



BERGISCHE
UNIVERSITÄT
WUPPERTAL

Fakultät 4 / Physik der kondensierten Materie

Train-the-Trainer Deep Learning Advanced

Katrin Link (KIT)
Martin Erdmann (RWTH)
Dirk Lützenkirchen-Hecht (BUW)

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Geb. U.08.19 / - 3103 bzw. D.09.23

ErUM-Data-Hub & DIG-UM present

DEEP LEARNING TRAIN-THE-TRAINER WORKSHOP

Part 2: Advanced concepts
Graph Neural Networks, GANs,
Autoencoder, Normalizing Flows

Introducing material for Lecturers
to give advanced courses on
Deep Learning

09 - 10 June 2022
Bergische Universität
Wuppertal

Rektoratsgebäude - B.06.01
Building B, Level 6, Room 1

Starts 09 June 2022, 1pm
Ends 10 June 2022, 2pm

Organisation:

Katrin Link (KIT)
Martin Erdmann (RWTH)
Dirk Lützenkirchen-Hecht (BUW)

Contact & Information:

<https://indico.scc.kit.edu/event/2728/>
verwaltunghub@physik.rwth-aachen.de



Train-the-Trainer Deep Learning Advanced / Program

2-days Workshop
University Wuppertal
Rektoratsgebäude
B.06.01



Topic:

**Material for Deep Learning Courses
incl. exercises**

Lectures given by:

4 Experts

Participants:

25 Lecturers (some knowledge of
neural networks is required)

Overnight stay:

Hotels in Wuppertal

Exercises:

Performed on VISPA Cloud

Thursday 9-Jun-2022

Friday 10-June-2022

9:00

GANs

Dr. Caroline Heneka
(RDS, Hamburg)

Travel

Normalizing Flows
PD. Dr. Roger Wolf
(KET Karlsruhe)

14:00

Graph Neural Networks
Dr. Jonas Glombitza
(KAT, Erlangen)

Travel

Autoencoders
Prof. Uwe Klemradt
(KFS, Aachen)

<https://indico.scc.kit.edu/event/2728>

Internet connection: via Wlan & Eduroam

Practical examples: <https://vispa.physik.rwth-aachen.de>.

Examples

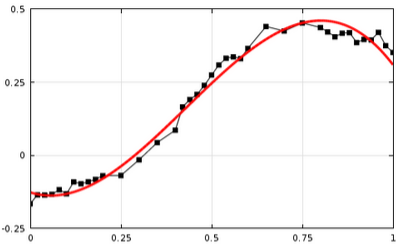
train_1D_fit.py

sinewave

sinewave.py

+

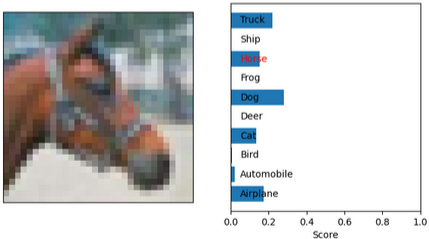
Deep Learning



1D Function Fitting
In this example, you can train a neural network to fit an arbitrary function and investigate the approximation performance during the training iterations.

Reset example

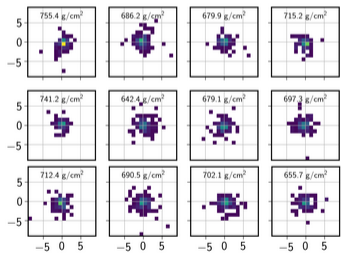
Open example



CIFAR-10 Image Classification
CIFAR-10 is a dataset of tiny natural images showing objects of 10 different classes. It is a popular data set for experimenting with different deep learning techniques. In the provided examples you can train and apply: a fully connected net, a simple convolutional net and a deep convolutional net.

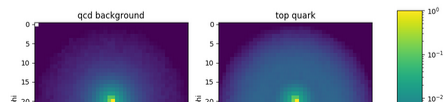
Reset example

Open example

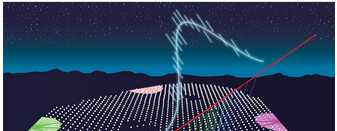


Air Shower Classification
Ultra-high energy cosmic rays produce extensive air showers, which vary among others with the cosmic ray mass. For tracking the cosmic rays back to their sources, the reconstruction of the charge is a key parameter hence it could allow for estimating the galactic magnetic field deflection for each cosmic ray. In this example you can train a neural network on a toy data set to reconstruct the mass of the air shower (classification) and the shower maximum (regression).

Open example



Toptagging using Deep Neural Networks
Top quarks are of special interest in high-energy physics due to their strong coupling to the Higgs boson. Additionally,



Deep Learning based Air Shower Reconstruction
Ultra-high energy cosmic rays produce extensive air showers of secondary particles upon entering the atmosphere. Sampling the footprint of these particles with surface detectors is a widely used detection technique. In this example you can exploit

Deep Learning Train-the-Trainer advanced 9. & 10.6.2022

3



Covid measures:



Mandatory masks become recommended masks

The mask obligation must be regularly reviewed for its necessity and proportionality. The University is taking the expiry of the Corona Occupational Health and Safety Ordinance on 25 May 2022 as an opportunity to adapt its overall concept for infection control regulations. The University no longer considers the obligation to wear a mask necessary and proportionate in view of the significantly reduced and further decreasing incidence rates. **The current mask requirement will therefore be discontinued from Monday, 30.05.2022.**

We all know that masks are an important means of preventing the transmission of infections. The University therefore combines the removal of the mask requirement with the strong recommendation to continue to voluntarily wear at least a medical mask in all University buildings and at all courses.

Rooms without technical ventilation (seminar rooms, laboratories) must be ventilated regularly. In addition, the other general hygiene rules of the RKI, e.g. on hand disinfection, must be observed.

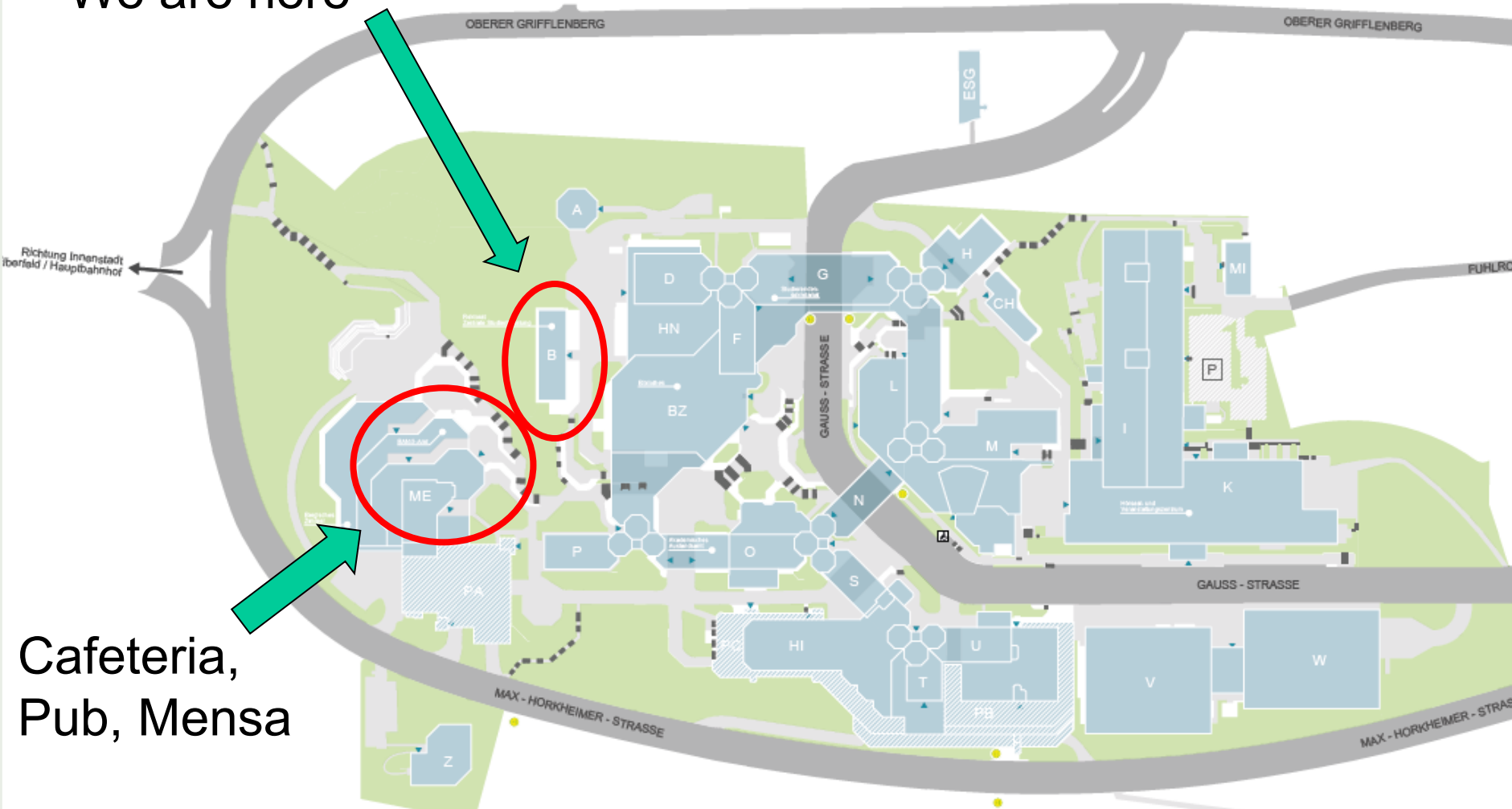
It is particularly important that each individual acts prudently and responsibly, especially when regulations are omitted. Together with the AStA, the Rectorate therefore appeals to all participants in courses and visitors to university facilities:

- Do not go to the university at the first sign of a cold. Wait three days to see if your antigen test comes back positive. Because: Cold symptoms are a strong indication of a possible CoViD19 disease. And infected people can be contagious before the antigen test comes back positive.



Some practical information ...

We are here



Cafeteria,
Pub, Mensa



Some practical information ...

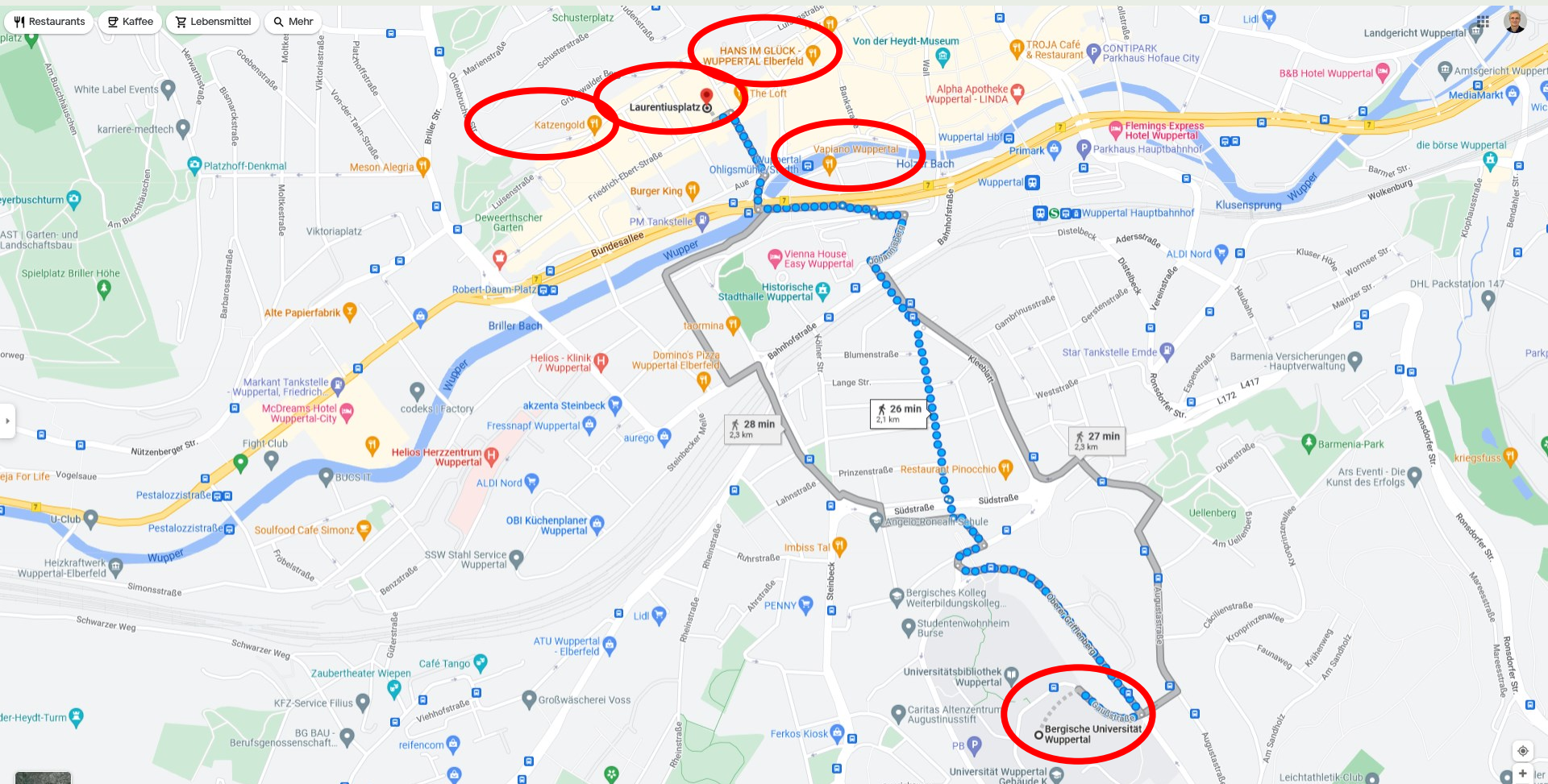
We are here

Bus to the city center, railway, ...
lines 615, 645, E-Uni, Uni-Express



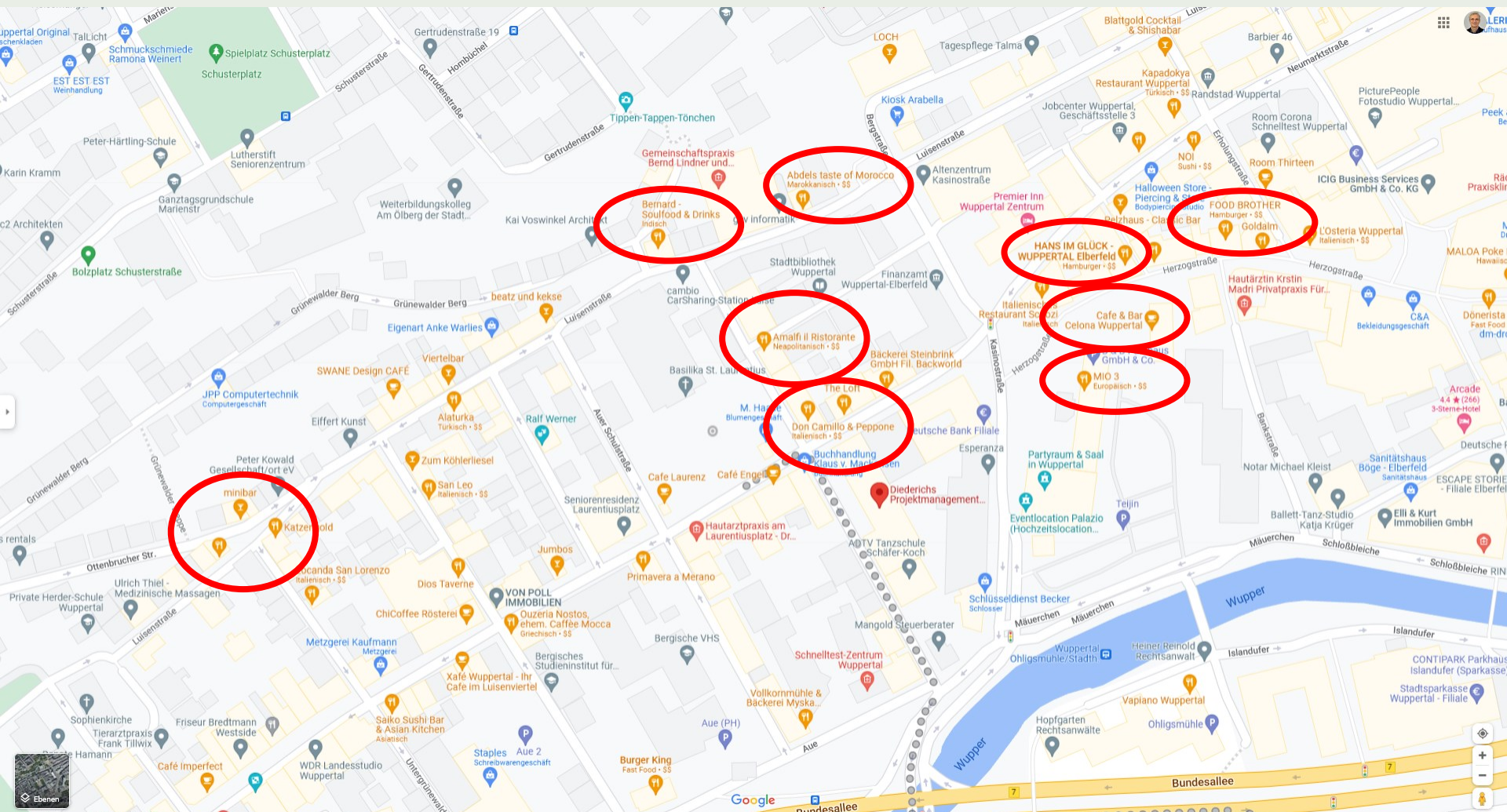


Food, bars, ...





Food, bars, ...



Any questions?

