

Autonomous Systems B Lab

Organization

Organizational Issues

- First task (will start after my introduction)
 - Team building 😊
 - Team consists of at most 4 persons
 - Within a team, vote a team leader
 - Task of team leader: Please, send an E-Mail containing all team members (surname, first name) to . Deadline: asap!

Organizational Issues

- We will meet weekly at 11 am in Zoom
 - Stand-Up Meeting: Open questions ...
- Breakout-session for each group
 - I will join every breakout-session
 - Show me the status of current milestone
 - Ask questions
- I am available in Zoom from 11 am to 13 pm

Lab Agenda

Lab: Autonomous System B Lab	
Date	Topic
24.09.21	Introduction to Petri-Net Make familiar with Petri-Nets Explore TAPAAL (www.tapaal.net) Work on Task 1
01.10.21	Work on Task 1
08.10.21	Work on Task 1
15.10.21	Present Task 1 / Work on Task 2
22.10.21	Work on Task 2
29.10.21	Present Task 2 / Work on Task 3
05.11.21	Work on Task 3
12.11.21	Work on Task 3
19.11.21	Work on Task 3
26.11.21	Present Task 3 / Work on Task 4
03.12.21	Work on Task 4
10.12.21	Work on Task 4
17.12.21	Present Task 4
24.12.21	XMas holidays
31.12.21	XMas holidays
07.01.22	Work on documentation
14.01.22	Work on documentation / submission of final documentation
	In plenary
	work in groups / breakout sessions

Overall Task: Documentation

Case study: Precision Farming



Source: <https://agrarpolitik-blog.com/2019/12/11/precision-farming-im-spannungsfeld-von-landwirtschaftlicher-produktion-und-umweltleistungen/>

Case study: Precision Farmin

- <https://www.youtube.com/watch?v=WhAfZhFxHTs>
- Make familiar with the topic on your own!!!



Tasks 1: Verification and Validation Env.

- Each group member
 - Model your own example (should have nothing to do with 'Precision Farming') to familiarize with TAPAAL
 - Verify: There is no deadlock in the model
- Milestone 1: Due to 15.10.2021
 - Explain example/TAPPAAL
 - Explain all features of Timed Petri Nets

Tasks 2: Deep Learning Env.

- Get familiar with
 - jupyter notebook
 - Our GPU-Server system
- Milestone 2: 22.10.2021
 - Explain example realization with jupyter notebook on our server system

Tasks 3: Use Case specification

- Identify and specify appropriate Use Cases in detail for agricultural tasks
 - monitored by drones
 - autonomously driving agricultural vehicles
 - several agricultural areas that cannot be monitored by a drone alone
 - external devices for monitor and control of the holistic system
- Get familiar with
 - plant data sets (focus on sugar beets)
- Milestone 3: Due to 29.10.2021

Tasks 4:

- Model and verify the Use Cases (Task 3)
- Milestone 4: Due to 26.11.2021
 - Live presentation of your model; live verification your model

Tasks 5:

- Learn models to be able to identify by using appropriate dl-algorithms
 - Weed, parasites, diseases, ...
- Milestone 5: Due to 03.12.2021
 - Live presentation

Task 6

- Integrated overall solution including coordinated autonomous vehicles and dl approach
- Deadline right before Christmas including demo

Task 6 – Details – 1 / 2

- Presentation/competition on Friday 17 during lab
- Competition field
 - 30 x 30 array of images (000 to 899)
 - Each team builds own competition field
 - Only images of known type are allowed (the 12 classes from the seedling dataset)
 - 'black_grass', 'charlock', 'cleavers', 'common_chickweed', 'common_wheat', 'fat_hen', 'loose_silky_bent', 'maize', 'scentless_mayweed', 'shepherds_purse', 'small_flowered_cranesbill', 'sugar_beet'
 - Follow the naming conventions below
 - Team must be able to check results of other teams
 - Original label compared with learned labels
 - Output number of correct identified images
 - Upload your test dataset as a zip file named competition_groupX.zip (where X is your group)
 - X is your group number so for group 4, the filename would be competition_group4.zip
 - The zip file contains your images named 000 to 899 with the correct extension (jpg for a jpg etc.)
 - It also contains a file labels_groupX.txt which is a CSV file. Use a semicolon (;) as the separator
 - The first row contains the headers id and label (id;label)
 - The second row contains 000 and the corresponding label (000;black_grass)
 - The third row contains 001 and the corresponding label (001;fat_hen) etc.
 - Make sure that you can build a data loader from your testset!

Task 6 – Details – 2 / 2

- There are two weeds (common_chickweed, scentless_mayweed) and ten plants
- You should classify each image in the test set from all groups and write the results in results_groupX_vs_groupY.txt as a CSV file with image number and labels just like your test file
- Each team is allowed to use 5 drones in up to 5 different roles
 - All drone(s) are only allowed to fly vertically and horizontally
 - Please log the flight path of all your drones in a CSV file, separated by semicolon
 - One file per drone drone1.txt, drone2.txt etc.
 - Each file contains the squares the drone flies through for example (000;001;002;003;004)
- Your petri net model fits to the used number of drones / roles
 - Meaning it implements the organized behavior of coordinating the drones

Task 6 – details

- First, you present your main idea/approach
 - 10 minutes plus 2 minutes discussion
 - Each student presents his or her contribution. The presentation time is balanced.
- Competition
 - 2 half finals
 - Match for 3rd place
 - Match for 1st place

Final Documentation

- Deadline 14.1.2022
 - Document your project
 - Document should contain all results of Task 2 – 4
 - Not only screenshots, please describe all images, models, etc. in a scientifically correct manner