



## Amir Ali Aali

M. Sc. Data Science Student at RWTH Aachen  
Working Student at SAP

# Contents

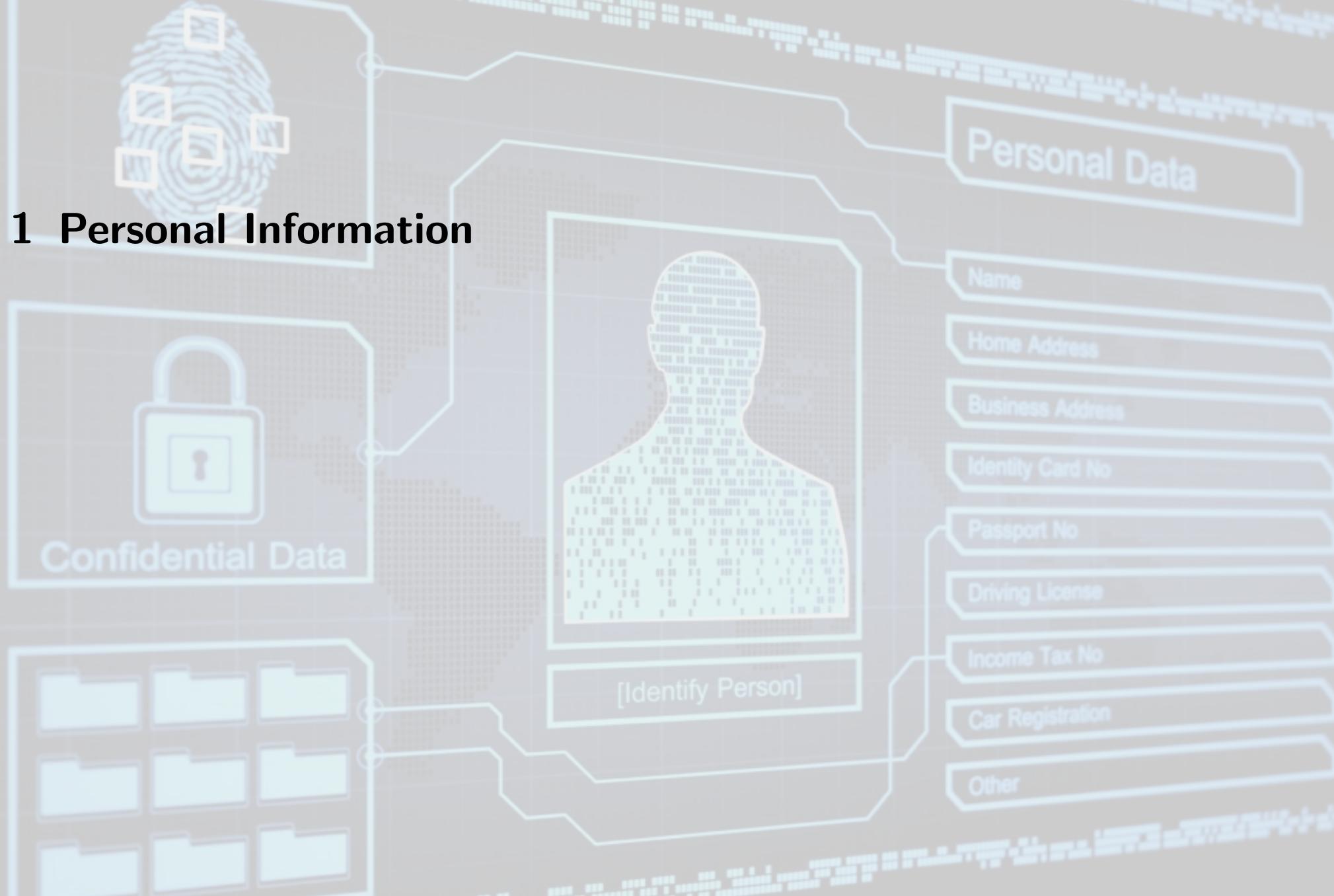
|   |           |
|---|-----------|
| <b>1 Personal Information</b>                                     | <b>4</b>  |
| <b>2 Education</b>  | <b>6</b>  |
| <b>3 Technical Working Experience</b>                             | <b>8</b>  |
| 3.1 Overview . . . . .  | 9         |
| 3.1.1 Working student for Data De-Identification (SAP) . . . . .  | 10        |
| 3.1.2 Working student for Computer Vision/AI/ML (Aptiv) . . . . . | 11        |
| <b>4 Skills and Languages</b>                                     | <b>12</b> |
| 4.1 Skills . . . . .  | 13        |
| 4.2 Languages . . . . .   | 14        |
| <b>5 Awards, Certificates and Volunteering</b>                    | <b>15</b> |
| 5.1 Awards . . . . .  | 16        |
| 5.2 Certificates . . . . .  | 16        |
| 5.3 Volunteering . . . . .  | 17        |
| <b>6 Recommendations</b>  | <b>18</b> |
| <b>7 Python Projects</b>  | <b>20</b> |
| 7.1 Street Lamp Area Detection . . . . .                          | 21        |

## Contents

---

|          |  |           |
|----------|--|-----------|
| 7.1.1    | Overview   | 21        |
| 7.1.2    | Results  | 22        |
| 7.2      | Autonomous Car Navigation using Proximal Policy Optimization (PPO) | 23        |
| 7.2.1    | Overview   | 23        |
| 7.2.2    | Results  | 24        |
| 7.3      | Traffic Signal Control using Deep SARSA                            | 25        |
| 7.3.1    | Overview   | 25        |
| 7.3.2    | Results  | 26        |
| 7.4      | Image Segmentation using Mixture of Gaussians (MoG)                | 27        |
| 7.4.1    | Overview   | 27        |
| 7.4.2    | Results  | 28        |
| 7.5      | Language Detector  | 29        |
| 7.5.1    | Overview   | 29        |
| 7.5.2    | Results  | 30        |
| <b>8</b> | <b>Rust Projects</b>   | <b>31</b> |
| 8.1      | Rust Decision Tree Classifier                                      | 32        |
| 8.1.1    | Overview   | 32        |
| 8.1.2    | Results  | 33        |
| <b>9</b> | <b>C++ Projects</b>  | <b>34</b> |
| 9.1      | Login System   | 35        |
| 9.1.1    | Overview   | 35        |
| 9.1.2    | Results  | 35        |

# 1 Personal Information



## Personal Information

---

| Field            | Details   |
|------------------|---|
| First Name       | Amir Ali  |
| Last Name        | Aali  |
| Date of Birth    | 06.11.2001  |
| Nationality      | Iranian   |
| Address          | Aachen, Germany   |
| Email            | <a href="mailto:amiraliaali@gmail.com">amiraliaali@gmail.com</a>                                  |
| Phone            | +49 157 302 72 150  |
| Personal Website | <a href="https://amiraliaali.github.io">amiraliaali.github.io</a>                                 |
| LinkedIn         | <a href="https://linkedin.com/in/amiraliaali-09240312b">linkedin.com/in/amiraliaali-09240312b</a> |
| GitHub           | <a href="https://github.com/amiraliaali">github.com/amiraliaali</a>                               |

### Short Description

I hold a Bachelor's degree in Software Engineering from the University of Duisburg-Essen, graduating with a final grade of **1.7**.

Currently, I am in my second semester of a Master's program in **Data Science** at RWTH Aachen University, with an expected graduation in October 2026.

I have substantial industry experience, having worked for a year and a half at **Aptiv**, an automotive technology company. Since May 2024, I have been employed at **SAP** in the Data De-Identification division.

I am eager to further develop my expertise in autonomous vehicles and am actively seeking new opportunities in this field, with a particular focus on computer vision and reinforcement learning positions.

## **2 Education**



## Education

---

| Title                      | From    | Till          | Institute                    | Location               | Final Grade |
|----------------------------|---------|---------------|------------------------------|------------------------|-------------|
| M.Sc. Data Science         | 04.2024 | Expected 2026 | RWTH Aachen University       | Aachen, Germany        | N/A         |
| B.Sc. Software Engineering | 10.2020 | 03.2024       | University of Duisburg-Essen | Duisburg, Germany      | 1.7         |
| Preparatory College        | 10.2019 | 08.2020       | FH Aachen                    | Geilenkirchen, Germany | 2.3         |

### **3 Technical Working Experience**

### 3.1 Overview

| Position                                   | From    | Till    | Duration   | Hours per Week | Employer | Location   |
|--|---------|---------|------------|----------------|----------|------------|
| Working student for Data De-Identification | 05.2024 | 04.2026 | 2 yr       | 20             | SAP      | Düsseldorf |
| Bachelor Thesis                            | 01.2024 | 04.2024 | 3 mos      | 40             | Aptiv    | Wuppertal  |
| Working student for Computer Vision/AI/ML  | 11.2022 | 01.2024 | 1 yr 3 mos | 20             |          |            |

### 3.1.1 Working student for Data De-Identification (SAP)

**Summary**

**Skills Leveraged**

Python, Pandas, NumPy, Databricks, Big Data Processing, Unit Testing, Git/Github, Agile

### 3.1.2 Working student for Computer Vision/AI/ML (Aptiv)

#### Summary

Collaborated with a specialized team focused on high beam assistant for the Gen. 7 systems to create a smart system for cars to automatically control their high beams at night.

During my time, I had the opportunity to contribute to several tasks, including:

- Contributing to the creation of a high beam assist classifier, which effectively discerns between car headlights and taillights.
- Conducting comprehensive experiments to fine-tune the hyperparameters of machine learning algorithms, ensuring optimal performance.
- Profiling the runtime performance and development of a profiling tool tailored for an embedded processor.
- Implementing Python bindings to seamlessly integrate C++ objects.
- Developing robust unit and regression tests to validate the functionality and reliability of the solutions.
- Designing and implementing a user-friendly GUI component, enabling live overlay of results and interactive adjustments to hyperparameters for enhanced usability and efficacy.

#### Skills Leveraged

Python, C++, PyTorch, OpenCV, NumPy, Bazel, Git/Gerrit, MISRA, Agile, Unit Testing

## 4 Skills and Languages

## 4.1 Skills

| Skill                  | Proficiency  | Skill        | Proficiency   |
|------------------------|--|--------------|---|
| Python                 |    | Git/GitHub   |    |
| C++                    |    | PyBinds      |    |
| Rust                   |    | Bazel        |    |
| Reinforcement Learning |    | Misra        |    |
| Computer Vision        |    | Agile        |    |
| PyTorch                |    | Unit Testing |    |
| OpenCV                 |  | SQL          |  |
| NumPy & Pandas         |  | Docker       |  |
| Matplotlib             |  | Matlab       |  |
| Scikit-Learn           |  | HTML         |  |

## 4.2 Languages

| Language | Proficiency   |
|----------|---|
| English  |  |
| German   |  |
| Persian  |  |

## **5 Awards, Certificates and Volunteering**

## 5.1 Awards

| Award   | Issued on | Institute              | Sponsor |
|---|-----------|------------------------|---------|
| <b>Germany's National Scholarship<br/>(Deutschlandstipendium)</b>         | 10.2024   | RWTH Aachen University | Porsche |
| <b>3rd Place – National Aerospace Student Competition (Glider League)</b> | 04.2016   | Amirkabir University   | -       |

## 5.2 Certificates

| Certificate   | Issued on | Link to certificate                 | Issued by |
|---|-----------|-------------------------------------|-----------|
| <b>Reinforcement Learning beginner to master - AI in Python</b> | 07.2024   | <a href="#">link to certificate</a> | Udemy     |
| <b>Python for Data Science and Machine Learning Bootcamp</b>    | 08.2022   | <a href="#">link to certificate</a> |           |
| <b>Beginning C++ Programming - From Beginner to beyond</b>      | 05.2022   | <a href="#">link to certificate</a> |           |

## 5.3 Volunteering

| Position  | From    | Till    | Institute                    | Task Description  |
|---|---------|---------|------------------------------|---|
| <b>Head of International Students Engineering (ISE) Student Council</b> | 03.2022 | 09.2022 | University of Duisburg-Essen | <p>Oversaw the planning and execution of several significant events. These included:</p> <ul style="list-style-type: none"><li>• an orientation event for incoming freshmen during the Summer Semester of 2022</li><li>• a major election event open to all ISE students</li><li>• a study night to support students as they prepared for their exams</li></ul> |

## 6 Recommendations

## Recommendations

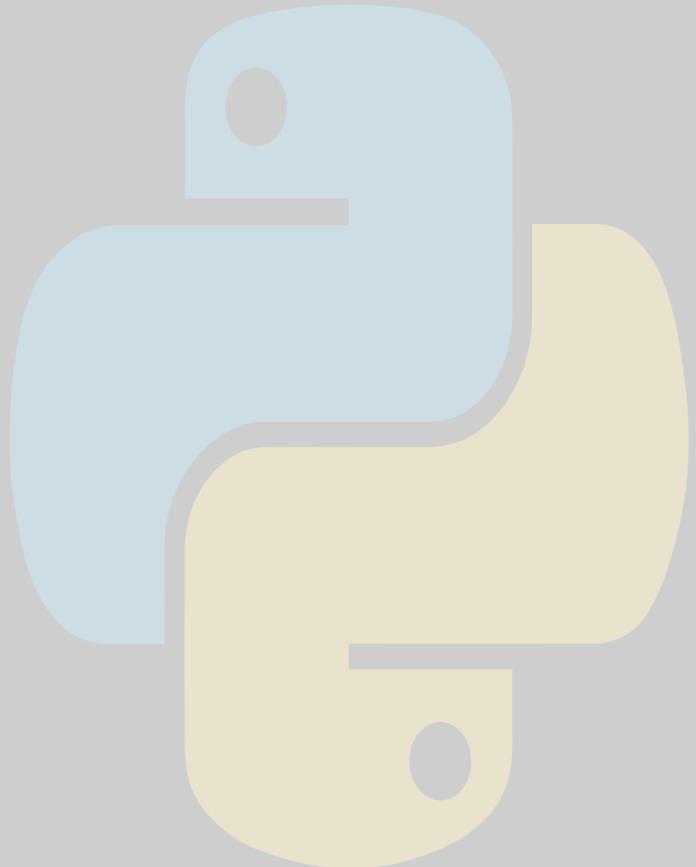
---

| Recommendation given by   | Given on | Recommendation Text  |
|---|----------|--|
| <b>Markus Bühren</b><br><b>(Manager Computer Vision at Aptiv)</b> | 05.2024  | <p>I highly recommend Amir for any role in the field of artificial intelligence and machine learning. Throughout his time as a student at APTIV, he consistently demonstrated a deep understanding of AI and ML concepts, coupled with strong problem-solving and programming skills in Python and C++. He is adept at applying theoretical knowledge to real-world scenarios. His dedication to continuous learning and passion for the field make him an invaluable asset to any team. I have no doubt that he will excel in any role he takes on.</p> |

\* Recommendation can be found on my [LinkedIn](#) homepage.

## 7 Python Projects

```
>>> print("Hello World")
Hello World
```



## 7.1 Street Lamp Area Detection

### 7.1.1 Overview

#### Task Description

As part of my Bachelor's thesis, titled Street Lamp Area Detection through Classical Vision and Convolutional Neural Networks, which was in cooperation with Aptiv, I developed a component that processed pre-recorded footage to assess lighting conditions in real-time. For each moment of the footage, the system determined whether there was sufficient lighting. This functionality allows for the automatic activation of a car's high beams in low-light conditions and deactivation when adequate surrounding light is detected.

#### Skills Leveraged

- Python
- Image Processing using OpenCV
- Deep Learning (CNNs) with PyTorch
- NumPy, Pandas, Matplotlib
- Git/Github

#### Link to Github repository

Unfortunately, I am unable to share the code per Aptiv's request.

### 7.1.2 Results

Click the thumbnail to watch a result video on YouTube:



Figure 7.1: Click to watch the YouTube video

## 7.2 Autonomous Car Navigation using Proximal Policy Optimization (PPO)

### 7.2.1 Overview

#### Task Description

This project explores reinforcement learning with Proximal Policy Optimization (PPO) to train an autonomous car for obstacle-free navigation toward a goal. The agent optimizes its path through trial and error, refining its strategy over time.

The entire environment, including reward design and all other aspects, was created entirely by myself using Pygame.

#### Skills Leveraged

- Python
- Reinforcement Learning
- Deep Learning with PyTorch
- PyGame
- Git/Github

## Link to Github repository

[https://github.com/amiraliaali/self\\_car\\_park](https://github.com/amiraliaali/self_car_park)

### 7.2.2 Results

Click the thumbnail to watch the result video on YouTube:

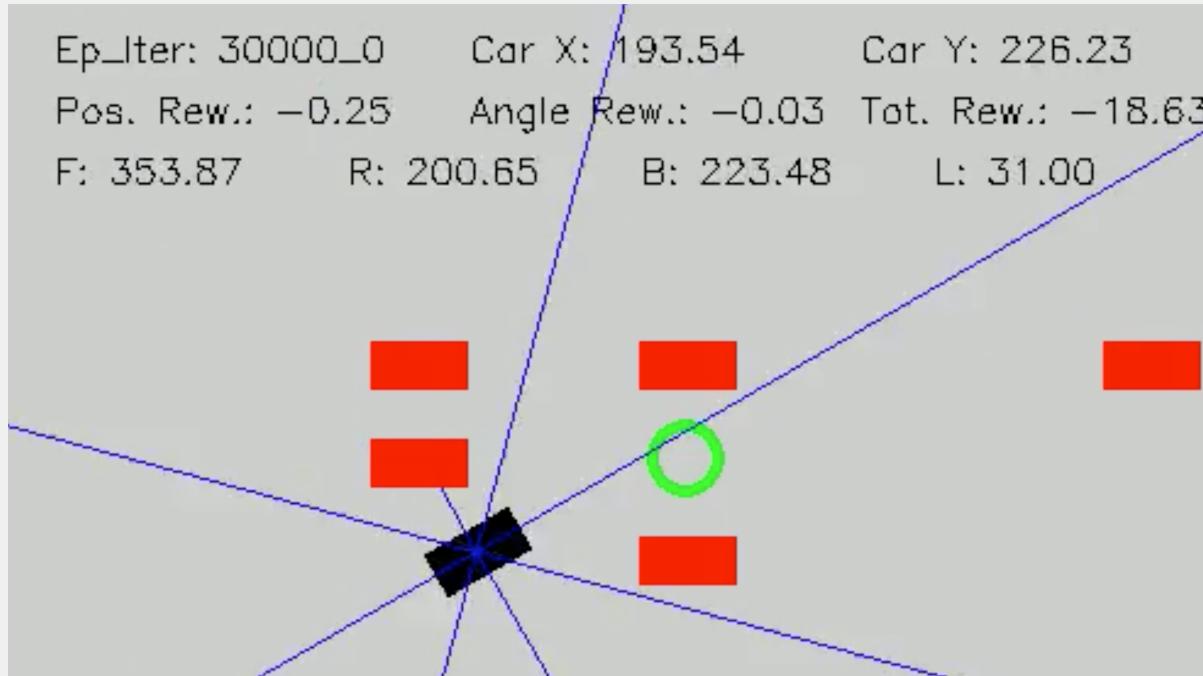


Figure 7.2: Click to watch the YouTube video

## 7.3 Traffic Signal Control using Deep SARSA

### 7.3.1 Overview

#### Task Description

For this task, I took the initiative to work on a Reinforcement Learning project to deepen my understanding of the subject, which I had studied in a university lecture. In this project, we trained an agent to optimize the control of traffic signals at a junction. Instead of deploying a specific pre-defined algorithm, we trained the agent using a set of rewards. The algorithm used for this task was Deep SARSA.

#### Skills Leveraged

- Python
- Reinforcement Learning
- Deep Learning with PyTorch
- NumPy, Pandas, Matplotlib
- Git/Github

#### Link to Github repository

[https://github.com/amiraliaali/traffic\\_signal\\_control](https://github.com/amiraliaali/traffic_signal_control)

### 7.3.2 Results

Click the thumbnail to watch the result video on YouTube:

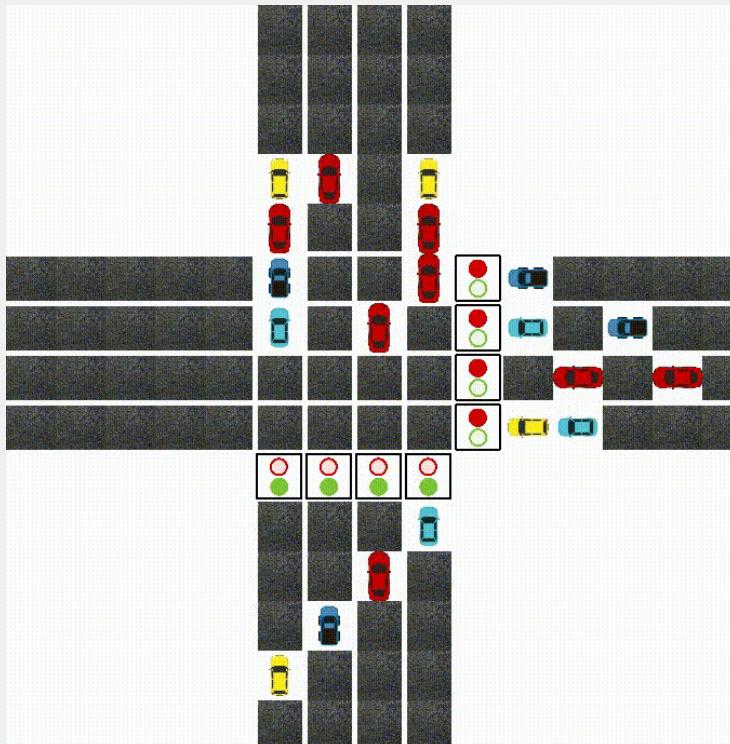


Figure 7.3: Click to watch the YouTube video

## 7.4 Image Segmentation using Mixture of Gaussians (MoG)

### 7.4.1 Overview

#### Task Description

As part of the Machine Learning lecture at RWTH Aachen University, we were introduced to the Mixture of Gaussians (MoG) algorithm.

To deepen my understanding of this algorithm, I decided to implement a foreground/background segmentation method using MoG on my own images.

#### Skills Leveraged

- Python
- Computer Vision
- Machine Learning with Scikit-Learn
- OpenCV
- Git/Github

#### Link to Github repository

[https://github.com/amiraliaali/mog\\_segmentation](https://github.com/amiraliaali/mog_segmentation)

## 7.4.2 Results

Click the thumbnail to watch the result video on YouTube:

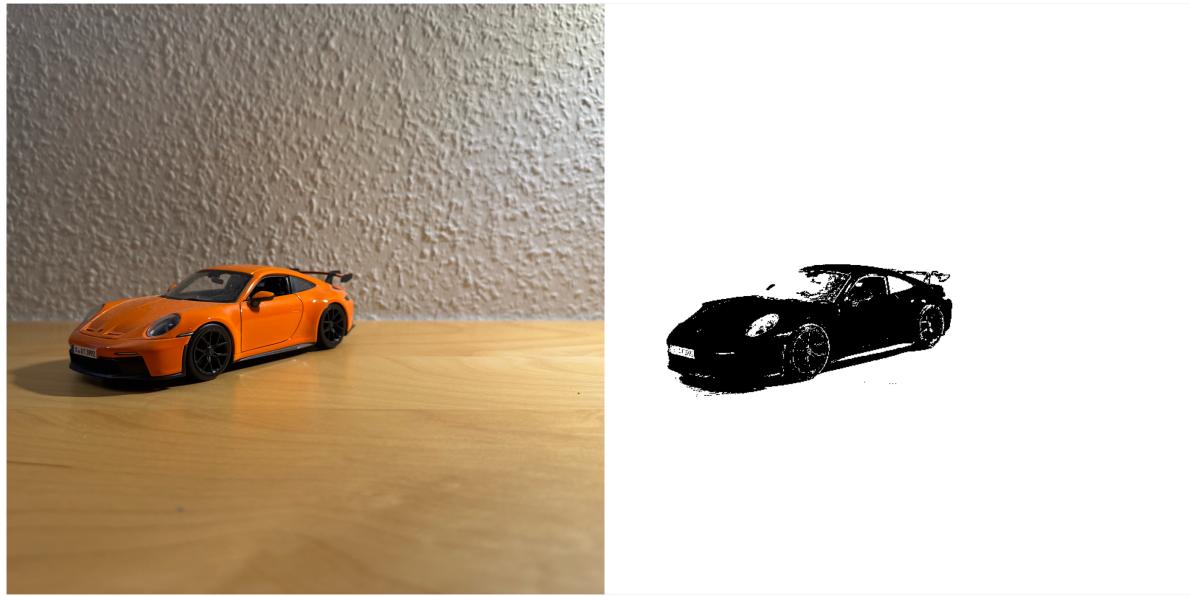


Figure 7.4: Click to watch the YouTube video

## 7.5 Language Detector

### 7.5.1 Overview

#### Task Description

As part of this task, we worked with a dataset containing a large collection of sentences from various languages, each one labeled according to its language. After preprocessing the data, we trained a Multinomial Naive Bayes model using these labeled sentences. The goal was to enable the model to learn language patterns effectively. Once trained, the model could accurately identify the language of any arbitrary sentence provided to it, making it a useful tool for automatic language detection in diverse text inputs.

#### Skills Leveraged

- Python
- Machine Learning with SciKit-Learn
- NumPy, Pandas
- Git/Github

#### Link to Github repository

[https://github.com/amiraliaali/language\\_detector](https://github.com/amiraliaali/language_detector)

### 7.5.2 Results

```
=====Language Detector=====
Enter a Text: Let's take a break.
The detected language of the input text is : English
```

Figure 7.5: English

```
=====Language Detector=====
Enter a Text: Einen schönen guten Tag zusammen.
The detected language of the input text is : German
```

Figure 7.6: German

## 8 Rust Projects



## 8.1 Rust Decision Tree Classifier

### 8.1.1 Overview

#### Task Description

As part of the lab course Efficient AI with Rust at RWTH Aachen University, I implemented a decision tree using the ID3 algorithm in Rust.

The dataset used contains various air condition features, with the target variable indicating whether we decide to play outside under those weather conditions.

#### Skills Leveraged

- Rust
- Machine Learning
- Git & GitHub

#### Link to Github repository

[https://github.com/amiraliaali/decision\\_tree\\_with\\_rust](https://github.com/amiraliaali/decision_tree_with_rust)

### 8.1.2 Results

The Decision Tree built on the dataset placed in the repository ([Link to CSV](#)) can be found in figure 8.1.

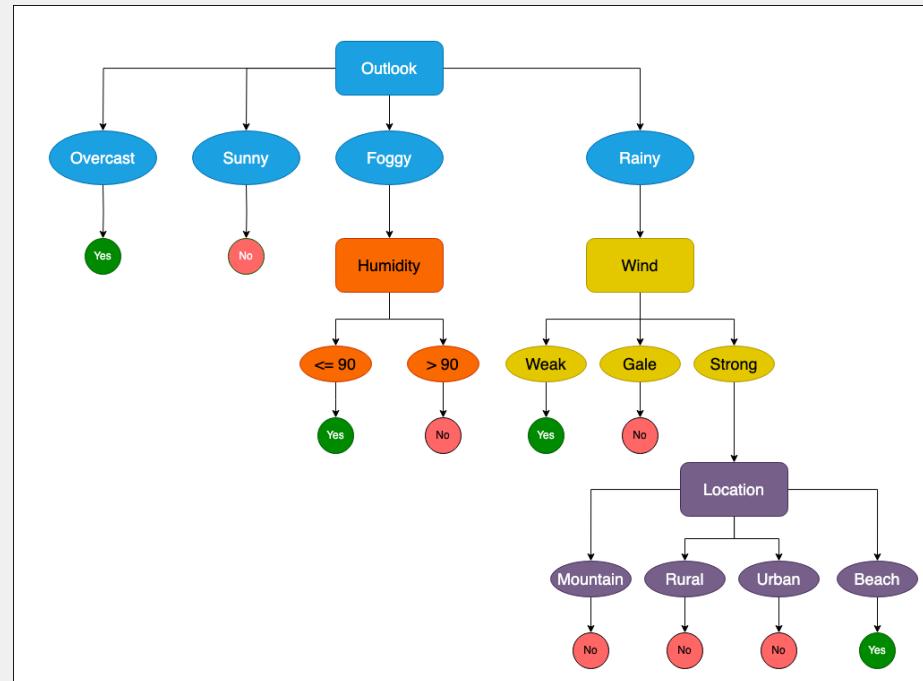


Figure 8.1: Decision Tree

## 9 C++ Projects



## 9.1 Login System

### 9.1.1 Overview

#### Task Description

This task highlights my proficiency in object-oriented programming with C++ and utilizing the Bazel build system.

The program is designed to manage a dataset of cars, allowing operations such as renting or returning a car, as well as adding new cars to the dataset or removing existing ones.

#### Skills Leveraged

- C++
- Object Oriented programming
- Bazel
- Git/Github

#### Link to Github repository

[https://github.com/amiraliaali/car\\_rental\\_system](https://github.com/amiraliaali/car_rental_system)

### 9.1.2 Results

Click the thumbnail to watch the result video on YouTube:

```
Welcome to the Car Rental System!
1. Add a car
2. Remove a car
3. Rent a car
4. Return a car
5. See the car table
6. Filter the car table
7. Reset the filtered car table
8. Exit
Please enter your choice: 5
      id      type   manufacturer     model  year    color mileage price_per_day last_rented is_available renter_id
1000   Coupe      Porsche       911 2021  Black   2100      85  27.8.2023        1          0
1001 Convertible  Porsche       718 2020   Red   53000      65  30.6.2022        0        2001
1002   Sedan      BMW         3 Series 2019  White  45000      60  15.4.2022        1          0
1003     SUV      BMW          X5 2020  Blue  25000      80  10.9.2023        0        2003
1004 Convertible  BMW          Z4 2018 Silver  35000      70  5.12.2021        1          0
1005   Sedan  Mercedes-Benz  C-Class 2021  Gray   1500      75  20.7.2023        0        2005
1006     SUV  Mercedes-Benz    GLE 2019  Black  40000      90  12.11.2022        1          0
1007   Coupe  Mercedes-Benz  AMG GT 2020   Red  18000     100  8.3.2022        0        2007
1008   Coupe      Porsche    Cayman 2017 Yellow  60000      75  3.6.2021        1          0
1009     SUV      Porsche   Macan 2021 Green   5000      95  18.9.2023        0        2009
1010 Hatchback     VW        Polo 2022 Black  30000      50  10.10.2024        1          0
1. Add a car
2. Remove a car
3. Rent a car
4. Return a car
5. See the car table
6. Filter the car table
7. Reset the filtered car table
8. Exit
Please enter your choice: 4
Please enter the car id: 100
```

Figure 9.1: Click to watch the YouTube video