**Project Title: Zebra Crossing recognition and Classification**

**Team members**

1. Nicolas Humbert
2. Yann-Arthur Tcheumani Mbialeu
3. Tobias Münzberg
4. Jan Tagge

**Project Description**

*Explain the main overall objectives of the project and provide a brief review on previous research on that topic (Maximum length 300 words).*

*We want to develop a software for potentially autonomous vehicles that automatically detects zebra crossings and classifies if there are people or animals crossing it using a deep learning system. The software will be based on Matlab and will use the image processing toolbox as well as the deep learning toolbox. There is a camera mounted to the autonomous vehicle which mostly has the same position. The first step will be to read the images and scale them to one size. After that we have to think of how much we actually want to use of the image for the zebra crossing recognition, since it will take less computational power to proceed a smaller picture. For example, you don’t the sky or houses on the top of the pictures for detecting the zebra crossings. The next part is the classification if there is pedestrians on the crossing or not. With this step, the car will be able to decide if it has to slow down or just move on. Therefor it is necessary to setup, modify and train a deep learning network. The final goal is to use the pictures of the Zebra Crossing recognition for the classification.*

**Specific Objectives**

*List the specific objectives of your project (Maximum length 300 words).*

* Read, rescale and crop images for zebra crossing recognition
* Create code for Zebra Crossing Recognition
* Pick and train a deep learning net to classify if people or animals are crossing
* Hand the images with Zebra Crossings from the recognition system to the classification System

**Methodology**

*Discuss the main methodological approaches that you are planning to use to tackle the objectives described in the previous section. Relate the selected methodology to the contents of the* ***Computer Vision*** *course (Maximum length 500 words).*

The methodology for our project involves concepts learned in the Computer Vision course to detect Zebra Crossings. To begin, we will split tasks among group members, ensuring each individual focuses on specific aspects aligned with their strengths. Regular discussions will enable us to monitor progress, share insights, and overcome challenges together.

Drawing from our course content, we plan to employ various Computer Vision techniques within Matlab. Gaussian Filters will help in preprocessing to reduce noise and enhance image clarity. Edge Detection algorithms like Sobel will identify the edges of the zebra crossings, facilitating their localization. Texture Analysis methods such will aid in discerning specific patterns.

Moreover, we aim to set up, modify, and train a deep learning network. This will involve designing and adapting convolutional neural network architectures to classify and detect zebra crossings in images. By combining traditional Computer Vision techniques with modern deep learning methodologies, we aim to create a robust Matlab code that accurately detects zebra crossings in various environments, ensuring pedestrian safety and contributing to real-world applications.

**Work plan**

*List the tasks (with a very brief description of them) that you are planning to carry out every week and relate each of them to the main objectives of the project. List the milestones that you are willing to achieve and the deliverables that you will submit for obtaining feedback.*

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| --- | --- | --- |
| **Week** | **Tasks** | **Milestones and deliverables** |
| **1** | **Create a git repository to organize the project** |  |
| **1** | **Organize the group and think of subtasks** | **29.11.23** |
| **1** | **Acquire pictures to train and test later algorithms** | **Due to 03.12.23** |
| **1** | **Search for a good deep learning model** | **Due to 03.12.23 (Nico & Yann)** |
|  | **Implement the Crossing detection in Matlab (use knowledge from former projects)** | **Due to 10.12.23 (Tobi & Jan)** |
| **2** | **Train the net to recognize zebra crossings and people on it** | **Due to 10.12.23 (Nico & Jan)** |
| **4** | **Get the project delivery slides and the presentation ready** |  |

**References**

* [**https://matlabacademy.mathworks.com/es/details/deep-learning-with-matlab/mldl**](https://matlabacademy.mathworks.com/es/details/deep-learning-with-matlab/mldl)
* [**https://es.mathworks.com/help/images/texture-analysis-1.html?s\_tid=CRUX\_lftnav**](https://es.mathworks.com/help/images/texture-analysis-1.html?s_tid=CRUX_lftnav)
* [**https://aules.uvic.cat/course/view.php?id=27516**](https://aules.uvic.cat/course/view.php?id=27516)
* [**https://www.degruyter.com/document/doi/10.1515/comp-2022-0260/html**](https://www.degruyter.com/document/doi/10.1515/comp-2022-0260/html)

**Ethical issues**

*If the project that you are intending to carry out raises ethical issues, discuss how you are intending to tackle them. Otherwise, state why it does not raise any kind of ethical issues (Maximum length 150 words).*

* How are we handling the pictures of people crossing the street?
  + We are planning a code without face recognition and we won’t save save the pictures after the situation has passed