, 1)
Average Accuracy: 0.6174999999999998 (auto, uniform, -1000, 1, 2)
Average Accuracy: 0.6175 (auto, uniform, -1000, 5, -1)
Average Accuracy: 0.6175000000000002 (auto, uniform, -1000, 5, 0)
Average Accuracy: 0.6175000000000002 (auto, uniform, -1000, 5, 1)
Average Accuracy: 0.6175000000000003 (auto, uniform, -1000, 5, 2)
Average Accuracy: 0.6175000000000004 (auto, uniform, -1000, 500, -1)
Average Accuracy: 0.6175000000000004 (auto, uniform, -1000, 500, 0)
Average Accuracy: 0.6175000000000005 (auto, uniform, -1000, 500, 1)
Average Accuracy: 0.6175000000000005 (auto, uniform, -1000, 500, 2)
Average Accuracy: 0.6175000000000002 (auto, uniform, 30, -500, -1)
Average Accuracy: 0.6175 (auto, uniform, 30, -500, 0)
```

*Image 14, 15: In this code block you see me trying out lots and lots of different combinations of hyperparameters. There were so many combinations that it took over 70 minutes in total. You can see the average accuracy for each combination, because important to note is that each combination also gets tested 100 times on 100 different seeds to make it more reliable.*

After 70 minutes of waiting, all combinations gave me somewhat the same accuracy. My conclusion was that kNN is just not suitable for this exact problem. This process might look useless, but I'm happy that my ML teacher did appreciate what I tried. Here's her feedback,

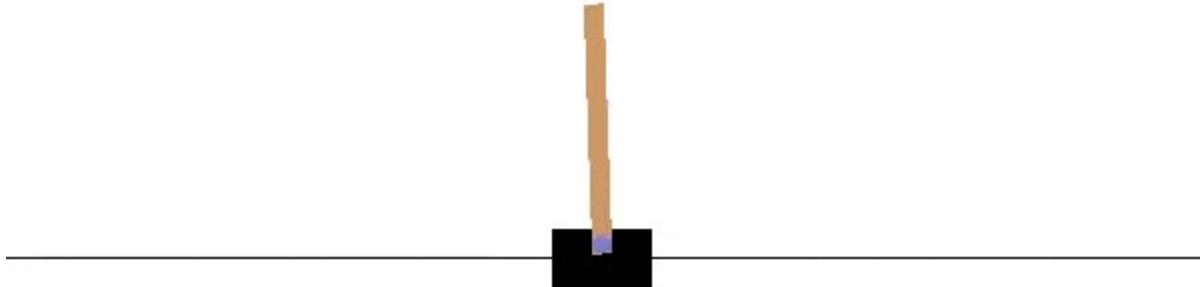
Good that you have tried two models, fine tuning the hyperparameters, and have compared the accuracy scores of the two models, which means you proof that your model is reliable and explainable.

Zhao, Qin Q.,  
17 Nov at  
11:11

*Image 16: My ML teacher about me trying out 2 different models.*

## Open Program

Inside my open program I tried making a model to play the Cart Pole Game and get a score of 500. To make the model play we first need to train it. In this training there goes A LOT of data. It works as follows. The model observes the game state he is in, does a random action and receives a reward. All this will be saved as one data entry. We do this every frame. Like this we can keep on adding data aka train the model.



*Image 17: Cart Pole Game, The goal of the game is to make the pole balance on the cart.*

If we have gathered some data we can try to test my model. In the test we let the model base its decisions off of the data the model has gathered. The model has for example saved that in a certain game state the optimal move is to move right, if we encounter this state whilst playing the model knows it should move right. So the more different game states we encounter during the training, the better the model will be prepared for the test.

## Grade - Proficient / Advanced

At the start of the semester I had very big plans. Sadly I couldn't execute them leaving me with less time to come up with a new project. That's why I chose 2 lame models that are both very easy to set up. The hyperparameter optimization was very messy and could've been executed way better using grid search. So in the end, what I've done isn't bad by any means, but I was just expecting to deliver a cooler project, I had bigger plans and some things could've been executed nicer. Therefore I'm giving myself a steady proficient. Is what I would say before I made my Open Program. With the addition of my Open Program it is considerable to receive an advanced grade.

## Self Assessment 2

In the image below, you see that my ML teacher advised me to tune the hyperparameters and try to use a different algorithm to try to get a higher accuracy for my project.

You have an average accuracy of 64% of SVM after you have tried searching the best C value. Did you try the different kernel parameter? Maybe you can discuss why the accuracy is not very high? One reason could be related to the resolution of the image. Another reason could be the number of images that you have collected. As the last step, if you still cannot improve the accuracy, you can try CNN.

Zhao, Qin Q. , 3 Nov at 9:39

So I started off by improving the accuracy by tuning hyperparameters.

Good to see that with some further tuning on image resolution and C value, you bring the accuracy up to 73%. You can try some other models, e.g. random forest, to prove the reliability of your models. Another approach would be trying more advanced algorithms, e.g. CNN for image classification.

Zhao, Qin Q. , 8 Nov at 21:30

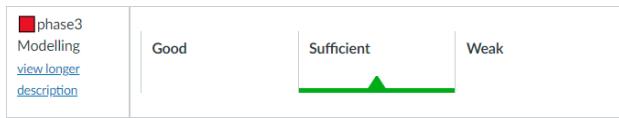
Next up I added a second algorithm,

Good that you have tried two models, fine tuning the hyperparameters, and have compared the accuracy scores of the two models, which means you proof that your model is reliable and explainable.

Zhao, Qin Q. , 17 Nov at 11:11

And with that feedback I also got a *Sufficient* from Qin.





*Grade - Proficient*

## Self Assessment 1

In the Nearest Neighbours exercise I put my coding skills to the test and improved the code in the document. By improving the code it became much quicker to solve the given problems. My machine learning teacher liked my way of working and replied to my exercise,

Good problem solving skills.  
Zhao, Qin Q. , 1 Sep at 14:32

You have run three models, Can you elaborate more on the accuracies from the three models?  
Zhao, Qin Q. , 1 Sep at 14:50

For section "Different results", the explanation is still vague for me. For further information, refer to sklearn page:  
[https://scikit-learn.org/stable/modules/generated/sklearn.model\\_selection.train\\_test\\_split.html?highlight=train\\_test\\_split#sklearn.model\\_selection.train\\_test\\_split](https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.train_test_split.html?highlight=train_test_split#sklearn.model_selection.train_test_split)  
Zhao, Qin Q. , 1 Sep at 14:52

For section "Hyperparameter n\_neighbors", you can run the code to check whether your hypothesis is true.  
Zhao, Qin Q. , 1 Sep at 14:54

As you can see I also got some feedback from her. I realised all this feedback and resubmitted the notebook.

Also in my challenge I have been working with models. Right now I am mainly focussing on Support Vector Machines (SVM). I used SVM for a classification problem. I visualised the results of my model in a heatmap. There you can see the results in a confusion matrix-like scheme.

For now everything is going well. I have only made use of Nearest Neighbours and SVM (and tried to use yolov5 but that didn't work out). In further iterations I will try out other models to see if it will suit my problem better and therefore give a better accuracy. So for now I will give myself a beginning but as the semester goes I feel like this shouldn't be too big of a problem to bring it to a proficient level.

*Grade - Beginning*

## Learning Outcome 3: Reliability and transparency

### Self Assessment 3

#### Brawlhalla AI (data)

The steps I took to collect data for this project were as follows.

1. Play a game of Brawlhalla
2. Record the entire match
3. Choose 100 frames
4. Label each image one by one

This data is reliable because these 100 frames I chose were chosen with actual attention. In these 100 frames I tried to gather as many different events as possible. For example, legend- falling, jumping, attacking, taking damage, dodging, being in the bubble, dying and so on. You can check images 18, 19, 20 and 21 to have somewhat of an idea what I'm talking about. It's important I try to gather as many events as possible, so the model is trained on everything that can happen in a match. Here are examples of different scenarios, so you have an idea of what I'm talking about.



Image 18: A frame from a match I recorded. In this frame you see Koji jumping and Volkov walking.



Image 19: Koji hugging a wall, Volkov falling with a scythe in his hand.



Image 20: Koji falling with a sword, Volkov performing the attack scythe neutral air.



*Image 21: Koji jumping with a bow, Volkov walking with a scythe.*

So even if a legend jumps with a different weapon, it looks different. That's why it's important to collect so many scenarios. I sadly don't have feedback on this part. But I know it belongs here and I know it's good.

### Brawlhalla Legend Classification (data)

We know the data I use is reliable because I have used a set of requirements for myself whilst collecting data. Here are the requirements (again).

- Only pick images where the legend is using the classic skin.
- Only pick images where the legend is using the classic colours.
- Only pick images where the legend is the only one on the image.

These requirements are important since a legend with a different skin can look very different making it harder for my model to train. Here's an example

*Left Bödvar classic skin, Middle Bödvar skin, Right Bödvar crossover skin*



*Image 22, 23, 24: Here you see Bödvar classic skin, Bödvars Bear'dvar skin and Bödvar crossover skin Xavier Woods respectively.*

Seeing this, you might understand why it's important to spend attention on collecting data. But it doesn't stop here. Here's an example of Bödvar on different colours,



*Image 25, 26, 27: Here you see Bödvar on the colours cyan, halloween and goldforged respectively.*

According to research performed by Brian Funt and Ligeng Zhu, colours do have a small effect in image classification. That's why I tried to stick to the classic colours as much as possible.

The last requirement speaks for itself. If you're gonna train with data where there are shown multiple legends. Your model will train wrong.

### Brawlhalla Legend Classification (modelling)

The modelling is reliable, because I have used multiple models. We won't go too in detail with the modelling since that has been explained in Learning Outcome 2. Because I made use of 2 models, my ML teacher agreed it gave reliable results. See the following feedback,

Good that you have tried two models, fine tuning the hyperparameters, and have compared the accuracy scores of the two models, which means you proof that your model is reliable and explainable.

Zhao, Qin Q.,  
17 Nov at  
11:11

*Image 28: Feedback of my Machine Learning teacher.*

## Brawlhalla Legend Classification (overall)

I presented my project to a pro player called TheLeo. This presentation was very short and quick due to a deadline and me being at the airport. So it could have definitely been better. In this presentation I showed TheLeo my notebook, and after, we filled in a TICT tool table. Whilst filling it in, I just asked him questions and wrote it down. But since I was in such a hurry. I wrote down very short answers, but I did know what he meant. That's why the TICT tool isn't 100% quotes, but more his opinion written down in my words.

QUICKSCAN - CANVAS		Brawlhalla Legend Classification	
NAME: Brawlhalla Legend Classification DATE: November 25, 2022 2:25 PM DESCRIPTION OF TECHNOLOGY Classify Brawlhalla legend images with use of Support Vector Machines		<b>HUMAN VALUES</b> -	<b>TRANSPARENCY</b>  My user did know what was going on without giving any additional information. But this was due to I have showed him results of the program before. On the other hand, the way the program works and makes its decisions wasn't clear without my explanation.
<b>IMPACT ON SOCIETY</b> My user can see this program be used to make mods. He can't imagine a problem this application solves.		<b>STAKEHOLDERS</b> Modders, since they are the ones making mods. In the end also the players who use the mods.	<b>SUSTAINABILITY</b> -
<b>HATEFUL AND CRIMINAL ACTORS</b> It could be used to make game breaking mods like bots. This is a problem because they could be used in tournaments. And by playing in tournaments you can earn a lot of money.		<b>DATA</b> -	<b>FUTURE</b>  The project could be expanded to giving human images, and asking the program what legend they look like.
<b>PRIVACY</b> -		<b>INCLUSIVITY</b> There is bias since I collected the data.	<b>FIND US ON <a href="http://WWW.TICT.IO">WWW.TICT.IO</a></b>   

Image 29: A TICT tool canvas I filled in with TheLeo, the person I showed my project.

I showed all of this to my Societal Impact teacher and he found it just enough to be proficient.

there is a reasonably acceptable delivery phase, that shows there is a basic understanding of LO3 Transparency & Reliability, however the execution of the delivery phase is not consistent, does not fully address the transparency issue and is not very systematical in documenting stakeholder feedback

Welman, Nick  
N.P.M., 29 Nov  
at 13:40

Image 30: Feedback of my Societal Impact teacher on the delivery phase.

## Open Program

Inside my open program I have tried to keep transparency into account like the following. Instead of letting a model play the game once or letting a random agent play a game once to compare scores. I made everyone play the game 100 times. In the end I would compare the average scores of each model/agent. I included the scoreboard so you have an idea what I'm talking about. For your information, 1 score point is equivalent to surviving 1 frame playing the game. Memory entries stand for the amount of different game states it has information of.

Rank	Model/Agent	Method	Memory entries	Average score
1	1dec-model-both-v1	Pole Speed + Pole Angle	121.466	136,17
2	1dec-model-angle-v1	Pole Angle	13.121	107
3	1dec-model-v3	Pole Speed	11.846	99,89
4	Random Agent (2)	Random Actions	0	23,64
5	Random Agent (1)	Random Actions	0	23,4
6	1dec-model-v2	Pole Speed	3050	19,08
7	1dec-5frame-model-v1	Look 5 frames ahead - Check Game Over	1072	13,91
8	1dec-6frame-model-v1	Look 6 frames ahead - Check Game Over	1754	11,95

*Image 31: A leaderboard for all the (main) models I have trained, there were twice as many models trained but usually they got combined into each other. (for example starting to train a 7 frame model and I decided it was too slow so I changed it into a 6 frame model)*

## Grade - Proficient

If we look at everything I did for Reliability and Transparency, there was definitely room for improvement. Take a look at hyperparameter optimization. I wrote my own function to optimise it, while something that does it better already exists. Also was my delivery phase executed with too much haste. Since there is definitely room for improvement I would grade myself proficient. With the arrival of my Open Program the proficient grade gets a bit more *reinforced* but I wouldn't say it's enough to receive an advanced grade.

## Self Assessment 2

Currently I get a 73% accuracy on my model with 2 data classes.

Good to see that with some further tuning on image resolution and C value, you bring the accuracy up to 73%. You can try some other models, e.g. random forest, to prove the reliability of your models. Another approach would be trying more advanced algorithms, e.g. CNN for image classification.

Zhao, Qin Q. , 8 Nov at 21:30

That means that my model has an ok reliability. But as soon as we add more classes this accuracy drops to 58% so it's not reliable at all anymore.

Further, whilst cleaning data, I upscaled my images to a higher resolution, because a higher resolution gives a better accuracy. Also for collecting the images. I tried to only collect images that resemble the legend in his classic colours and classic skin for a higher accuracy. This all adds up to the transparency of the project.

*Grade - Proficient*

## Self Assessment 1

So the subject of my project is Brawlhalla. I've been playing this game for 5 years, have been coding Brawlhalla bots, repeatedly reporting bugs and I've been very active in the community. Like this you slowly feel like you understand everything about the game. But still, still I tried to understand more about my domain. This is where I think I really shine. My teacher also thought so.

this is a promising first draft of the challenge proposal - the use of a cognitive scheme provides an overview over the entire subject - the proposal is not finished yet - so please submit the second (and final) iteration of the proposal where everything is exactly as you intend it to be, including the domain understanding interview - pay attention to overall layout and pleasing, professional appearance of the proposal

Welman, Nick N.P.M. , 27 Sep at 13:52

Whilst exploring my domain I found some subjects you can't easily get to know more about. For these subjects I will do an interview with a Brawlhalla Modder over discord.

I feel like this learning outcome is pretty much done for, but before giving myself a proficient grade I want to interview the guy.

*Grade - Beginning*

## Learning Outcome 4: Targeted interaction

### Self Assessment 3

#### Group Project

##### My Role

If we look at the group project, I was assigned as group leader. This was the result of a very professional process where we would take turns spinning a wheel, and for some reason I always become project leader in these random events. Every other semester I found it really easy to lead my group to victory, but this semester it was different. I think it is because usually I get to work with introverted people who agree with almost everything I propose, of course they would also share their opinions but in the end we would compromise. This semester it was a bit different. My group members added so much themselves, and I think it's really good of them that they actually brought in their opinions, but this made it often harder to compromise. Even though I was assigned Group Leader, it often felt I wasn't and I believe that's all on me.

##### Peer Feedback

Inside our group we did peer feedback, and a group member gave me a tip that I should try to bring more structure to the group and looking back to the entire semester he is right on one side. But when I came up with ideas to for example setup a scrum board, group members disagreed because we were only working once a week anyway. This also refers back to the group not agreeing with ideas that sounded very logical to me.

Feedback op samenwerkingscompetenties					
Naam reviewer	Naam reviewer				
<b>Sprint</b>	1				
<b>Betrokkenheid</b>					
aanwezig op teambijeenkomsten	4	3	2	1	regelmatig afwezig of te laat
zet zich in voor het teamresultaat	4	3	2	1	meer gericht op eigen resultaat
toont enthousiasme	4	3	2	1	nauwelijks gemotiveerd
houdt zich aan afspraken	4	3	2	1	komt vaak afspraken niet na
<b>Actieve inzet</b>					
neemt initiatieven	4	3	2	1	wacht af (maakt zich afhankelijk)
zegt tijdig wat hij/zij wil	4	3	2	1	laat alles over zich heen komen of komt achteraf met kritiek
neemt voorzittersrol of ondersteunt	4	3	2	1	houdt zich niet aan vergaderprocedure
geeft steeds aan wat er gedaan moet worden	4	3	2	1	gaat zijn/haar eigen gang
<b>Steun geven</b>					
helpt anderen bij hun taak	4	3	2	1	doet alleen eigen ding
denkt met anderen mee	4	3	2	1	drukt vooral eigen mening door
maakt gebruik van de inbreng van anderen	4	3	2	1	werkt alleen eigen ideeën uit
laat waardering blijken	4	3	2	1	toont geen waardering voor bijdragen van anderen
<b>Luisteren en begrip</b>					
stelt open vragen en vraagt door	4	3	2	1	stelt geen vragen, geeft alleen meningen
vat samen en checkt interpretaties	4	3	2	1	reageert direct met eigen mening
legt goed uit wat hij/zij bedoelt	4	3	2	1	is onduidelijk
checkt of hij/zij begrepen wordt	4	3	2	1	checkt niet of anderen hem/haar begrijpen
<b>Kritiek geven en ontvangen</b>					
geeft opbouwende kritiek, zegt vooral wat hij/zij wel wil	4	3	2	1	geeft afbrekende kritiek; blijft hangen in verwijten
komt tijdig met zakelijke kritiek	4	3	2	1	slikt kritiek in (tot hij/zij "ontploft")
staat open voor kritiek	4	3	2	1	sluit zich af voor kritiek
gaat na wat reeel is in ontvangen kritiek	4	3	2	1	schiet meteen in de verdediging
<b>Toelichting:</b>					
<b>Tip:</b>	Mag wel wat vaker structuur in de groep brengen				
<b>Top:</b>	Heel erg gemotiveerd voor school				

Image 32: Peer reviews of one of my group members to me.

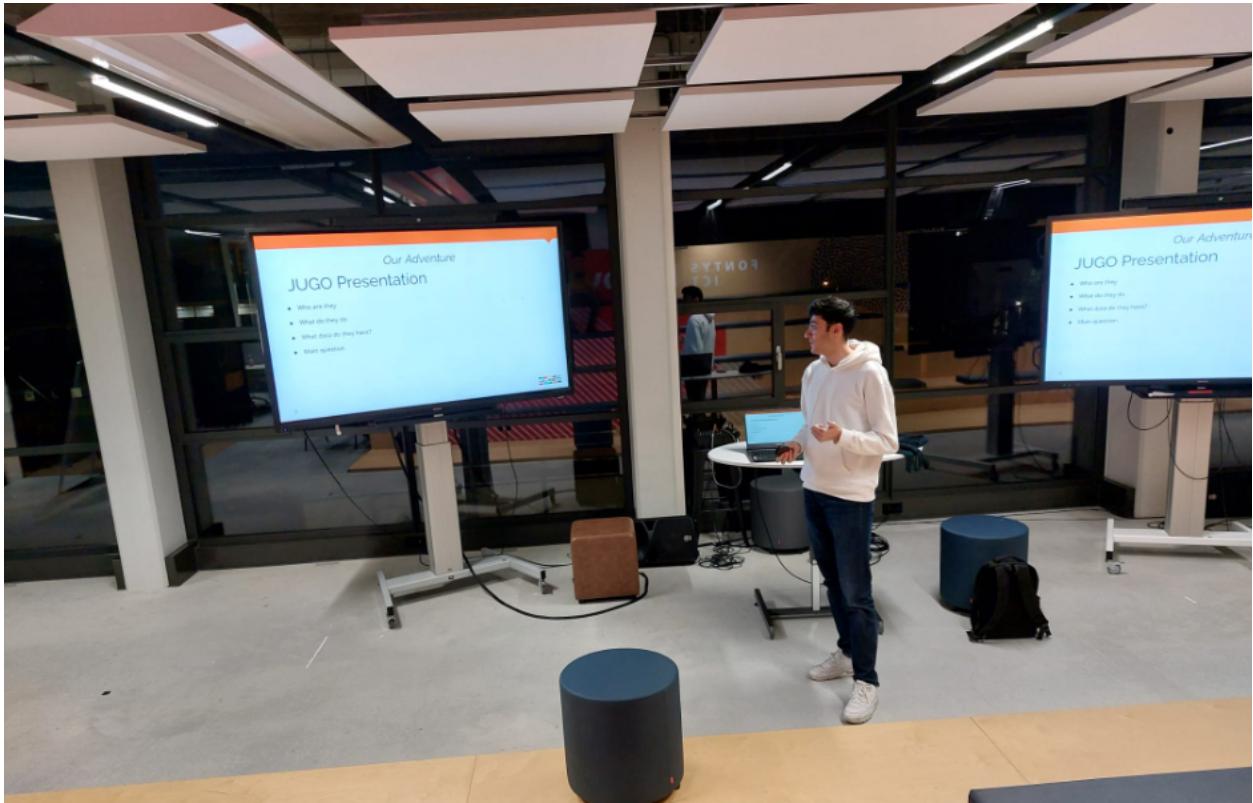
Also, one of my group members gave me feedback that I'm very motivated in school and I secretly really like that, because I always also just try to shine out a happy atmosphere.

Overall

If we look back on the way we worked, I do gotta say that I have had a lot of fun this semester with my project group. We shared the same humour and there wasn't a single day we didn't laugh.

### Presentation Skills

I Always felt like I'm good at giving presentations, but I hate giving them. For my group project I offered to do the last presentation because, even though I hate to present, I wanted the last presentation to be a really good one. To practise the presentation I have practised it for a friend of mine who does a completely different study and has no idea what our group project is about.



*Image 33: Me practising the final presentation a few days before the actual presentation.*

Also I practised it twice at home and a third time in a different language. I did this to prevent myself from practising the same sentences, and instead practising topics to talk about. In the end when I gave the ending presentation multiple people came toward me telling they liked the presentation. I was nervous as hell and just had no oxygen left at some points but luckily no one noticed.

## JUGO

So I asked Ronald from JUGO feedback on the way we as a group interacted with him and also for myself. He said that I was always showing a very good involvement in not only our project but also the other projects. He liked how I always listened to others' presentations.

 Gögcay, Kaan K.S.  
Aan: r.v.lent@jugo.nl



Di 13-12-2022 12:12

Hey Ronald,

I was wondering If I could get feedback on how I acted in general against you guys. Like for example the way I presented, The way we talked, everything that you could bascially think of around professional skills.

Kind Regards,

Kaan Gögcay

*Image 34: Me mailing Ronald form JUGO if I can get feedback on the semester.*

 Ronald van Lent (JUGO) <r.v.lent@jugo.nl>  
Aan: Gögcay, Kaan K.S.



Do 15-12-2022 13:49

Hi Kaan,

Sure no problem. Let's see we can find sometime tomorrow after the presentations.

First piece of feedback "against you guys" is not a use of professional language 😊 This is more a generic comment, as I see more and more that students lacking professional communication skills in the sense of writing and speaking. So do not take it to personally.

Regards,  
Ronald.

*Image 35: Ronald from JUGO replying to my mail.*

Ronald also wondered if it was my choice to become group leader, and if so, why? I explained to him that I got it assigned randomly but that I did believe that I'm a pretty good leader. Next he asked why it went wrong, because the group was lacking structure and it would actually be my responsibility, and I explained to him that it might be because I'm used to working with introverted software people. Then he said it could actually be and that there are different types of project leaders you can be.

Ronald also gave me feedback on the presentation I gave, and told me it was a bit too much. It kinda felt like an American presentation where I tried to sell my product, he said. Overall he did like the energy and the drawing was also a nice addition. But just too jumpy.

Ronald told us he never really got the feeling we became a team. He never felt the team spirit he felt in the other groups. Also did he feel like I was carrying the entire group project. But this wasn't actually the case. I was actually just mainly documenting, or documenting stuff others did. So actually everything was split up quite fairly.

## PDR

### Delivery 1 (sort of)

Soo my PDR was something different. On the first PDR delivery I didn't actually deliver one, since I didn't know it had to be delivered. There was a deadline for it, but this deadline was literally somewhere on teams attached to a REPLY, to a teams message. Of course I'm not blaming anyone else for this event. I didn't deliver it as one of the only ones, and it's just my bad. But canvas does support deadlines, so why not add it there. I was a bit pissed off over that. In the end I did show my PDR to my teacher and got the following feedback.

What you have done so far is okay! Separate chapter for each learning outcome is the desired stricture.

I hope that you will make it look like a proper document e.g. having a title page, table of content, references, appendices (if any).

Also, you do not have to describe everything week by week. I can imagine that by doing that you will start repeating yourself. Instead, try to describe the most important activities per LO

Pencheva, Sabina  
S., 9 Sep at 16:21

*Image 36: Feedback on my first PDR delivery.*

### Delivery 2

In my second PDR delivery I did actually deliver something. I wrote a self assessment per learning outcome explaining what I did and giving myself a grade in the end. The problem was, I didn't add any feedback nor did I add proof to the PDR. Also were 2 of the learning outcomes blank because I just didn't know what to fill in there. I delivered it and the teacher gave me the following feedback.

Hello Kaan,

Thank you for your submission! We think it is good start, however, it will be nice if you put some more effort into formatting your document. For example, the table of content should be on a separate page (shouldn't be on the title page). Also, the introduction should be on a new page etc.

Pencheva, Sabina  
S., 21 Oct at 12:14

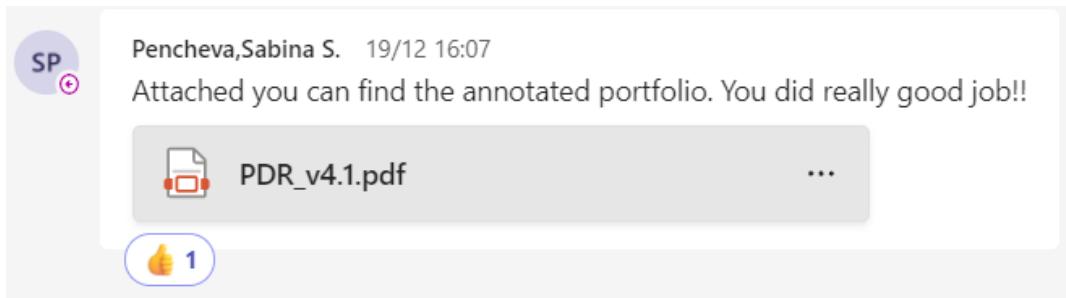
*Image 37: Feedback on my second PDR delivery.*

### Delivery 3

I applied the feedback of the previous delivery by putting a template over my PDR. This overall gives my PDR a nicer look. Also did I try to put a new header on a new line. In this PDR delivery I knew I had to include proof and feedback. I took it a bit too seriously and wrote stuff like "I deserve a proficient grade because my teacher gave me a proficient grade, look at the image below" (showing an image of my teacher giving me a proficient grade). Also did I just include every piece of feedback I could find on canvas. This is actually just funny as I'm typing it. But I asked for feedback on what I should do, to hit at least a proficient level for my learning outcomes. My semester coach explained I should try to explain what I do combined with feedback and proof that can validate what I just explained. So that was the plan for my last PDR delivery.

## Delivery 4

In the last PDR delivery I tried to do exactly that. Explain what I did and show feedback or proof validating it. You might have seen till now that I also included parts without any feedback or proof on it. That is because I have gotten feedback on it multiple times irl, or its just an old project. There were several reasons I felt uncomfortable asking feedback for it so I just left it as it was. Also did I plan a meeting with my semester coach to look at the progress I made on my last PDR delivery before actually delivering it. This was to make sure I was going in the right direction. Overall, my teacher liked it.



*Image 38: My teacher replying with my PDR with comments on it. There were a total of 3 comments aimed more at the looks of the document. So nothing too special.*

## My Notebook

Inside my notebook I cover phases 2 and 3 of the AI methodology. Since it adds so much documentation to my notebook I made it more readable by adding colours to the headers.

### Preface

To separate certain topics I make use of colors. If a header is colored blue, it means its aimed at DAIA. If it's red it's aimed at ML. And you'd never guess it, if it's purple it's relevant for both. This header-coloring also notifies the reader when you enter a new header so it gives overall more structure.

### Data Requirements

*Image 39: Screenshot from my notebook. You can see the headers have colours with a meaning attached to it. A blue header means it's aimed at my DAIA teacher, red means it's aimed at my ML teacher, and purple is aimed at both. Also if you scroll fast through the document you could notice you entered a new header because of the colour. So overall a very nice addition in my opinion.*

Classmates of me have checked my notebook and gave me feedback on it. And they thought it was a nice addition as well.

The different coloured headers are a nice touch for the lay-out of your document, that keep everything very clear and the versioning table was also very nice to see. The data requirements are a little on the shorter side, so maybe you could try expanding these a bit and explain why stuff is relevant for example a stakeholder. Furthermore, in the data collection part, you address the different data you would like to collect, but then talk about where you want to get the data.

Joosen, Sjoerd  
S.H.J.P., 25 Nov  
at 10:46

*Image 40: A portion of feedback from my classmate on my notebook.*

Regarding your classification document, I think that you did a great job in documenting all the steps that you have taken to achieve your results.

Houtermans,  
Shannon S., 27  
Nov at 17:41

I think that comparing KNN and SVC with each other is an excellent idea, as I feel that this can convince the reader that you are indeed putting some time into looking for the most optimal way to recognise images.

I like the way you have structured this document, and the layout really helps in making it easy to read and follow.

*Image 41: Another portion of feedback from my classmate on my notebook.*

I like how it's appreciated since I really tried my best to give the notebook a clear structure for readers since it looked like a mess, especially when I added data documentation to it. I solved this problem by styling the markdown blocks in my notebook with html & css.

```
<h1 style="background-color: #EAADF3; text-align:center">Preface</h1>
```

To separate certain topics I make use of colors. If a header is colored blue, it means its aimed at DAIA. If it's red it's aimed at ML. And you'd never guess it, if it's purple it's relevant for both. This header-coloring also notifies the reader when you enter a new header so it gives overall more structure.

### Data Requirements



*Image 42: The way I accomplished the coloured headers and what it looks like. It's just very basic HTML & CSS*

## Open Program

For my Open Program I created a new document from scratch. I learned from my mistakes and decided to make the document in Word. I applied the structure based feedback I got from my semester coach such as working with figures, everything on a new page.

### *Grade - Proficient / Advanced*

I still find it very hard to give myself a grade for this learning outcome. I feel like I have definitely done enough for this learning outcome. But since I don't have an exact idea of what the bare minimum is to reach a proficient level, I also can't know if I surpassed this minimum to get an advanced grading. So somewhere in between I'd say.

## Self Assessment 2

In the group project we try to make what Jugo wants. As a group we work well in my opinion. I find it really hard to put any proof in here in any way.

### *Grade - Undefined*

## Self Assessment 1

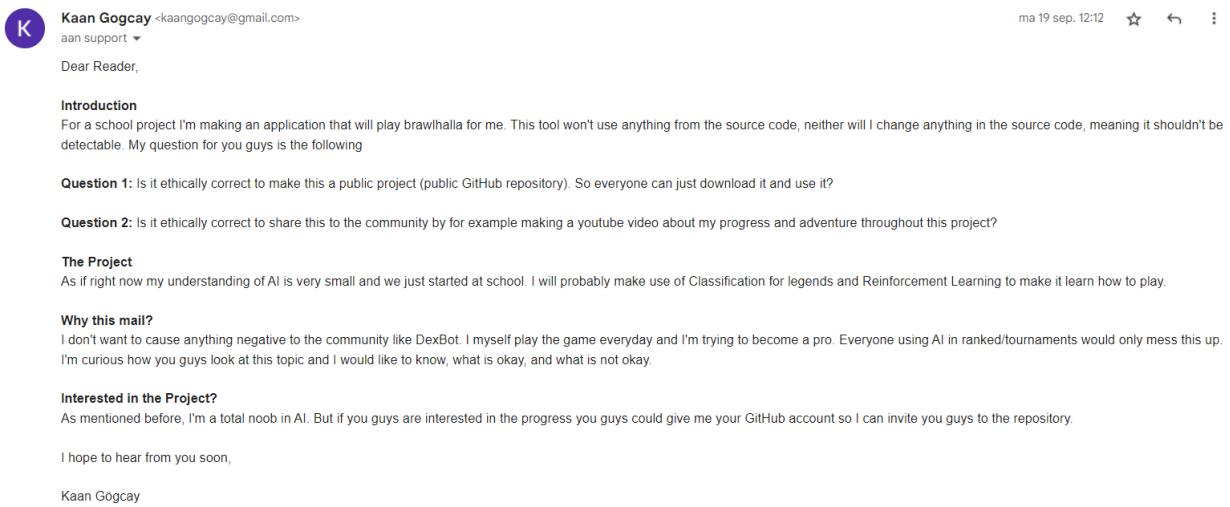
### *Grade - Undefined*

## Learning Outcome 5: Future orientation

### Self Assessment 3

#### Brawlhalla AI

If this project was executed successfully, it could absolutely ruin the game. Let me explain. In the past there have been bots made by the community inside of Brawlhalla. These bots were so good that they could even beat pro-players. Brawlhalla responded to the bots with Easy Anti Cheat. Easy Anti Cheat could detect modified game files, meaning the bots were made by modified game files. The way I wanted to make a bot didn't modify any game file, meaning it would avoid Easy Anti Cheat, making it unable to detect my bot. So in theory, my project could start an entire new bot era. Therefore I mailed the Brawlhalla staff about my project and if it's even ok to share any idea and anything I'm doing with the outside world. In the following image you can see the mail,



*Image 43: Me sending an email to the Brawlhalla staff about ethics and the future of Brawlhalla.*

This mail has been sent 19 September. Right now it is 26 December so I have low hopes for a response.

#### JUGO Project

The JUGO project, The traffic jam predictor, could be used to improve the current route services. For example Google Maps. But, just think. If everyone on the earth would start using the traffic jam predictor. This would mess up everything we're used to. Since if everyone sees there is a traffic jam at 08:00 that lasts 30 minutes, everyone will leave a bit later and this might create even bigger traffic jams. So this project is very useful if just one person uses it or a smaller group, but the more people use it, the more problematic it gets.

## Exercise 6s - Future Orientation

My Societal Impact teacher advised me to do this exercise, so that I could get a proficient grade for my PDR. So that's what I did. I watched a podcast involving AI, and after watching it I edited a video about how the podcast changed my view on my professional future.



*Image 44: A screenshot of the video I watched. The video is about Elon Musk talking about SpaceX and AI.*

My teacher watched the video and gave me the following response on my exercise.

this exercise was done with genuine interest in the subject

Welman, Nick N.P.M., 22 Nov  
at 13:53

*Image 45: Feedback from my Societal Impact teacher on the exercise future orientation.*

### Grade - Advanced

My Societal Impact teacher told me they made the Future Orientation exercise, so that everyone can get a proficient grade for Learning Outcome 5. I made this exercise so you would say I deserve at least a proficient grade. But, I have gone a step further and looked into the future of my own projects. The Brawlhalla AI part is very interesting and controversial. Since I did more than necessary for this learning outcome, I believe I deserve an Advanced.

## Self Assessment 2

It looks like my project won't have any impact on the world. There is no societal impact making it very hard to keep in mind ethics.

I did make the future orientation exercise to touch this learning outcome. Here is my teacher his comment,

this exercise was done with genuine  
interest in the subject

Welman, Nick N.P.M., 22 Nov at 13:53

*Grade - Beginning*

## Self Assessment 1

On my first project (the one with object detection and reinforcement learning) I took multiple actions involving the future of the game Brawlhalla. Because the bot I'm making could be used to play online, that means I could wake people up and motivate them to do the same, this would result in a community where everyone in Brawlhalla would let a bot play for them and this would ruin the community. To avoid this I have sent a letter to brawlhalla explaining the case, and asked them if it's ok to even share the idea and code with others. Here is the mail.

### Brawlhalla Bot Artificial Intelligence Ethical Aspect

 **Kaan Gogcay** <kaangogcay@gmail.com>  
aan support \*

ma 19 sep. 12:12 ⌂ ⌓ ⌚ ⌚ ⌚

Dear Reader,

**Introduction**  
For a school project I'm making an application that will play brawlhalla for me. This tool won't use anything from the source code, neither will I change anything in the source code, meaning it shouldn't be detectable. My question for you guys is the following

**Question 1:** Is it ethically correct to make this a public project (public GitHub repository). So everyone can just download it and use it?

**Question 2:** Is it ethically correct to share this to the community by for example making a youtube video about my progress and adventure throughout this project?

**The Project**  
As if right now my understanding of AI is very small and we just started at school. I will probably make use of Classification for legends and Reinforcement Learning to make it learn how to play.

**Why this mail?**  
I don't want to cause anything negative to the community like DexBot. I myself play the game everyday and I'm trying to become a pro. Everyone using AI in ranked/tournaments would only mess this up. I'm curious how you guys look at this topic and I would like to know, what is okay, and what is not okay.

**Interested in the Project?**  
As mentioned before, I'm a total noob in AI. But if you guys are interested in the progress you guys could give me your GitHub account so I can invite you guys to the repository.

I hope to hear from you soon,

Kaan Gögçay

If we look at the future of my current project it has a positive effect and a negative effect. I have written this part pretty late and haven't got feedback on it yet sadly. it's about the positive and negative effect about image classification

If i did ask feedback and showed it in my PDR this could have been a beginning but since i don't have anything to show from my teacher i'll put it on orienting

*Grade - Orienting*

## Learning Outcome 6: Investigative problem solving

### Self Assessment 3

#### Brawlhalla AI

I started off this project by doing exploratory research and putting it inside a cognitive scheme.

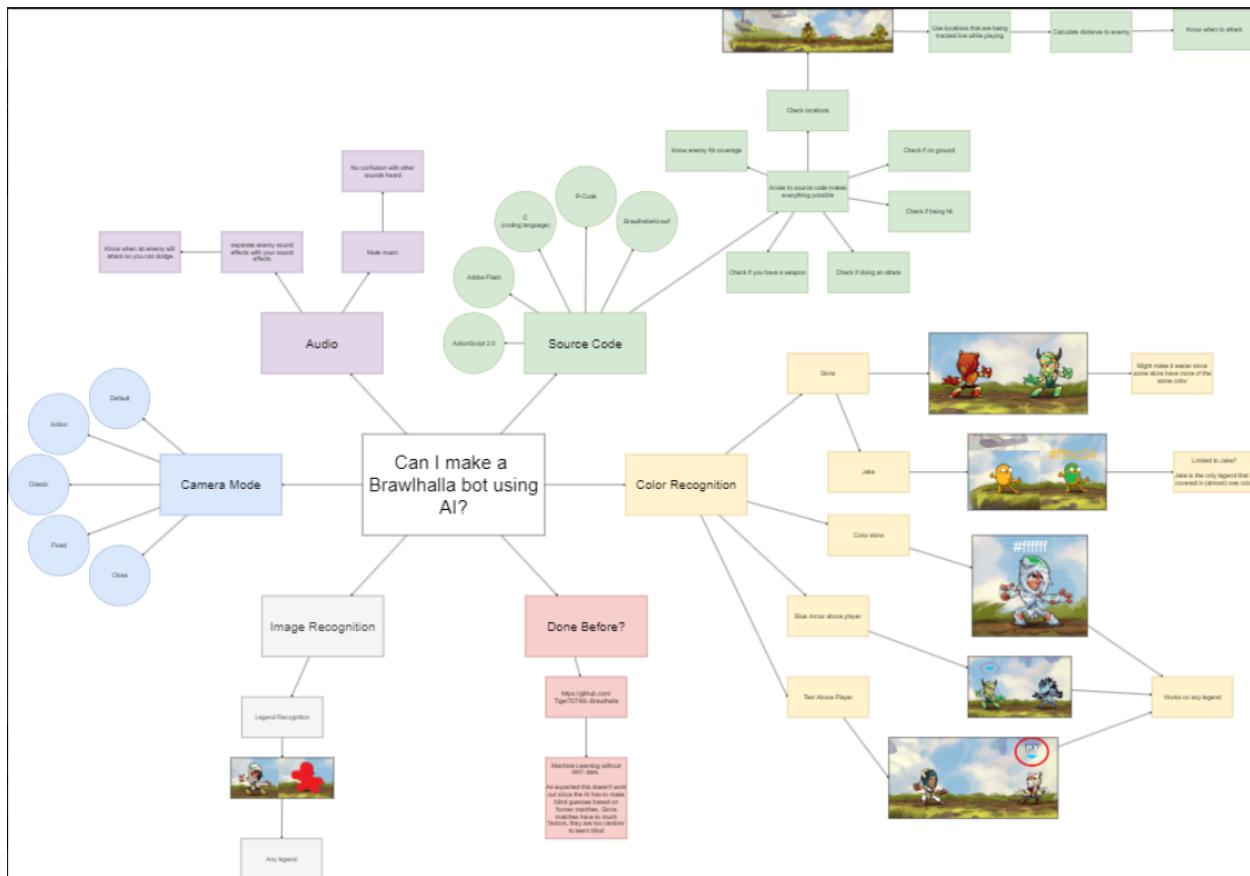


Image 46: My exploratory research about Brawlhalla and AI.

Even though I already know quite a lot about the domain Brawlhalla, I still managed to learn new things. In this research I mainly looked for opportunities to create a bot inside the game Brawlhalla. And since I never looked at the game like this before I managed to expand my knowledge. Me, my teacher, and my classmates all thought the cognitive scheme and the domain understanding were really strong. Here's feedback from all of them validating the strength of my domain understanding /cognitive scheme.

Hello Khaan, Your submission is nicely done. I appreciate how well you explain your research and domain understanding. Additionally, you demonstrate a cognitive scheme to support your findings. However, I'm still not clear on the project's goal and problem. For instance, I notice that you want

Benedictus  
Ashley Julian,  
Benedictus B.,  
23 Nov at 16:46

*Image 47: A cutout part of feedback from my classmate Benedictus.*

Having read both of your documents, I can definitely see that you have performed quite a bit of research to gain more insights for your topic's domain understanding. Your Domain Understanding & Analytical Approach document is structured in a logical way, and you make sure to explain your topic extensively to the reader.

Houtermans,  
Shannon S., 27  
Nov at 17:41

*Image 48: A cutout part of feedback from my classmate Shannon.*

the domain understanding is very complete and elaborate and touches almost every feature of the game - there was some relevant research done - having said that, the domain understanding could have even been better with a sharper focus on "what do I exactly need to know about Brawlhalla to start my challenge" - also the interview still needs to be done

Welman, Nick  
N.P.M., 14 Nov  
at 14:47

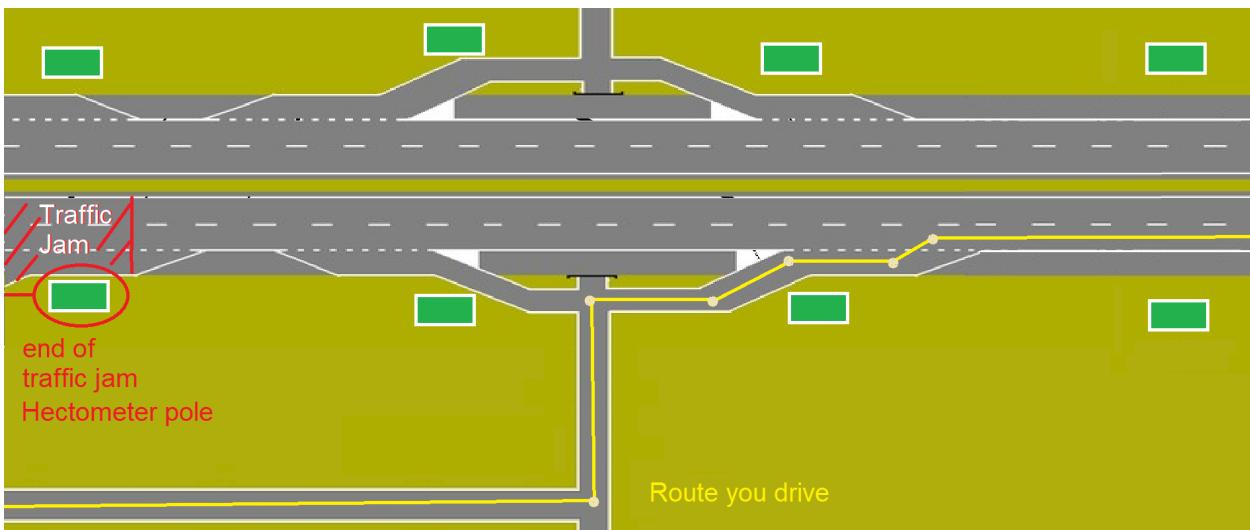
*Image 49: A cutout part of feedback from my SI teacher Nick.*

After making the cognitive scheme I started writing out the opportunities I saw inside my cognitive scheme. One of the most logical ones was the one where I would monitor the variables of the game live and feed it to an AI.

Inside this project there was one major roadblock which almost made me quit the project even before I started it. I had no data that I could feed to my model. Knowing from an earlier Brawlhalla AI project, I know that feeding just images doesn't give any results. I am referring to the project of Tiger767. He tried exactly that and the bot didn't improve at all. Even worse, it looked completely random. So my first solution to this problem was to monitor all variables of the game, and feed this to my model. This sounded like a really good idea. But it was beyond my skill and I couldn't figure out how. Next up I expanded my Brawlhalla understanding by doing exploratory research and putting it in a cognitive scheme. So I came up with an idea so smart, even I was surprised. I wanted to detect certain objects on screen, and generate this data (I wanted to monitor) myself. This was a very interesting solution but in the end. I couldn't get it to work.

## Project JUGO

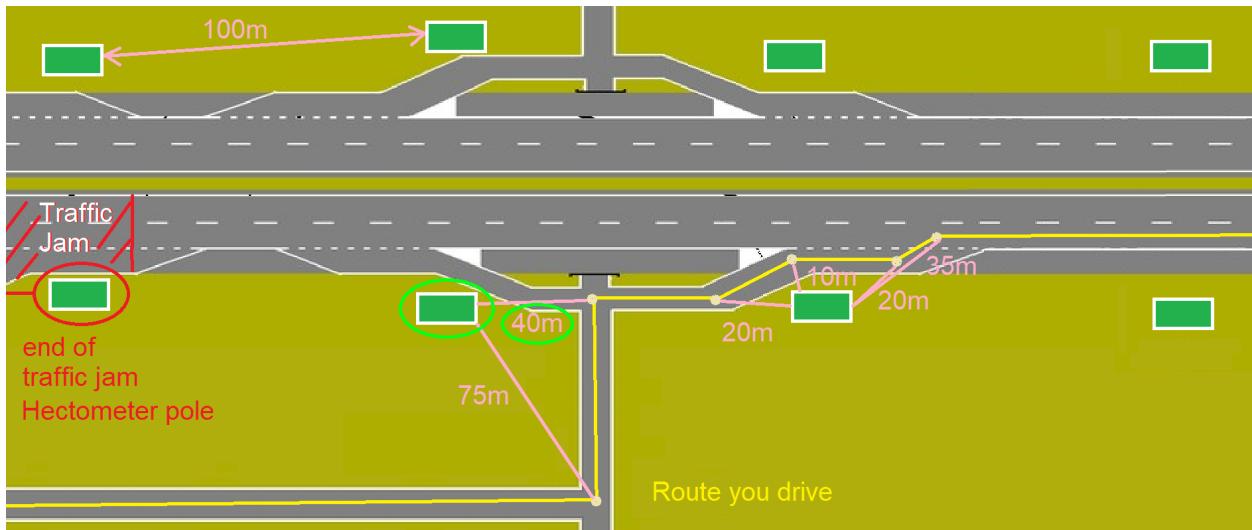
First of all, it's important to know that we downscaled this project to the A2 only. If you would drive a route where you travel somewhere on the A2, and there is a traffic jam somewhere on the A2. Our model would always think that the traffic jam would have an impact on you. But this isn't always the case. For example, if there is a traffic jam on the start of the A2, but you enter and leave the A2 somewhere at the end. The traffic jam is actually irrelevant to you. See the image below.



*Image 50: Here you see an image of a highway. In red you see a traffic jam. The yellow line is the road you drive. As you can see, the traffic jam is irrelevant to you, but our model didn't know this yet.*

But the model doesn't know where you enter and leave the highway. It only knows where the traffic jam is. So to solve this problem I wrote an algorithm that calculates the closest hectometer pole from each route point. If the distance to this hectometer pole is below 60

metres, then it means you are on the highway. See image below.



*Image 51: If you haven't read the description of image 50 I would highly recommend that. First of all, the distance between two hectometer poles is 100 metres (distance shown in top left corner with a pink line). So if there would be a route point in the middle it would be approximately 50 metres. So just to be sure we took 60 metres. So let's say we look at the first route point in the bottom centre of the image. If we calculate what the closest hectometer pole is, we follow the pink line and get the hectometer pole on the left. We also see that it's at a distance of 75 metres. 75 is not smaller than 60, meaning you are not on the highway. If we look at the next route point, we see it's only 40 metres to the closest pole. This means this is the exact route point you enter the highway. Repeating this process we can extract the locations of where you enter and leave the highway in hectometer poles. In our data we have the start and end of the jams in hectometer poles, meaning we can compare both locations to see if the traffic jam will affect you.*

After the algorithm calculated it for each route point it would create a new column to the dataset where you can exactly see from which hectometer pole you enter the highway and which hectometer pole you leave the highway. So in the end, you have the location of the traffic jam and the location of where you enter and leave the highway. This makes it possible for us to check if the traffic jam on the highway you drive will actually affect you. This is definitely one of my best findings this semester.

## Open Program

In my Open Program I tried to make use of Deep Q-Learning. I found code on the internet but I just couldn't get this code to work. I got error after error and that was very frustrating because it's not the first time this happened this semester.

I was actually so done, I had it all. I was so done that I decided to make it myself. I was going to create a self-learning algorithm myself. This surprisingly worked out quite well and gave pretty good results. Let's look at the scoreboard table I made.

Rank	Model/Agent	Method	Memory entries	Average score
1	1dec-model-both-v1	Pole Speed + Pole Angle	121.466	136,17
2	1dec-model-angle-v1	Pole Angle	13.121	107
3	1dec-model-v3	Pole Speed	11.846	99,89
4	Random Agent (2)	Random Actions	0	23,64
5	Random Agent (1)	Random Actions	0	23,4
6	1dec-model-v2	Pole Speed	3050	19,08
7	1dec-5frame-model-v1	Look 5 frames ahead - Check Game Over	1072	13,91
8	1dec-6frame-model-v1	Look 6 frames ahead - Check Game Over	1754	11,95

*Image 52: Leaderboard of all the models I have trained*

My trained model scores 5 times better than a random agent. But how did I accomplish this? I wrote code that played the game by doing a random input each frame. Each frame I would save,

- The state the game was in
- The action my code took
- The reward of this action

The reward was different for each model. For one model the lower the pole speed the higher the reward, for another model the straighter the pole is standing, the higher the reward. I even tried a model where they both get taken into account. And last I tried to train a model that would only learn from being alive or game over.

So now that we have this [**state**, **action**, **reward**] data saved for each frame we have actually trained a model. How? Let me explain. Everytime if my model will do a move it looks into its previously collected data and asks itself "*Have I been in this game **state** before?*" if it indeed has been, in this state before it will look at the **reward** it previously got in this state. If this reward is bigger than x (x can be defined in the code, the higher x is, the more you force the code to find better rewards) it will perform the **action** it performed the other time it encountered this state. If the reward it previously got was bad, it will perform a different action. This way we are implementing the concept of Reinforcement Learning totally by ourselves only using external libraries to play games and receive states of the game.

Was this useful to execute? Maybe not in the field of getting good results, but we did break down reinforcement learning and improved my problem solving skills. My ML teacher can verify this

19 Jan at 11:38



Hi Kaan, in your open program report, you did describe your learning path on applying reinforcement learning to a simple game. Via this open program you learned how to start from small, how to break things down, how to come back when getting stuck, I believe you enhanced your problem solving skills and research skills.

- Zhao, Qin Q.

*Image 53: Feedback from my ML teacher on my Open Program*

## Grade - Advanced

I used to say I find it hard to grade myself on this learning outcome because I didn't know what the minimal requirement was for a sufficient grade. But looking at everything I have accomplished we can definitely say that I can solve problems very creatively. I would give myself an advanced grade.

## Self Assessment 2

For my Brawlhalla-AI-Bot project I didn't have real time game information to feed to my bot. So I found 3 solutions to this problem, 1 obvious solution and 2 rather creative. The first one was to get the game data from the game itself, but I couldn't access it. So the other 2 solutions were to generate it myself really fast with object detection the other solution was to generate it with object tracking.

Object Tracking didn't work out so I chose my alternative, object tracking. This was looking better but it cost too much time so instead of risking this entire semester. I dropped the project.

## Grade - Oriënting

## Self Assessment 1

With a group of students we made the exercise *Research Based Learning* In the exercise we prepared a research about reinforcement learning. The main question was: Is Reinforcement Learning suitable to create practice bots in Brawlhalla? We presented the research to the AI classes and John. As feedback we got the following,

The main research question is specific enough and the research goal is clear.  
Welman, Nick N.P.M., 6 Sep at 18:36

The 'side quests' should be called: sub questions. Main question - sub questions. There are simply too much sub questions. There needs to be a simple path from the first sub question to the answer to the main question. That is not the case here. The sub questions are too many, without a proper logical order and each of them is probably too specific or too detailed.  
Welman, Nick N.P.M., 6 Sep at 18:36

After this feedback we decided to take out sub questions that don't help answering the main question. Also did we change 'Sub Quests' to 'Sub Questions'

Also did I make the exercise *Domain Understanding* with another student as comment we got

exercise well done - concept is  
well understood  
Welman, Nick N.P.M. , 13 Sep at 14:19

In my own project I wanted to make a bot in the game Brawlhalla using AI. After an exploratory research I found multiple ways to realise this project and it was a very creative idea in my opinion. Since I didn't have access to the game's source code I wanted to generate it using object detection. Here's feedback on the idea,

Looking forward to the AI learning  
part. Maybe you can start  
exploring object detection first!

Zhao, Qin Q. , 4 Oct at 20:36

Hi Kaan,

To me this project is looking  
promising. Therefore, I would  
encourage you from next week on  
to focus on actual EDA delivery  
under Challenge - Further  
iterations

Pencheva, Sabina S. , 7 Oct at 10:48

Since it was too hard I looked for alternatives and that brought up object tracking. In the end it all took too much time and I picked up an easier project. here's a comment from my SI teacher about the decision to switch challenge

what you have done is exactly  
what we expect from Iteration  
Zero - the conclusion is that it is  
better to progress with a different  
challenge

Welman, Nick N.P.M. , 11 Oct at 14:23

With all this I believe I don't struggle with noticing problems and solving them in some (creative) way. Therefore, I would give myself a proficient grade.

*Grade - Proficient*

## Learning Outcome 7: Personal leadership

### Self Assessment 3

#### Individual Projects

Throughout this semester I always tried to know how the teachers thought about my project. It was important for me to always know if there were sections in my project that were weak, so I could improve them before the end of the semester. This was also important since I wanted to use the Open Project weeks to try to make more steps on the Brawlhalla AI project. Most of the points I covered here can be confirmed by the feedback of my teachers.

Pencheva,Sabina S. 18:18

Hello Kaan, thank you for your message! The feedback that Frank and I have is as following:  
 Overall, we believe that you did really good job during the past semester. You were constantly making sure that you know where you are standing and you were seeking opportunities for growing and developing.  
 Regarding the group project, you distinguished yourself as a group leader and manage to motivate the team to work and eventually to deliver something.

1

*Image 54: Feedback of Frank and Sabina on this semester.*

#### Group Ambience

I was also able to get my group off all the serious work, and just have some fun together. So would we often just play games all together and forget all our burdens and just clear our minds. We laughed a ton and we sure had a fun time.

#### Why didn't I do any exercises?

Well starting this semester, I had no understanding of AI. Like absolutely zero. So of course in the beginning I would just join every lesson and immediately try to do the exercise, but every time I felt like I was just wasting my time. It was like everything was already done for us but we just had to add or remove lines or comment or uncomment lines. This made no sense to me. I explained this to my teachers and they found it okay to skip exercises to work on my personal project right away. Since this talk happened in real life, I don't have any validation for it.

#### Grading - Proficient / Advanced

Same issue as LO4, I don't really know the minimum requirements for a proficient grade, so I can't know if I surpassed it. But it should be at least proficient.

## Self Assessment 2

I ask actively for Feedback, This is usually in real life so I can't show too much of it.

09/11 13:25

Hi Sabina,  
I saw that you also haven't filled in the rubric for my submit on further iterations. Could you fill that in? Also was I wondering if the work i've done in the previous project will be taken into account since most of the work was stronger in that project.

03/11 16:34

Hi Qin,  
I have done some experimenting and improved the average accuracy (i have also submitted it again into further iterations <https://fhict.instructure.com/courses/12719/assignments/210160/submissions/20635>).

If we look learning-outcome-wise, what would be the smartest to do at this point on ML area. I was thinking to try out additional models but if that's not necessary.. Any ideas?

I do have a big list of feedback from my teachers here

You have an average accuracy of 64% of SVM after you have tried searching the best C value. Did you try the different kernel parameter? Maybe you can discuss why the accuracy is not very high? One reason could be related to the resolution of the image. Another reason could be the number of images that you have collected. As the last step, if you still cannot improve the accuracy, you can try CNN.

Zhao, Qin Q. , 3 Nov at 9:39

the domain understanding is very complete and elaborate and touches almost every feature of the game - there was some relevant research done - having said that, the domain understanding could have even been better with a sharper focus on "what do I exactly need to know about Brawlhalla to start my challenge" - also the interview still needs to be done

Welman, Nick N.P.M. , 14 Nov at 14:47

Thank you for your submission!  
Overall, you did good job. It is really nice that you worked upon all the given rubrics.  
Here are some points you can improve on:  
1. Data requirements --> there you could be way more elaborate and convincing  
2. Data visualisation --> every time you have a graph describe the choice of a particular visualisation.  
  
I am missing data cleaning and data understating part.

Pencheva, Sabina S. , 8 Nov at 9:27

Good to see that with some further tuning on image resolution and C value, you bring the accuracy up to 73%. You can try some other models, e.g. random forest, to prove the reliability of your models. Another approach would be trying more advanced algorithms, e.g. CNN for image classification.

Zhao, Qin Q. , 8 Nov at 21:30

the domain understanding is very complete and elaborate and touches almost every feature of the game - there was some relevant research done - having said that, the domain understanding could have even been better with a sharper focus on "what do I exactly need to know about Brawlhalla to start my challenge" - also the interview still needs to be done

Welman, Nick N.P.M. , 14 Nov at 14:47

I would advice you to stick to one and the same submission for all of us. I am missing the technical part of your submission, for example, the justification for data preparation is very good, however, I am missing the proof (python code) of how you did it and whether you actually did it.

Pencheva, Sabina S. , 15 Nov at 11:05

Good that you have tried two models, fine tuning the hyperparameters, and have compared the accuracy scores of the two models, which means you proof that your model is reliable and explainable.

Zhao, Qin Q. , 17 Nov at 11:11



<p>The main research question is specific enough and the research goal is clear.</p> <p>Welman, Nick N.P.M. , 6 Sep at 18:36</p>	<p>The 'side quests' should be called: sub questions. Main question - sub questions. There are simply too much sub questions. There needs to be a simple path from the first sub question to the answer to the main question. That is not the case here. The sub questions are too many, without a proper logical order and each of them is probably too specific or too detailed.</p> <p>Welman, Nick N.P.M. , 6 Sep at 18:36</p>	<p>As we just discussed, you can either fix this by installing a package in VS code, or using Jupyter notebook to export the file to html format.</p> <p>Zhao, Qin Q. , 1 Sep at 11:02</p>
<p>Good problem solving skills.</p> <p>Zhao, Qin Q. , 1 Sep at 14:32</p>	<p>You have run three models. Can you elaborate more on the accuracies from the three models?</p> <p>Zhao, Qin Q. , 1 Sep at 14:50</p>	<p>For section "Different results", the explanation is still vague for me. For further information, refer to sklearn page:  <a href="https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.train_test_split.html?highlight=train_test_split#sklearn.model_selection.train_test_split">https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.train_test_split.html?highlight=train_test_split#sklearn.model_selection.train_test_split</a></p> <p>Zhao, Qin Q. , 1 Sep at 14:52</p>
<p>For section "Hyperparameter n_neighbors", you can run the code to check whether your hypothesis is true.</p> <p>Zhao, Qin Q. , 1 Sep at 14:54</p>	<p>exercise well done - concept is well understood</p> <p>Welman, Nick N.P.M. , 13 Sep at 14:19</p>	<p>the exercise was done somewhat unbalanced - the focus should be on personal challenge proposals that are consistent in addressing the main topics and in proportion to the entire scope</p> <p>Welman, Nick N.P.M. , 20 Sep at 14:37</p>

I am very motivated and enthusiastic throughout the semester. Also do I think I present myself very professionally because of how I keep contact with my teachers.

*Grade - Proficient*

## Self Assessment 1

So in the beginning of the semester I wanted to create a Brawlhalla bot using reinforcement learning. I couldn't reach the game source code, so to solve it I also wanted to make an object detection tool. The object detection tool would generate the needed game data in real time by looking at the screen. This sounded like such a cool project but after 2/3 weeks of working on it I realised it wasn't working out. It was possible to realise but not for me in this given time with my experience. Here's a comment from my teacher about the subject

what you have done is exactly  
what we expect from Iteration  
Zero - the conclusion is that it is  
better to progress with a different  
challenge

Welman, Nick N.P.M., 11 Oct at 14:23

### *image*

Every day I am at school on time. If I'm not I always let my teachers know, as fast as possible, how much later I will be at school. By keeping the teachers up to date with my absence I keep my professional skills on a high level. Here are a few examples.

#### Example 1

14 October

14/10 08:13  
Hi Sabina,  
As group we decided its not a must to come to school today since we don't really have anything to work on.

SP Pencheva,Sabina S. 14/10 08:14  
Good morning! Thank you for letting me know!

#### Example 2

04/10 08:45 Edited  
Hi, idk if i should let you know but today i think i'll be around an hour later

SP Pencheva,Sabina S. 04/10 09:40  
Hello, thank you for letting me know!

Absence is just a part of the professional skills. Also do I try to communicate with the teachers a lot to make sure everything is going alright / I understand everything correctly

#### Example 3

31/08 10:11  
Hoi bas, ik zit in klas 2 maar tijdens het bespreken van neirest neighbours ben ik bij de tandarts, ik vroeg me af wanneer jullie klas de opdracht gaat bespreken en of ik dat misschien kan bijwonen?

Michielsen,Bas B.S.H.T. 31/08 10:27  
op vrijdagochtend om 11:00 in ruimte TQ5 2.504. Kun je dan?

31/08 10:27  
Yes ik weet alleen nog niet zeker of mijn klas dan iets anders doet, maar ik probeer er te zijn dankuwel

Michielsen,Bas B.S.H.T. 31/08 10:28 1  
prima, sluit maar gewoon aan. tot dan

01 September

01/09 11:00 1  
het is me toch nog gelukt om vandaag met mijn klas mee te doen dus ik ben er morgen niet. toch bedankt voor de tijd en moeite

## Example 4

26/09 12:44  
hoi nick, zijn er dingen die ik moet weten voor het interview? bijvoorbeeld moet het met cameras? moet het gesprek opgenomen worden? moeten mijn topics/vragen goed gekeurd worden?

 Welman,Nick N.P.M. 26/09 12:48  
nee hoor, ga gewoon het interview maar doen, je kunt altijd dingen vooraf aan me laten zien - de insteek moet vooral zijn: zit je volgens de deskundige met je challenge op de goede weg?

Welma 1

26/09 12:54  
ik krijg net reactie van de desbetreffende persoon en hij wilt het liever niet in een vc (voicechat) doen, is het dan eventueel om het tekstueel te doen?

 Welman,Nick N.P.M. 26/09 12:55  
ik heb geen bezwaar tegen een gesproken chat, zoals in MS Teams, maar ik vind een tekstchat geen interview

26/09 12:55  
isgoed dan zal ik opzoek gaan naar iemand anders bedankt voor de snelle reacties

 Welman,Nick N.P.M. 26/09 12:55  
check !

## Example 5

06/10 11:20  
Hi Sabina,

do you have any news about the pdr's from last year?

 Pencheva,Sabina S. 06/10 14:55  
Hello, not yet. I will try to contact them again

Edited  
Thank you for the reminder

If I keep it up like it is going now I believe I will get a good grade for this learning outcome, for now I will give myself a beginning but if I maintain my current behaviour I might give myself proficiency or advanced of course depending on how everything goes and how i feel about it then.

*Grade - Beginning*

## Learning Outcome 8: Internship Preparation

### Self Assessment 3

#### Curriculum Vitae

At the beginning I didn't take my CV too seriously. I made one, just to have one, so I could apply somewhere. I showed it to my teacher and I got quite some feedback. That meant there was a lot of room for improvement. Here is the list of feedback I wrote down from our appointment,



#### Profiel

In the last 2 years at school i've built experience in the languages c#, Java, TypeScript and python.  
Recently I've been working with python a lot as well as in my free time as at school.

Currently I'm creating and managing my discord bots. I code these bots in python. More information about the bots in the links below.

<https://github.com/Skyward-Brawlhalla/Queen-Spy>

<https://github.com/Skyward-Brawlhalla/Ranknir>

#### Work Experience

##### All-round, Lidl Nederland, Eindhoven

December 2019 — Juni 2021

Checkout, Stocking Shelves, Manager Stuff

##### Sales, Mediamarkt Eindhoven Centrum, Eindhoven

Juli 2021 — Augustus 2021

Stocking Shelves, Selling Products, Learn about product in my own time, Fix technical problems,  
Apply screen protectors.

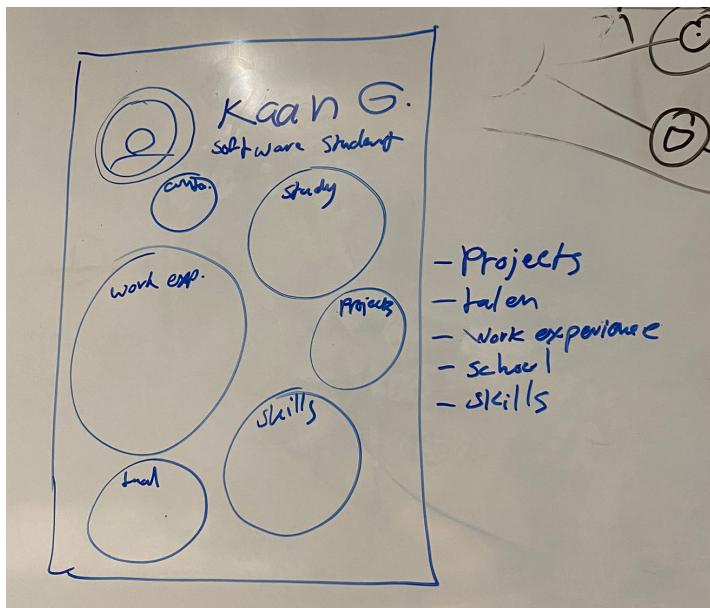
*Image 55: My first CV I quickly generated using a website.*

cv  
foto groter helderder  
link te klein of andere kleur  
school -> study  
c hoofdletter  
python hoofdletter  
languages in skills  
adres voeg  
mobiel voeg  
houw cv kort -> een pagina  
maak een hyperlink van links  
kopje projecten - in een zin wat je erinn doet  
chronologie andersom -> study  
hoe hoeger hoe relevanter  
no stuff  
geen inleiding  
creatief cv  
gooi persoonlijkheid in de cv  
eerste impressie moet goed zijn

*Image 56: All feedback I wrote down in the feedback talk with Frank on my first CV submission. As you can see, it's quite a lot...*

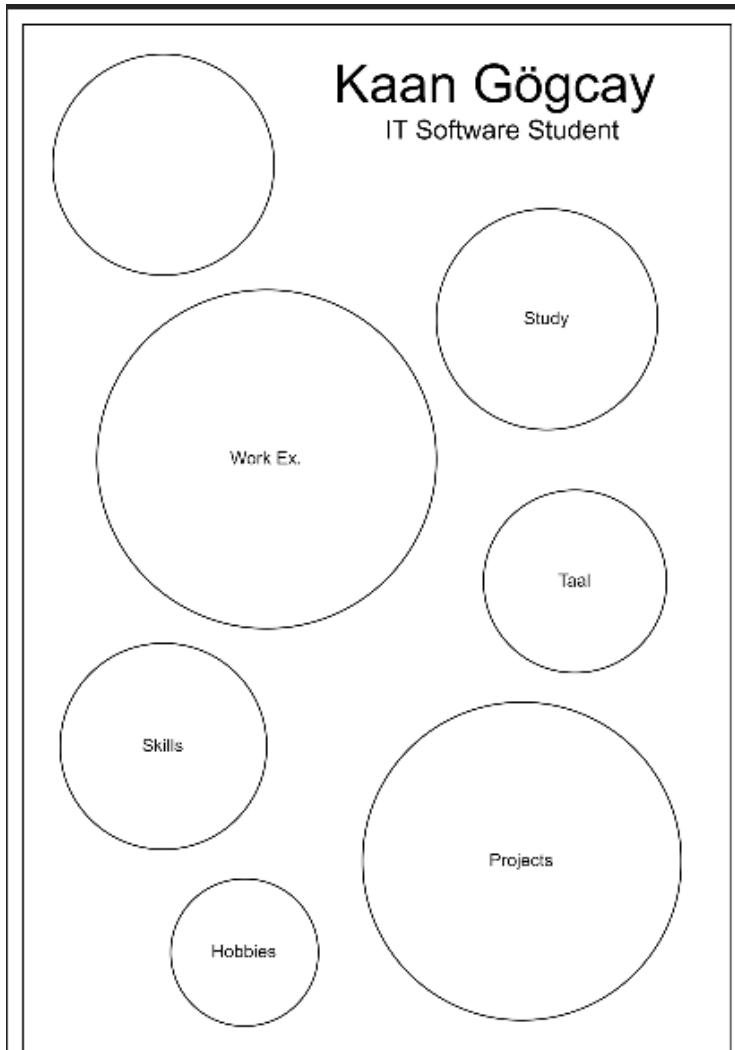
After the feedback appointment, I sat down, and started drawing what I had in mind. I knew I had some decent design skills, so why not use them. Plus all free CV designs on the internet sucked.

So this was my first idea. Just a sketch of some bubbles with text in it.



*Image 57: A quick sketch of the CV I wanted to design.*

I recreated this sketch quickly on draw.io. Draw.io is a website where you can create diagrams, flowcharts and much more. Here's the second sketch I made.



*Image 58: Recreated the sketch on my laptop so I can use it as a guideline in photopea.*

Next up I would go to Photopea (free photoshop-ish website). And put this image as a base template for myself. The only thing I had to do now was to fill in the circles. I did this by

1. creating circle inside of draw.io with text in it
2. Copy paste it to Photopea
3. Style the circle in Photopea

By repeating this process I felt like it was becoming pretty nice

*Left Draw.io no style bubble, Right styled bubble in Photopea*



Image 59: A text bubble I created on the diagram website.

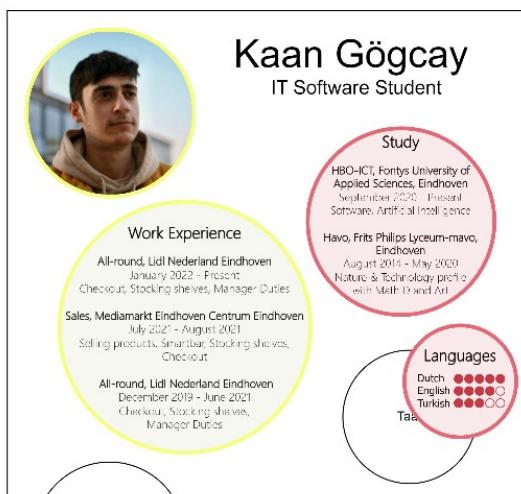


Image 60: Threw it in Photopea and styled it a bit.

Add some more bubbles, and voila. We have somewhat of a CV.

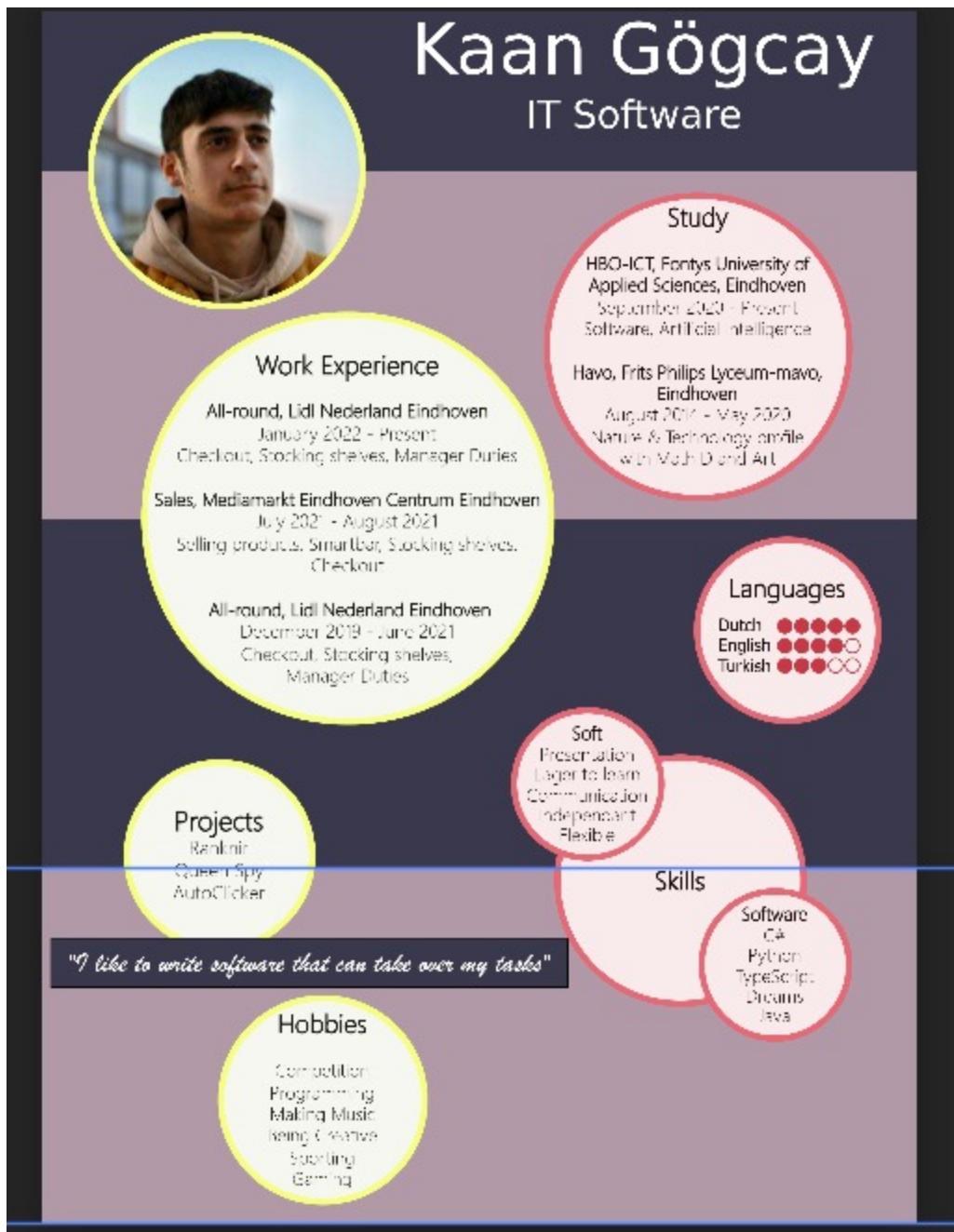


Image 61: First draft of my CV, but it still looked off.

Also important to note is that I did use the website Colormind.io for a colour palette that matches. Even though I used a colour palette, the red-purple-ish colour still looked off. So I changed it a little, also some more tweaking to make it less boring. And we have this.

# Kaan Gögcay

## IT Software Student



**Study**

HBO-ICT, Fontys University of Applied Sciences, Eindhoven  
September 2020 - Present  
Software, Artificial Intelligence

Havo, Frits Philips Lyceum-mavo, Eindhoven  
August 2014 - May 2020  
Nature & Technology profile with Math D and Art

**Work Experience**

All-round, Lidl Nederland Eindhoven  
January 2022 - Present  
Checkout, Stocking shelves, Manager Duties

Sales, Mediamarkt Eindhoven Centrum Eindhoven  
July 2021 - August 2021  
Selling products, Smartbar, Stocking shelves, Checkout

All-round, Lidl Nederland Eindhoven  
December 2019 - June 2021  
Checkout, Stocking shelves, Manager Duties

**Projects**

Ranknir  
Queen Spy  
AutoClicker

*"I like to write software that can take over my tasks"*

**Hobbies**

Competition  
Programming  
Making Music  
Being Creative  
Sporting  
Gaming

**Languages**

Dutch ●●●●●  
English ●●●●○  
Turkish ●●●○○

**Soft Skills**

Soft  
Presentation  
Eager to learn  
Communication  
Independent  
Flexible

**Skills**

Software  
C#  
Python  
TypeScript  
Dreams  
Java

**Information**

Adres: Noord-Brabant, Eindhoven  
Phone: +316 40538035  
Mail: kaangogcay@gmail.com  
LinkedIn: linkedin.com/in/kaangögçay/

Image 62: Second draft of my CV. Added more details and changed a colour.



At this point I was at school at 18:00 and there weren't too many people left. I found a semester 6 media student and asked him for feedback about my CV. Also, I ask a software semester 6 student for feedback. The software student didn't have much to say but the media student gave me the following feedback,

- Don't use more than 2 fonts. Maybe use Italian text if you want to show a quote.
- You wrote the names of your projects but how should I know what it is?
- Also something about the colours looking odd but not bad

With some final tweaks this is my current CV, and I'm very proud of it.

*And yes, even the links are clickable (inside of the real CV)*

# Kaan Gögcay

## IT Software Student

A circular portrait of Kaan Gögcay, a young man with dark hair, wearing a yellow hoodie, looking slightly to the side.

### Work Experience

- All-round, Lidl Nederland Eindhoven**  
January 2022 - Present  
Checkout, Stocking shelves, Manager Duties
- Sales, Mediemarkt Eindhoven Centrum Eindhoven**  
July 2021 - August 2021  
Selling products, Smartbar, Stocking shelves, Checkout
- All-round, Lidl Nederland Eindhoven**  
December 2019 - June 2021  
Checkout, Stocking shelves, Manager Duties

### Study

- HBO-ICT, Fontys University of Applied Sciences, Eindhoven**  
September 2020 - Present  
Software, Artificial Intelligence
- Havo, Frits Philips Lyceum-mavo, Eindhoven**  
August 2014 - May 2020  
Nature & Technology profile with Math D and Art

### Languages

Dutch	●●●●
English	●●●●○
Turkish	●●●○○

### Projects

- Ranknir
- Queen Spy

*"I like to write software that can take over my tasks"*

### Hobbies

- Competition
- Programming
- Making Music
- Being Creative
- Sporting
- Gaming

### Skills

Software	C# Python TypeScript Dreams Java
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### Information

Adres: Noord-Brabant, Eindhoven  
Phone: +316 40538035  
Mail: kaangogcay@gmail.com  
LinkedIn: [linkedin.com/in/kaangögçay/](https://linkedin.com/in/kaangögçay/)

Image 63: Final CV. Changed the quote font.

I also showed it to my teachers and they gave me the following feedback.



Image 64: My teacher giving me feedback on my CV.

## Looking for internships

To start off, I looked to see if Nintendo was doing software internships. I visited their website and didn't see any software internships and let the idea die.

I visited a Partners in Education market on Fontys TQ. I talked with quite some companies and took notes. Here's a quick example of what my notes looked like,



Image 65, 66: Note I made during the partners in education market.

A month after the market I threw together a CV real quick and applied for Basic-Fit Tech. The thing Basic-Fit Tech had that others didn't, is that they really gave the feeling that you will experience how it is to work in a software team. At other companies it felt like you



would do your own thing just to finish your internship. That's why Basic-Fit Tech looked so good. Sadly I was way too late with applying, so I expect not to get chosen.

After my teacher approved my CV I applied for multiple companies, such as Practoraat Tilburg, Blue Mammoth Games, DLL, ASML, My-Lex. And as we speak, I have had a talk with Erdinc Saçan at Practoraat Tilburg and I can start writing my Project Proposal.

#### *Grade - Proficient*

I feel like I started way too late finding an internship. I underestimated how long it would actually take and this results in me not being able to go on an internship wherever I want. Right now I'm willing to go to any company for an internship. I also started not minding if it's actually software engineering. I'm also down to go on an AI internship. So because I postponed all of this and didn't put too much time and effort in finding an internship, I would give myself a steady proficient grade.

### **Self Assessment 2**

My dream as a kid was to work at Nintendo, but sadly Nintendo isn't doing IT internships. But I could understand why.

I visited a Partners in Education market on Fontys. I think I will be reaching out to Basic Fit Tech since they actually work in a software development team. The others were more like "just do your thing" projects or semester 8 internships. I think I will learn the most in the Basic Fit internship, not only about coding but also about working in a team.

#### *Grade - Beginning*

### **Self Assessment 1**

Haven't done anything for this learning outcome.

#### *Grade - Undefined*



## References

- Funt, B. F., & Zhu, L. Z. (2018). *Does Colour Really Matter? Evaluation via Object Classification.*  
[https://www2.cs.sfu.ca/~funt/Funt\\_Zhu\\_DoesColourMatter\\_CIC26\\_2018.pdf](https://www2.cs.sfu.ca/~funt/Funt_Zhu_DoesColourMatter_CIC26_2018.pdf)
- . T. (n.d.). *GitHub - Tiger767/ML-Brawlhalla: A machine learning bot that can 1v1 in the popular game Brawlhalla*. GitHub. <https://github.com/Tiger767/ML-Brawlhalla>