

18.04.23

# Machine Learning With TensorFlow

## **GENERAL INTRODUCTION**

- **Personal Introduction**
- **Organizational Matters**
- **Introductory Discussion on AI**
- **Coursera Registration**
- **Course Projects**
- **ML Frameworks**

# PERSONAL INTRODUCTION

# CHAT

The screenshot shows a Slack channel interface. At the top, the channel name is 'C\_Machine Learning With TensorFlow' with a dropdown arrow and a star icon. Below the name, there's a status bar showing '2' members, '1' star, and a schedule 'Tuesday, 4-6 p.m.: Zoom; Course Handbook'. A search bar is on the right. The left sidebar shows a list of channels, with 'C\_Machine Learning With ...' selected. The main area displays a pinned post titled 'Beginning of C\_Machine Learning With TensorFlow' by Steffen Brandt, dated March 02, 2021. The post content says: 'This is the start of the C\_Machine Learning With TensorFlow channel, created by Steffen Brandt on March 02, 2021. Any member can join and read this channel.' Below the post are links to 'Invite others to this channel' and 'Set a Header'. The right sidebar shows 'Pinned Posts' with the same post by Steffen Brandt, dated 23:10, with the text: 'Welcome to the course "Machine Learning With TensorFlow"! In this course we will try to provide you with hands-on knowledge about how to train machine learning models with TensorFlow. An important part when working in the field of machine learning is networking and working together in a team. An important goal of the course is therefore that you get to know each other and work in a team on a project. I would therefore like to ask you to introduce yourself quickly here in the channel already. Maybe

- Please, ask questions to us in the chat

# COURSE HANDBOOK



opencampus.sh Machine  
Learning Program

EDU-Platform

Chat

Search...

opencampus.sh Machine Learning  
Program

Course Kick-Off

How do I choose a course?

FAQ

COURSES

Einführung in Data Science und  
maschinelles Lernen

Machine Learning with  
TensorFlow

Requirements for a Certificate of  
Achievement or ECTS

Preparation

Week 1 - General Introduction

Week 2 - Introduction to  
TensorFlow, Part I

Week 3 - Introduction to

## Week 1 - General Introduction

### This week you will...

- get a basic introduction to neural nets in order to get a first intuition in the underlying mechanisms
- get a first idea about possible projects you might want to work on throughout the course

### Learning Resources



220419\_Introduction to Neural Nets.pdf 4MB  
PDF

- Video Neural Networks Explained (12 minutes)
- Introductory course on Python from Kaggle
- Tutorial on Colab on Medium

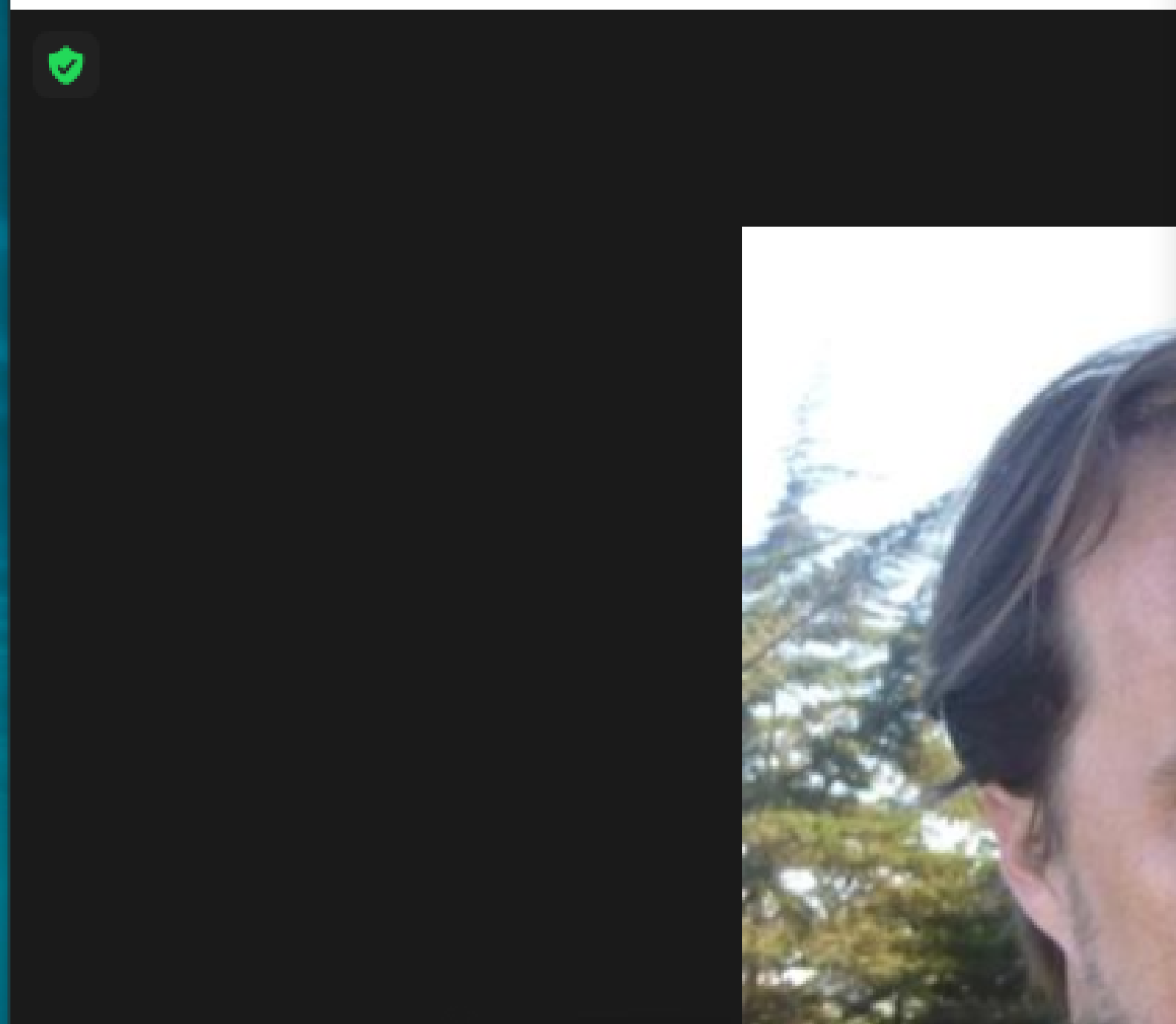
# ORGANIZATIONAL MATTERS

- **Use your full names in the zoom meetings!**
- Scan the QR-Code if you participate in presence
- **Complete your profile in the Mattermost chat with your full name and a photo.**
- **Please write us if you will not go on with the course!**

# ZOOM

- Try the different viewing modes:
  - Gallery View/ Active Speaker
  - Split Screen/ Full Screen Mode
- Maybe watch this video to get an idea:  
<https://www.youtube.com/watch?v=v3IPAbpVjd4>

Zoom Meeting



Select a Camera (Alt+N to switch)

NewTek NDI Video

✓ Integrated Camera

Choose Virtual Background...

Choose Video Filter...

Video Settings...

Steffen Brandt

Mute

Start Video

Security

Participants 1

Settings

General

Video

Audio

Share Screen

Chat

Background & Filters

Recording

Profile

Statistics

Keyboard Shortcuts

Accessibility

Window size when screen sharing:

☐ Fullscreen mode

☐ Maximize window

☒ Maintain current size

☒ Scale to fit shared content to Zoom window

☐ Show my Zoom Windows to other participants when I am screen sharing

☐ Enable the remote control of all applications

☒ Side-by-side mode

☒ Silence system notifications when sharing desktop

When I share my screen in a meeting

☐ Automatically share desktop

☒ Show all sharing options

When I share directly to a Zoom Room

☒ Automatically share desktop

☐ Show all sharing options

Advanced



18.04. 16:00	<b>Introduction to Neural Nets and Tools Used During the Course</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark	
25.04. 16:00	<b>Introduction to TensorFlow for AI, Machine Learning, and Deep Learning, Part I</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark	
02.05. 16:00	<b>Introduction to TensorFlow for AI, Machine Learning, and Deep Learning, Part II</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark	← Present your project idea
09.05. 16:00	<b>Convolutional Neural Networks, Part I</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark	
16.05. 16:00	<b>Convolutional Neural Networks, Part II</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark	
23.05. 16:00	<b>Natural Language Processing, Part I</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark	
		30.05. 16:00
		<b>Natural Language Processing, Part II</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
		06.06. 16:00
		<b>Sequences, Time Series and Prediction, Part I</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
		13.06. 16:00
		<b>Sequences, Time Series and Prediction, Part II</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
		20.06. 16:00
		<b>Presentation of the Final Projects, Part I</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
		27.06. 16:00
		<b>Presentation of the Final Projects, Part II</b> Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark

# CODING.WATERKANT 2023

Beim Coding.Waterkant treffen sich die Machine Learning und KI Enthusiasten aus Schleswig-Holstein und darüber hinaus, um ihre Projekte auf die nächste Stufe zu heben und sich mit anderen auszutauschen – und das alles in der einzigartigen Atmosphäre des Waterkant Festivals.



yourself

## KEYFACTS

**26. - 30 Juni**

2023 findet das Coding.Waterkant statt

**4 Tage**

lang kannst Du allein oder mit einem Team an Coding.Waterkant teilnehmen

**100 Teilnehmer:innen**

Werden für Coding.Waterkant 2023 erwartet

**Waterkant Gelände**

Hier findet das Coding.Waterkant statt

# PARTICIPATION FORMS

## *Join a project:*

If you want to get further expertise by working on a real-life machine learning project, you can select on Tuesday morning of the event to work on one of the projects that is looking for participants to join them.

## *Bring your own project:*

If you want to work on your own machine learning project during the four days, please, contact us under [team@kiel.ai](mailto:team@kiel.ai), so we can include your project into the list of participating projects. If you are interested in support for your project you can decide to invite other participants to join your project during the four days.

# FIRST BREAKOUT

- 15-20 Minutes
- Present yourself
- Discussion Questions:
  - Do you know examples for Machine Learning?
  - Do you know examples for Deep Learning?
  - Are there AI tools that you use?(Chat GPT etc.)

## **Artificial Intelligence**

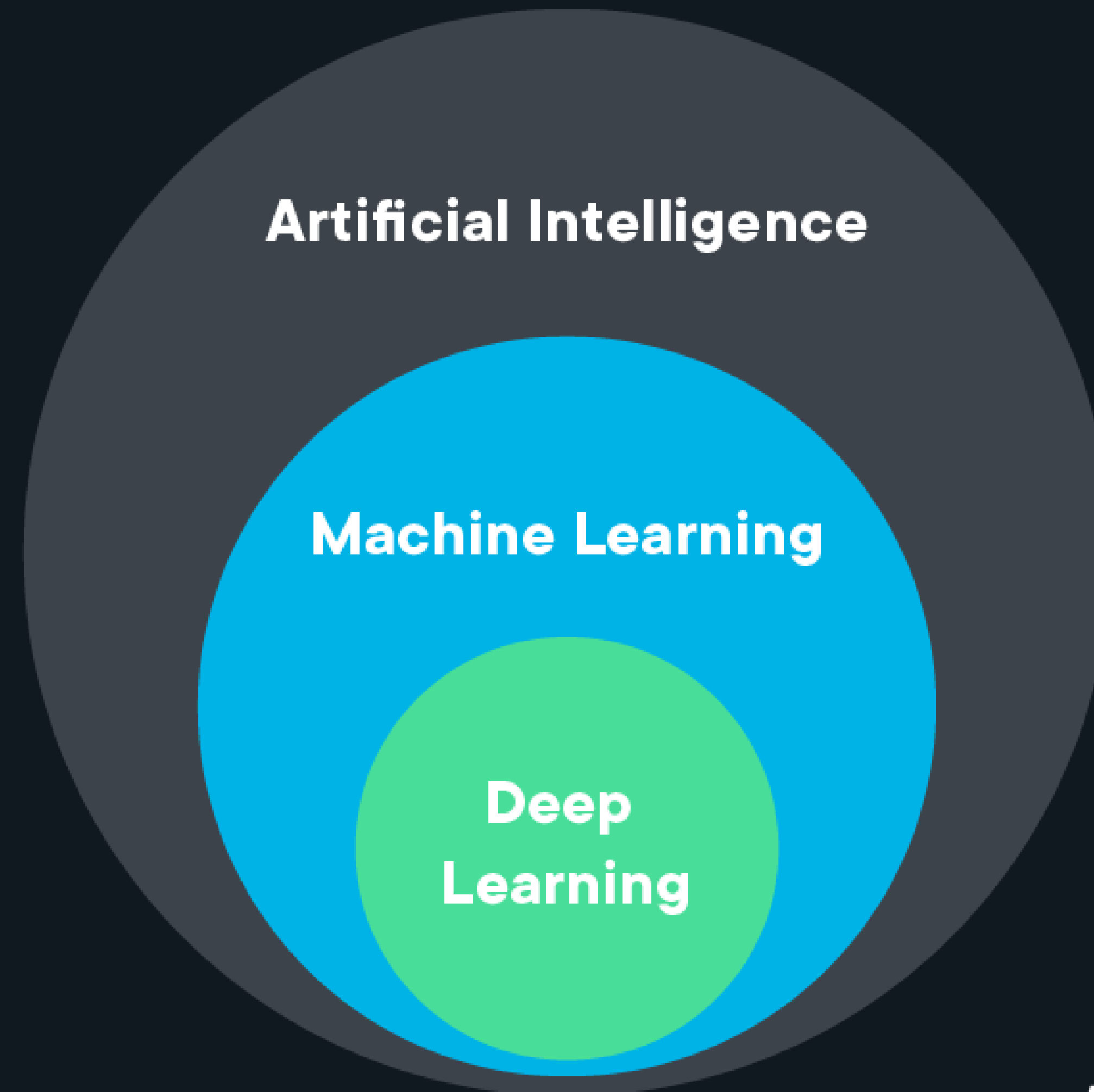
A science devoted to making machines think and act like humans.

## **Machine Learning**

Focuses on enabling computers to perform tasks without explicit programming.

## **Deep Learning**

A subset of machine learning based on artificial neural networks.



# INTRO TO NEURAL NETS

- The linked videos are good to get an overview
- Don't be intimidated if you didn't understand everything
- Watch the videos again at a later stage and see if you understand more

# COURSERA REGISTRATION

The screenshot displays the Coursera website interface. At the top, the Coursera logo is on the left, followed by navigation icons and a search bar containing the text "What do you want to learn?". On the right, a user profile for "Steffen Brandt" is shown. Below the search bar, a "Switch to" dropdown menu is open, listing four options: "My Coursera All Courses", "opencampus.sh unlimited OPENCAMPUS Sponsored Courses", "opencampus.sh explore Coursera Sponsored Courses", and "Coursera Admin Training Coursera, Inc. Sponsored Courses". A yellow arrow points to the "opencampus.sh unlimited" option. The main banner area features a teal background with the text "Welcome to opencampus.sh unlimited" and "Start Hacking Your Life". Below the banner, a navigation bar includes links for "Business", "Computer Science", "Data Science", "Information Technology", "Health", and "Math and Logic". At the bottom, a personalized message reads: "Hello Steffen Brandt! Browse content from the **opencampus.sh unlimited** learning program. Your organization has sponsored this program. Discover the [content types](#) we offer."

Hello Steffen Brandt!

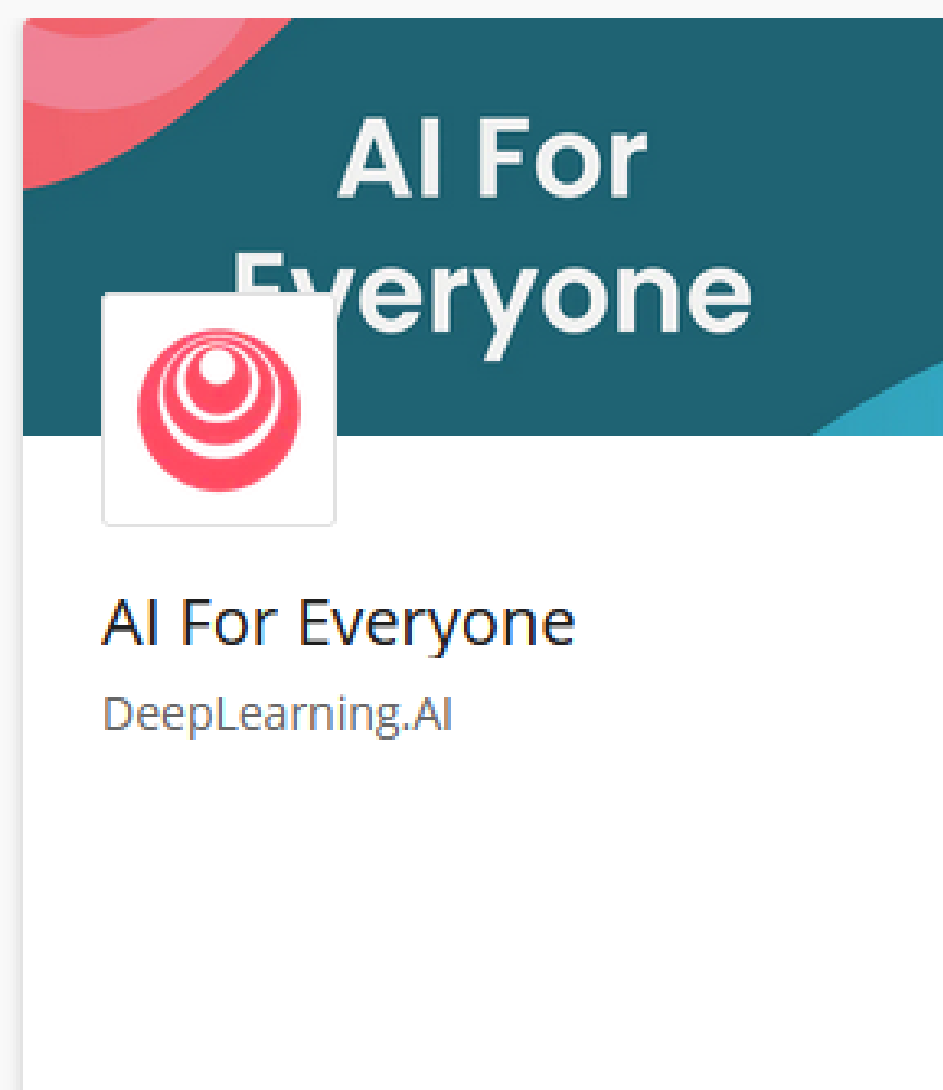
Browse content from the **opencampus.sh unlimited** learning program.

Your organization has sponsored this program. Discover the [content types](#) we offer.

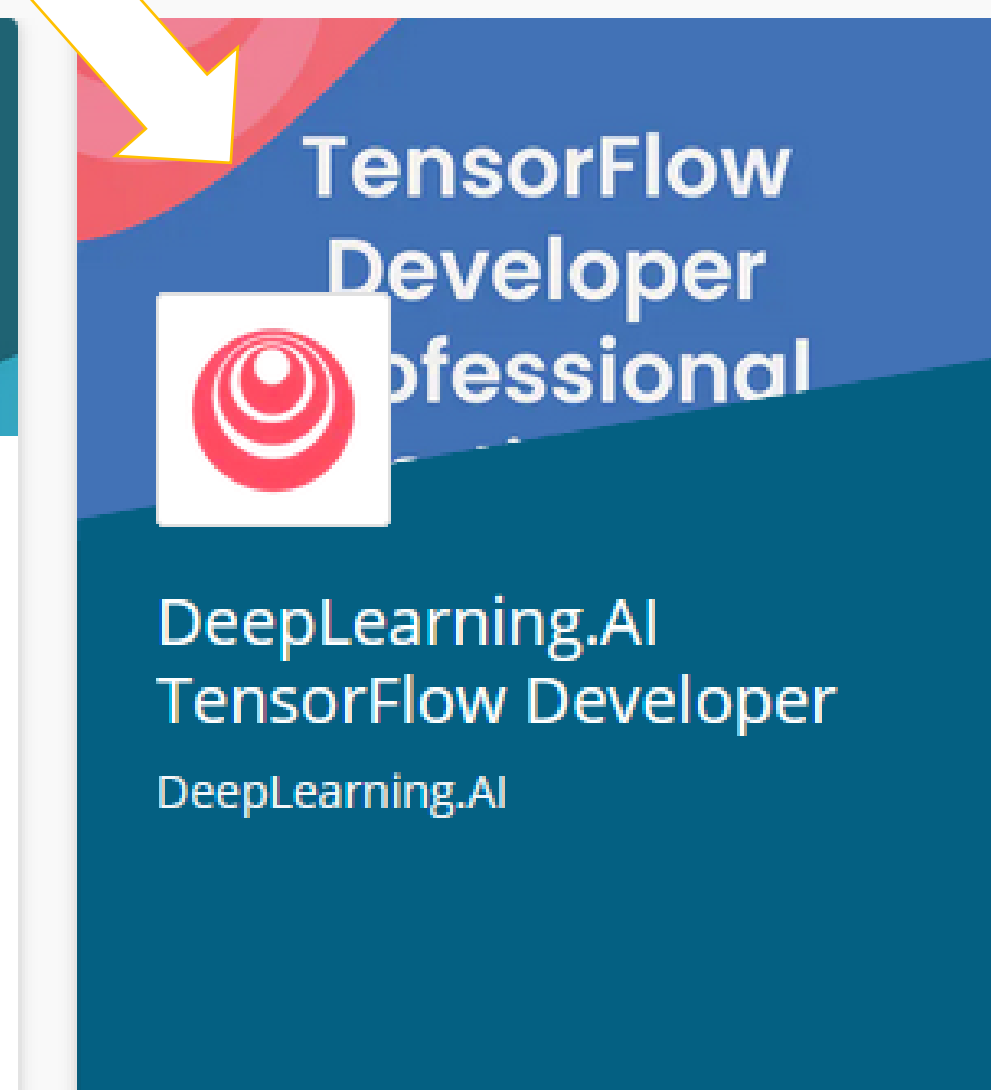
## Recommendations from your organization

Choose from hand-picked content from this program to advance your career!

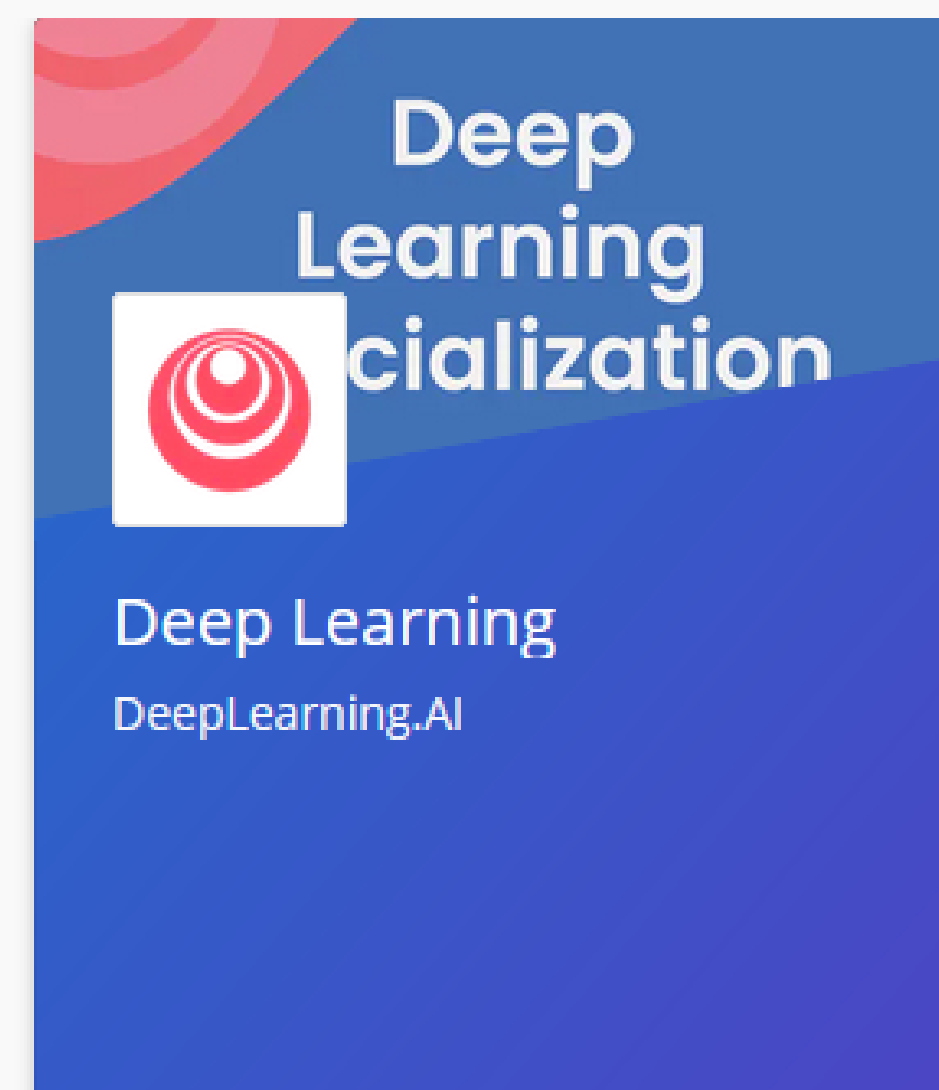
### Machine Learning



**AI For Everyone**  
DeepLearning.AI



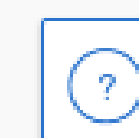
**TensorFlow Developer Professional**  
DeepLearning.AI TensorFlow Developer  
DeepLearning.AI



**Deep Learning Specialization**  
Deep Learning  
DeepLearning.AI



**AI for Medicine Specialization**  
AI for Medicine  
DeepLearning.AI





COUR

PROFESSIONAL CERTIFICATE

# DeepLearning.AI TensorFlow Developer

Offered by



Enrolled

Go to Course



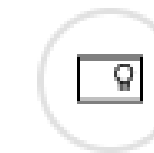
Save for Later

Sponsored by OPENCAMPUS

## About this Professional Certificate

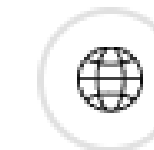
TensorFlow is one of the most in-demand and popular open-source deep learning frameworks available today. The DeepLearning.AI TensorFlow Developer Professional Certificate program teaches you applied machine learning skills with TensorFlow so you can build and train powerful models.

In this hands-on, four-course Professional Certificate program, you'll learn the necessary tools to build scalable AI-powered applications with TensorFlow. After finishing this program, you'll be able to apply your new TensorFlow skills to a wide range of problems and projects. This program can help you prepare for the [Google TensorFlow Certificate exam](#) and bring you one step closer to achieving the Google TensorFlow Certificate.



### Shareable Certificate

Earn a Certificate upon completion



### 100% online courses

Start instantly and learn at your own schedule.



### Flexible Schedule

Set and maintain flexible deadlines.

[About](#) [How It Works](#) [Courses](#) [Instructors](#) [Enrollment Options](#) [FAQ](#)

## COURSE

1

**Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning**★★★★★ **4.7** 12.904 ratings • 2.739 reviews

If you are a software developer who wants to build scalable AI-powered algorithms, you need to understand how to use the tools to build them. This course is part of the upcoming Machine Learning in Tensorflow Specialization and will teach you best practices for using TensorFlow, a popular open-source framework for machine learning.

[SHOW ALL](#)

## COURSE

2

**Convolutional Neural Networks in TensorFlow**★★★★★ **4.7** 5.658 ratings • 858 reviews

If you are a software developer who wants to build scalable AI-powered algorithms, you need to understand how to use the tools to build them. This course is part of the upcoming Machine Learning in Tensorflow Specialization and will teach you best practices for using TensorFlow, a popular open-source framework for machine learning.

[SHOW ALL](#)

## COURSE

3

**Natural Language Processing in TensorFlow**★★★★★ **4.6** 4.631 ratings • 711 reviews

If you are a software developer who wants to build scalable AI-powered algorithms, you need to understand how to use the tools to build them. This Specialization will teach you best practices for using TensorFlow, a popular open-source framework for machine learning.

[SHOW ALL](#)

## COURSE

4

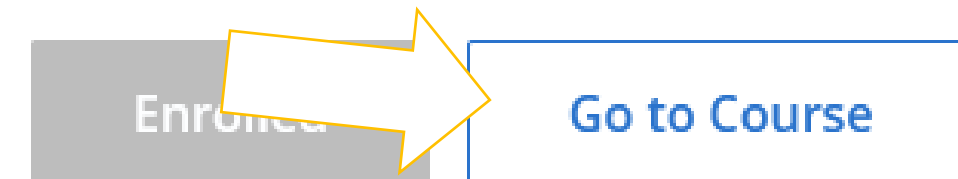
**Sequences, Time Series and Prediction**★★★★★ **4.6** 3.279 ratings • 526 reviews

If you are a software developer who wants to build scalable AI-powered algorithms, you need to understand how to use the tools to build them. This Specialization will teach you best practices for using TensorFlow, a popular open-source framework for machine learning.

[← Back to DeepLearning.AI TensorFlow Developer](#)

# Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning

★★★★☆ 4.7 14,803 ratings • 3,104 reviews



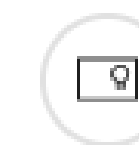
Sponsored by OPENCAMPUS

## About this Course

If you are a software developer who wants to build scalable AI-powered algorithms, you need to understand how to use the tools to build them. This course is part of the upcoming Machine Learning in Tensorflow Specialization and will teach you best practices for using TensorFlow, a popular open-source framework for machine learning.

[SHOW ALL](#)

Offered by



### Shareable Certificate

Earn a Certificate upon completion



### 100% online

Start instantly and learn at your own schedule.



### Flexible deadlines

Reset deadlines in accordance to your schedule.



### Intermediate Level





[Browse](#) > [Data Science](#) > [Machine Learning](#)

Offered By

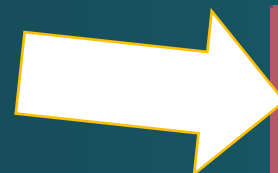


# DeepLearning.AI TensorFlow Developer Professional Certificate

★★★★★ 4.7 15.626 ratings



Laurence Moroney



**Enrolled**

Already enrolled

115,497 already enrolled

[About](#) [How It Works](#) [Courses](#) [Instructors](#) [Enrollment Options](#) [FAQ](#)

## WHAT YOU WILL LEARN

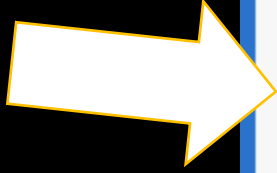
✓ Best practices for TensorFlow, a popular open-source machine learning framework

✓ Handle real-world image data and explore



**LEARNER CAREER OUTCOMES**

# EXERCISES (LABS)



The screenshot displays the Coursera interface for the course 'Introduction to TensorFlow for Artificial Intelligence, N > Woche 1 > Exercise 1 (Housing Prices)'. The left sidebar contains a list of items under the heading 'Weekly Exercise - Your First Neural Network'. A yellow arrow points to the 'Labor: Exercise 1 (Housing Prices)' item, which is highlighted with a blue bar. Below it are 'Programmierungsaufgabe: Exercise 1 (Housing Prices)' and 'Lesevorgang: Week 1 Resources'. The main content area shows the title 'Exercise 1 (Housing Prices)' and a button labeled 'Labor öffnen' with an upward arrow icon. Below this is a section titled 'Anweisungen' (Instructions) with a scroll bar. The instructions text states: 'Starting September 2020, notebook items in course shells will become Ungraded Labs. Paid learners will be able to access their notebooks in the new Coursera lab environment; Auditors will lose access. We strongly encourage you to download your notebooks if you are auditing this course. You can also upgrade or applying for financial aid to access premium Lab items in your course. For more information, please see this [forum link](#).' Below this is a paragraph: 'Great! You've come a long way already! Now it's time to do an exercise in programming. Earlier this week you saw a 'Hello World' in Machine Learning that predicted a relationship between X and Y values. These were purely arbitrary, but it did give you the template for how you can solve more difficult problems. So, for this exercise you will write code that does a similar task -- in this case predicting house prices based on a simple, linear equation.' At the bottom, a bold note reads: 'NOTE: Please do not modify any of the code already provided in the Exercise question, and please only add your additional code in the indicated areas marked by the comments. Once you have completed your notebook assignment and received a final score, please save your notebook, run the final cell, and close your Jupyter Workspace. This will help optimize your Jupyter workspace performance for future assessments. Please note that this step will shut down your kernel, so it is important to save your work in advance of completing this step'.

**Exercise 1 (Housing Prices)**

[Labor öffnen](#)

### Anweisungen

Starting September 2020, notebook items in course shells will become Ungraded Labs. Paid learners will be able to access their notebooks in the new Coursera lab environment; Auditors will lose access. We strongly encourage you to download your notebooks if you are auditing this course. You can also upgrade or applying for financial aid to access premium Lab items in your course. For more information, please see this [forum link](#).

Great! You've come a long way already! Now it's time to do an exercise in programming. Earlier this week you saw a 'Hello World' in Machine Learning that predicted a relationship between X and Y values. These were purely arbitrary, but it did give you the template for how you can solve more difficult problems. So, for this exercise you will write code that does a similar task -- in this case predicting house prices based on a simple, linear equation.

**NOTE: Please do not modify any of the code already provided in the Exercise question, and please only add your additional code in the indicated areas marked by the comments. Once you have completed your notebook assignment and received a final score, please save your notebook, run the final cell, and close your Jupyter Workspace. This will help optimize your Jupyter workspace performance for future assessments. Please note that this step will shut down your kernel, so it is important to save your work in advance of completing this step**

# EXERCISES

- Each week two to four of you will present the learnings from the exercises
- Each of you presents at least once
- Your presentation should take no longer than 6 minutes
- We will provide with a template for your presentation

# OVERCOMING OBSTACLES

- Use this slide to present the challenges you faced during this exercise
- Describe the process of running into a problem and how you fixed it or why the problem still remains
- There are no wrong answers here, even if your problems seem trivial others might have had the same problem and will benefit from your experience
- Make sure to include some screenshots of code highlighting what you are talking about (only a few lines)



# UNEXPECTED DISCOVERIES

- Use this slide to present what surprised you the most about this weeks exercise
- It can be something new, you didn't know existed before or maybe a parameter you didn't know you could set etc.
- Again there are no wrong answers here, if you can't think of anything right away, think back to this weeks content and be creative. What exactly did you learn this week?



# ANYTHING ELSE

- Use this slide to talk about remaining questions or topics that stuck with you during this weeks course
- If you already have a project idea you can use it to connect the exercises and talk about how the two relate
- If you had another obstacle you can talk about that
- It can also be something you found very important and want to know by heart

EXERCISES:  
WHO WILL PRESENT NEXT WEEK?

# PROJECTS

Option 1:

Bring your own idea and data

Option 2:

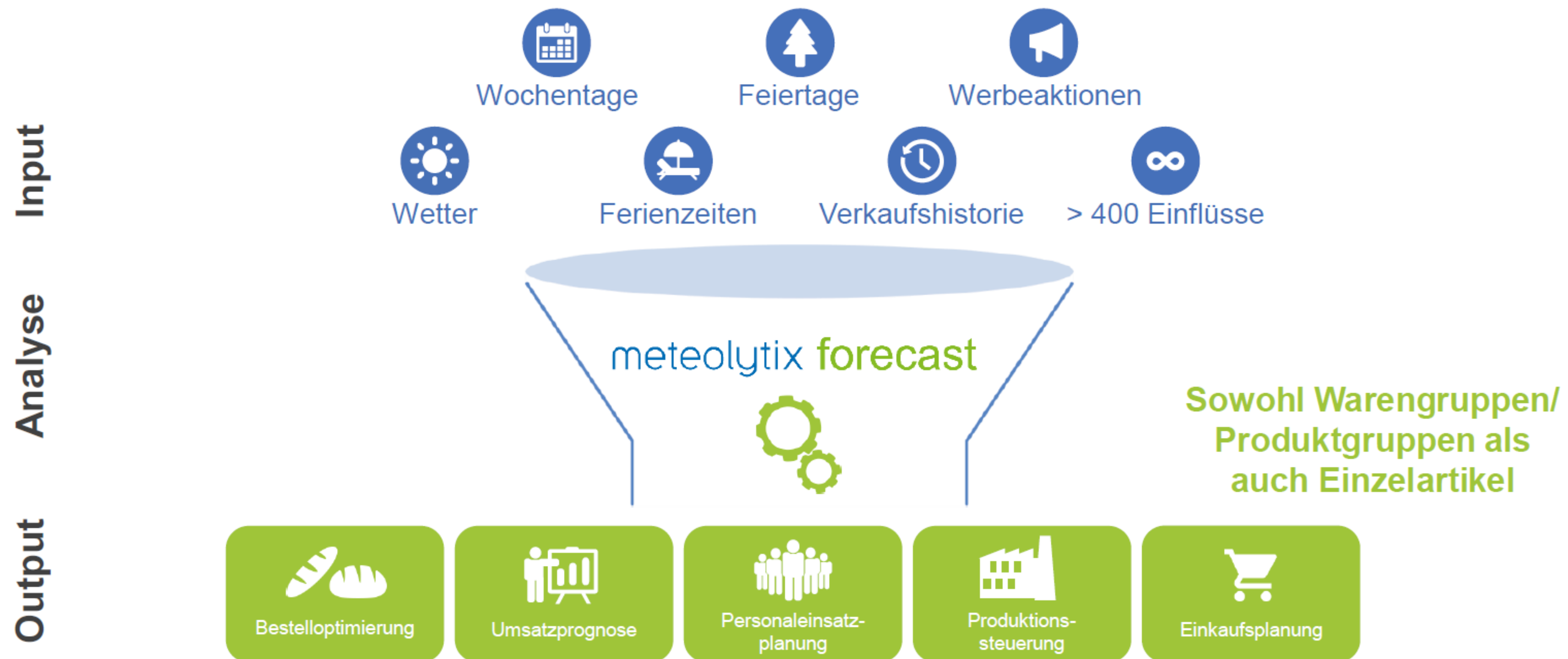
Do one of the two default projects

# DEFAULT PROJECT

- Time series prediction
- Based on sales data from a local bakery chain
- Prediction of future sales for three different stores and different product groups

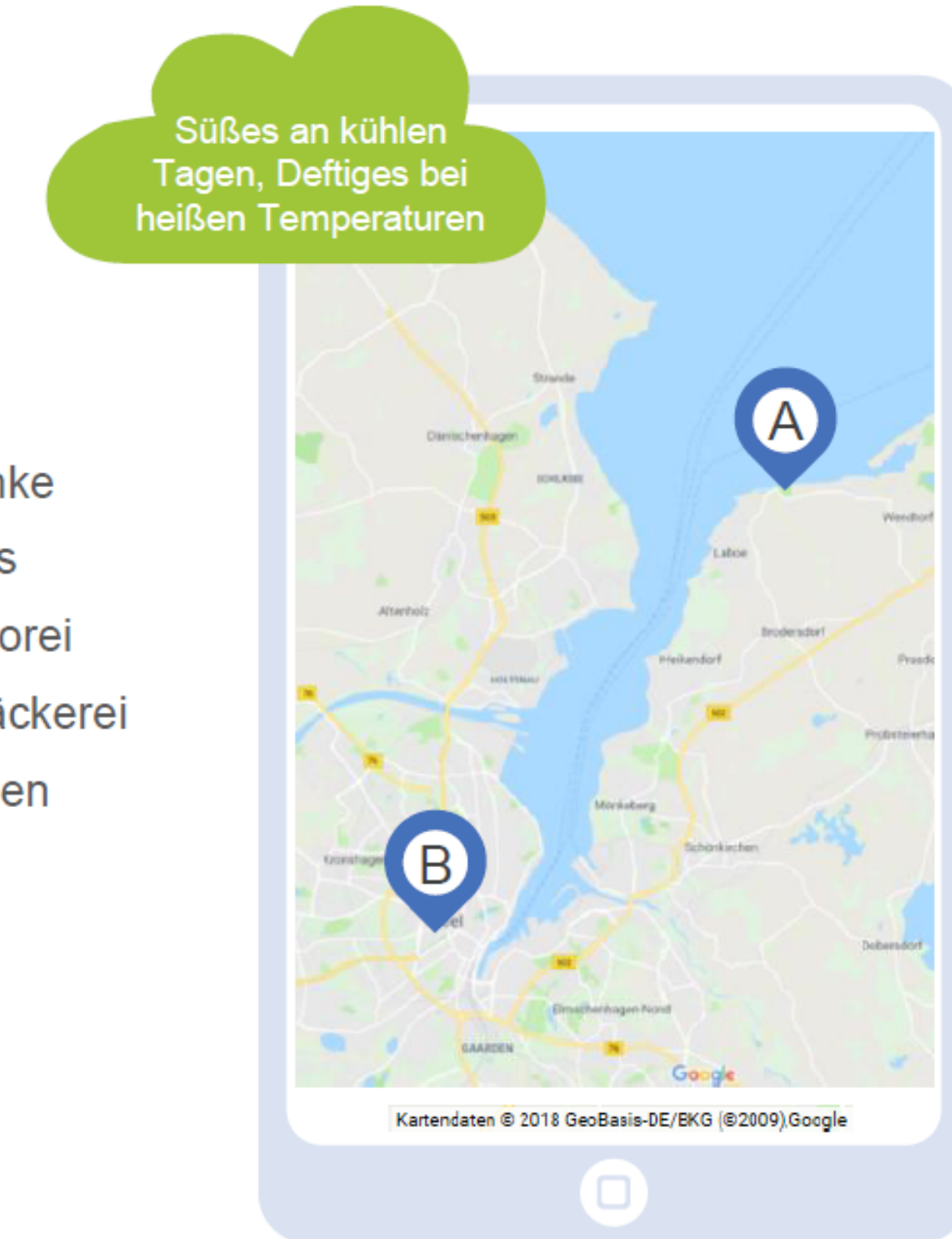
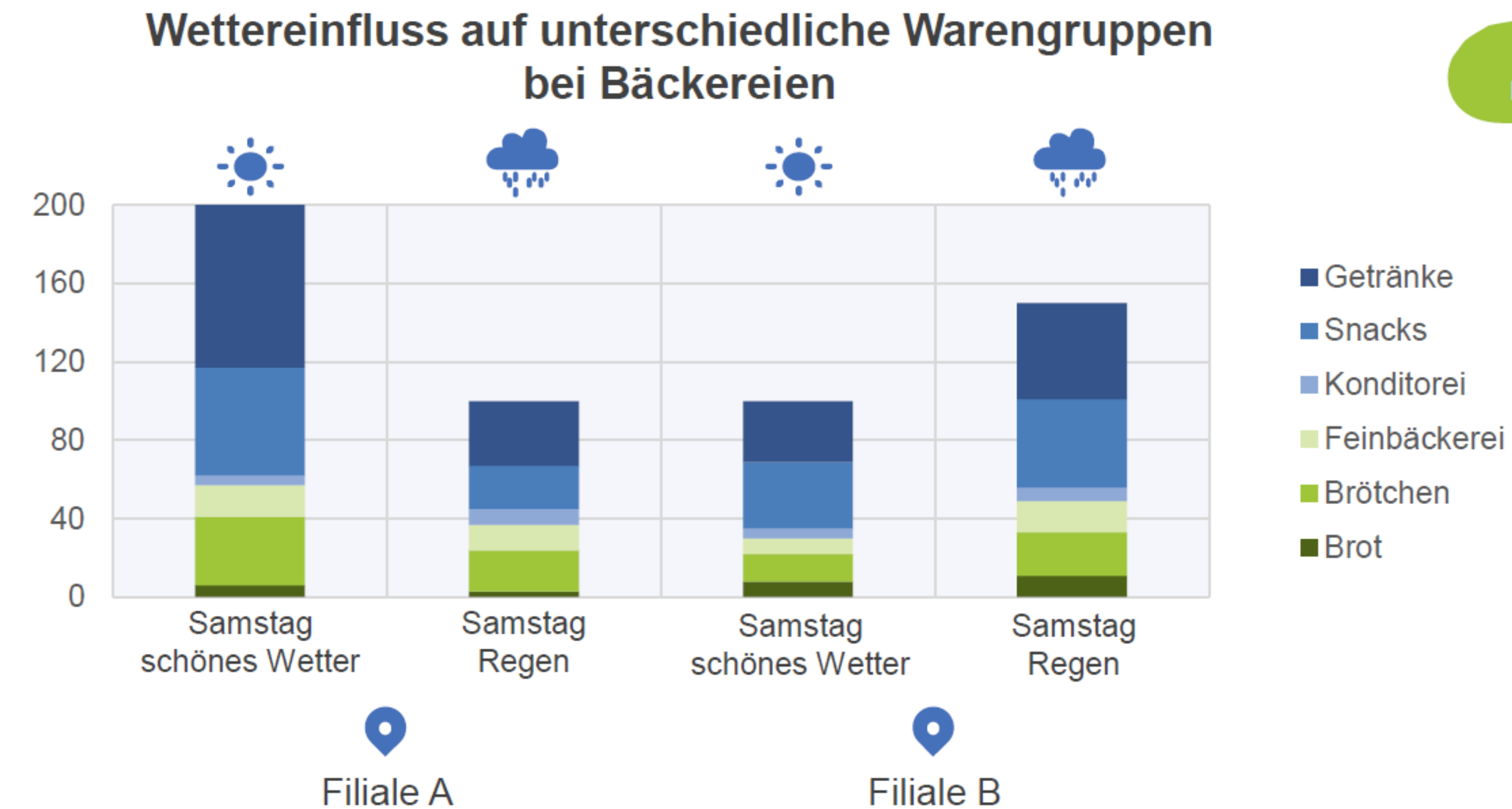
*meteolytix forecast* analysiert die Datenzusammenhänge von mehr als 400 Einflussfaktoren und liefert Absatzprognosen für viele Einsatzfelder.

WAS WIR MACHEN



Die Stärke des Wettereffekts variiert von Ort zu Ort und wird jeweils filialindividuell berücksichtigt.

WAS WIR MACHEN



# PROJECT INTERESTS



## EVENTS

Coding.Waterkant 2023

Prototyping Week

## PROJECTS

Requirements

Possible Projects

Past Projects

Project Template

## ADDITIONAL RESOURCES

Glossary

Coursera

Selecting the Optimizer

Choosing the Learning Rate

Learning Linear Algebra

Learning Python

Support Vector Machines

ML Statistics

# Possible Projects

There are different options for you to define or select your course project:

- **Bring your own data and project idea** to the course. Simply talk to your course lead about your idea and the goal of the project until the end of the semester.
- **Choose a project from the list** of current projects provided in the table at the end of this page.
- **Talk to local companies or chairs at your local higher education institutions** if they are interested in a machine learning prototype for some of their production or research tasks and would like to share the corresponding data. If you find a partner that would be interested in such a project, we will be happy to support you in the definition of the project together with the partner and also, for example, with setting up a non-disclosure agreement for the provided data.
- **Look for an interesting dataset on the Internet** and define yourself a project based on this dataset. However, we would very much recommend you to choose one of the before mentioned options. With datasets from the Internet (e.g. from Kaggle competitions) your main challenge is typically limited to optimizing the model with an already prepared dataset. However, in practice the challenge is more often to construct the right training and validation datasets and construct the right features.

## General Comments

- For a text classification task usually a few hundred labeled cases are already sufficient.
- Daily sales or usage data is also always interesting, you can then try to predict solely based on the given characteristics of a day and the sales before this day (which week of the day, beginning/end of the month, during holidays, sales on the same day a week earlier, sales on the day before, and many more). Minimum for such time series analyses is around 1000 cases (i.e. about 3 years).
- Considering the work with images it is also an option for a project to take a set of maybe just 100 unlabeled images with similar objects and generate new images from these using a Generative Adversarial Network (GAN).

## Data Resources



Time Series Prediction >

Lehren und Lernen mit KI

Archive >

#### EVENTS

Coding.Waterkant 2023

Prototyping Week

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ML Statistics

# Requirements


**In order to receive ECTS** for a course you have to **complete a machine learning project in a team** with a maximum of 4 participants and miss less than 2 sessions of the course.

Usually the project starts in the middle of the course, the exact date may depends on the course. It will be discussed in the first sessions

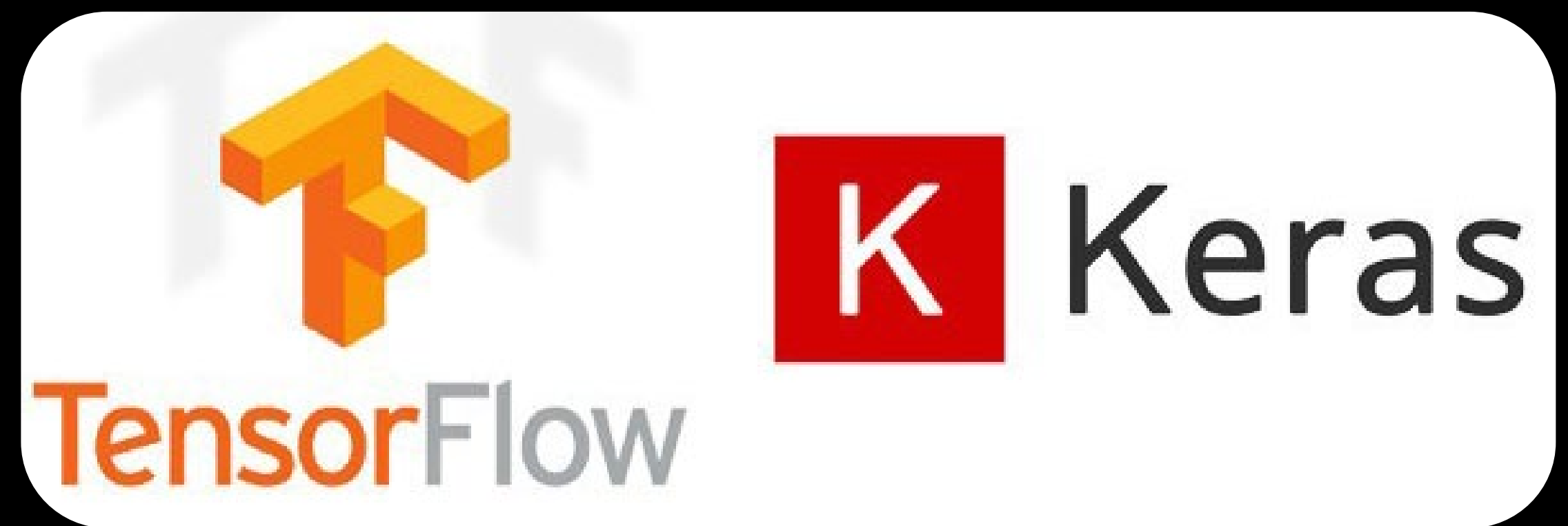
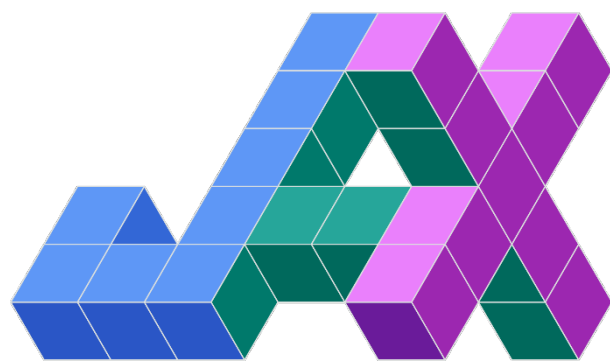
 This is a general page. Projects may varies slightly in each course.  
If your course instructor is giving you different information, please follow those.

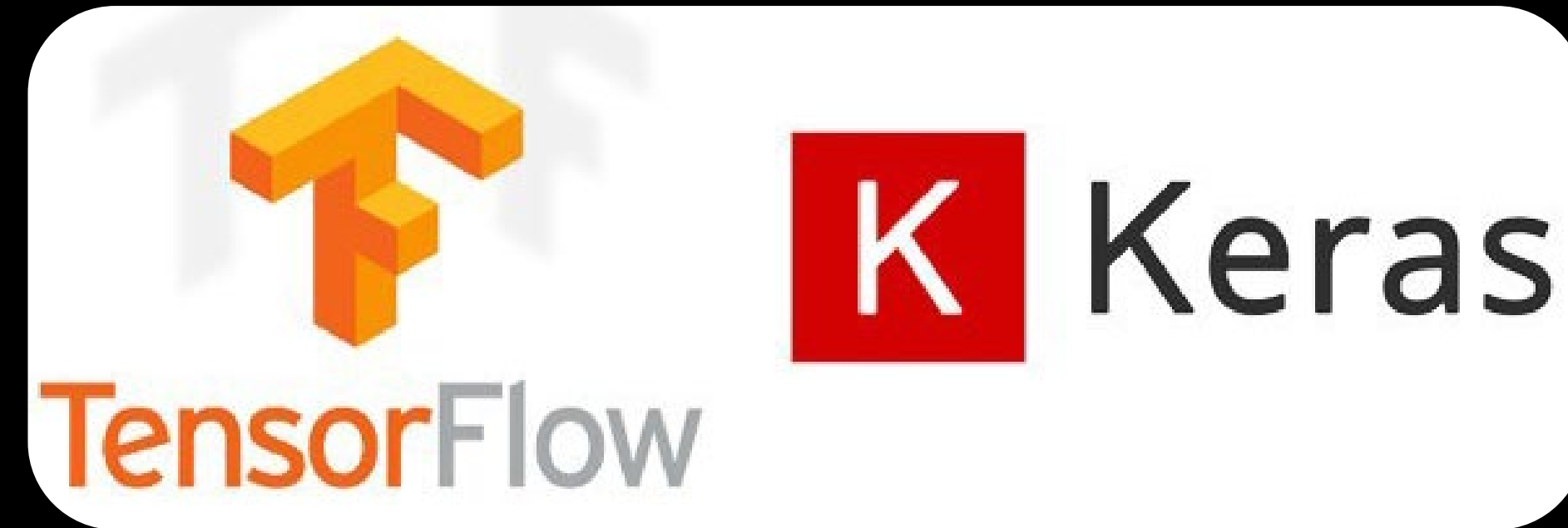
The requirements are:

1. The Code, which should include
  - the python code (notebook .ipynb or .py are accepted)
  - comments to make the code clear and readable
  - the definition of the environment (dependencies)
  - text explaining the project divided in sections (Introduction, Data and Methods, Results, Baseline)
2. The project has to be presented in class during the last sessions.  
This can be done during the class or a short video can be recorded. For example, a screen recording of the notebook with an explanation of the project, the code and the results would work.  
The length of the presentation and/or the video will be discussed in each course, it usually is around 15 minutes.

 If you do not specify anything, we will release the code in our repository alongside with the other projects. If you want, you can add a statement that the code is released as open source software and a license which explains how the code can be re-used.  
The data you use in your project can remain private if you wish.

PYTORCH





- **Feb 2017:**      **TensorFlow 1.0 (Estimator API)**
- **Nov 2017:**      **TensorFlow 1.4 (Estimator API, Keras API)**
- **Jan 2019:**      **TensorFlow 2.0 (Estimator API, Keras API)**

# DEVELOPMENT ENVIRONMENTS



Google Colaboratory



Visual Studio Code



**PyCharm**

# TASKS UNTIL NEXT WEEK

- Completion of the learning material of week 1 and 2 of the course "introduction to TensorFlow"
- Complete Exercises 1 and 2 of the above course
  - Who presents?
- Bring questions!