10.11.20

*Machine Learning
With TensorFlow*

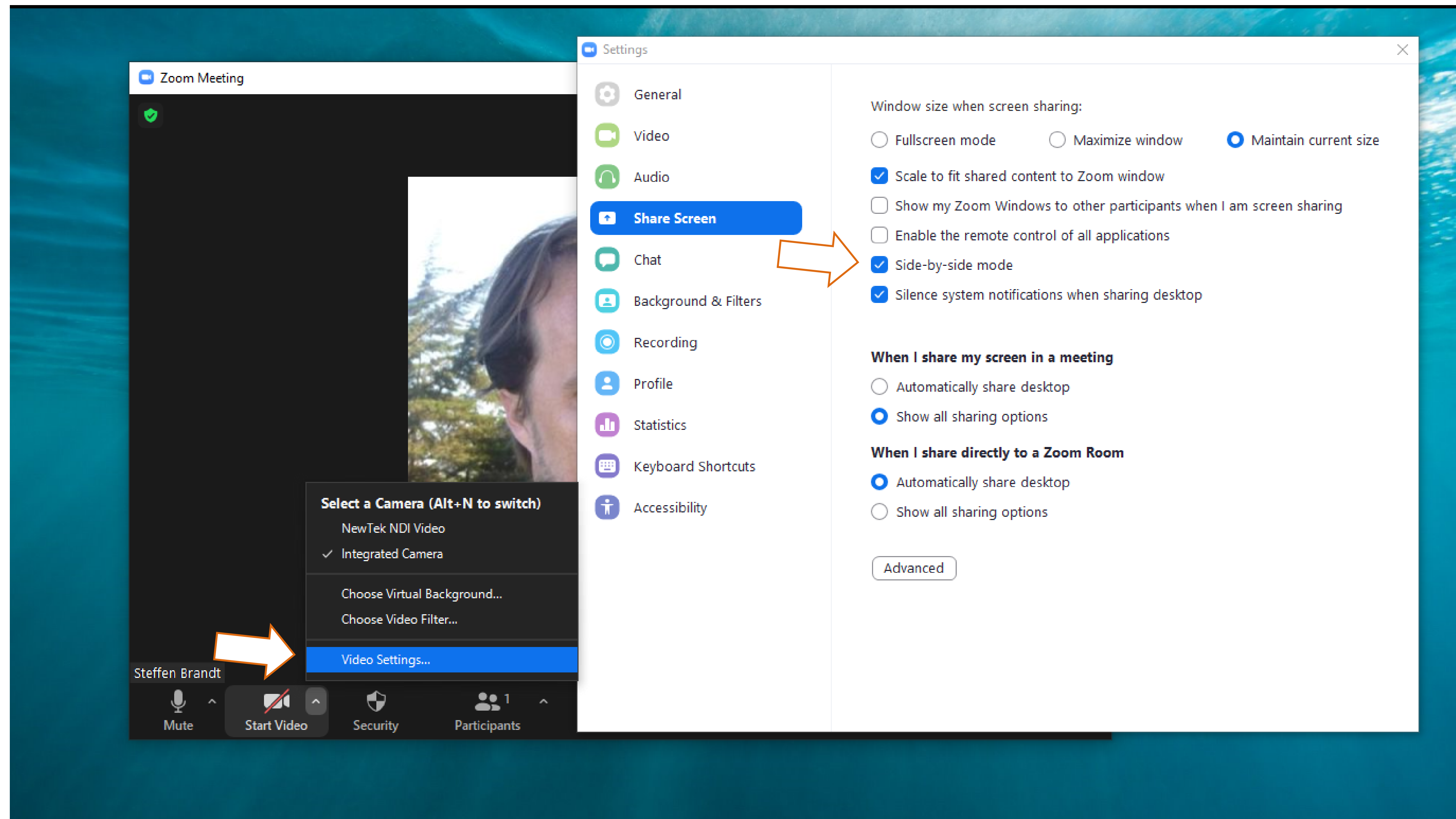# Introduction to Neural Nets and Tools

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- **Zoom/ Mattermost/ Gitbook**

- **Introductory Discussion on AI**

- **Coursera**

- **Google Colab**

- **Neural Net Basics**

- **TensorFlow**

- **Course Projects**

- **Use your real names in the zoom meetings!**

- **Complete your mattermost profile with your name and if possible also a foto**

- **Please write me if you will not go on with the course!**

- **Zoom**

- **Mattermost**

- **Gitbook**

Week 1 - Introduction to Neural Nets

This week you will...

- get a basic introduction to neural nets in order to get an intuition for the technical terms used in training them
- get an introduction to the tools that we use during the course and that you will need for your practical project

Learning Resources

- Presentation of this weeks session (will be uploaded after the session)
- Video Neural Networks Explained (12 minutes)
- Introductory course on Python from Kaggle

Until next week you should...

- register for the opencampus.sh program at Coursera (you will get an invitation link from opencampus.sh to do so) and enroll for the course Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning
- complete week 1 and week 2 of the course Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning, including the provided assignments

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What is an Artificial Intelligence?

- **Short introductory round**

- **Discussion**

- **Presentation of a proposal**

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"What's the difference between data science, machine learning, and artificial intelligence?"

(http://varianceexplained.org/r/ds-ml-ai)

Data science produces insights.

Machine learning produces predictions.

Artificial intelligence produces actions.

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ARTIFICIAL INTELLIGENCE

„an autonomous agent executes or recommends actions"

(Poole, Mackworth, & Goebel, 1998)

„ Systems with 'intelligent' behavior that analyze their environment and act with a certain degree of autonomy to achieve certain goals. "

(European Commission, 2018)

„By artificial intelligence we mean highly developed software systems that are capable of learning and training to master complex tasks. "

(AI-Strategy of the State Schleswig-Holstein, 2019)

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05. 11. **18:00-20:00**	**SEMESTER OPENING** Online	

10. 11. **16:00-17:45**	**INTRODUCTION TO NEURAL NETS AND TOOLS USED DURING THE COURSE** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
17. 11. **16:00-17:45**	**INTRODUCTION TO TENSORFLOW FOR AI, MACHINE LEARNING, AND DEEP LEARNING, PART I** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
24. 11. **16:00-17:45**	**INTRODUCTION TO TENSORFLOW FOR AI, MACHINE LEARNING, AND DEEP LEARNING, PART II** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
01. 12. **16:00-17:45**	**CONVOLUTIONAL NEURAL NETWORKS, PART I** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
08. 12. **16:00-17:45**	**CONVOLUTIONAL NEURAL NETWORKS, PART II** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark

15. 12. **16:00-17:45**	**NATURAL LANGUAGE PROCESSING, PART I** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
22. 12. **16:00-17:45**	**NATURAL LANGUAGE PROCESSING, PART II** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
05. 01. **16:00-17:45**	**SEQUENCES, TIME SERIES AND PREDICTION, PART I** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
12. 01. **16:00-17:45**	**SEQUENCES, TIME SERIES AND PREDICTION, PART II** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
19. 01. **16:00-17:45**	**SPECIAL ISSUES CONSIDERING YOUR FINAL PROJECTS** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark
26. 01. **16:00-17:45**	**PRESENTATION OF THE FINAL PROJECTS** Zoom + Starterkitchen, Kuhnkestraße 6, Wissenschaftspark

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Option 1

You use the free Coursera for Campus course from opencampus.sh

✕

ZERTIFIKAT ÜBER BERUFLICHE QUALIFIKATION

DeepLearning.AI TensorFlow Developer

von

🌀 deeplearning.ai

Kostenlos anmelden
Beginnt am 10. Nov.

🔖 Für spätere Verwendung speichern

Sie können **1 Kurs absolvieren**

Gesponsort von OPENCAMPUS

Über dieses Zertifikat über berufliche Qualifikation

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.

Looking for more advanced TensorFlow content? Check out the new **TensorFlow: Data and Deployment Specialization**.

🔲 **Zertifikat zur Vorlage**
Erhalten Sie nach Abschluss ein Zertifikat

🌐 **Kurse, die komplett online stattfinden**
Beginnen Sie sofort und lernen Sie in Ihrem eigenen Tempo.

🗓 **Flexibler Zeitplan**
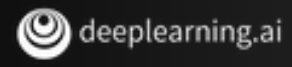Festlegen und Einhalten flexibler Termine.

📊 **Stufe „Mittel"**
Einige einschlägige Kenntnisse erforderlich.

💬 **Englisch**
Untertitel: Englisch, Französisch, Portugiesisch (Brasilien), Russisch, Türkisch, Spanisch, Japanisch, Koreanisch

Kurse in Zertifikat über berufliche Qualifikation

About   How It Works   Courses   Instructors   Enrollment Options   FAQ

COURSE

1

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

★★★★½ **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

★★★★½ **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

★★★★½ **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

★★★★½ **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.

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coursera

A new programming paradigm

Weekly Exercise - Your First Neural Network

📖 **Lesevorgang:** Introduction to Google Colaboratory
10 min

</> Get started with Google Colaboratory (Coding TensorFlow)
4 min

▢ **Labor:** Exercise 1 (Housing Prices)
1 h

</> **Programmierungsaufgabe:** Exercise 1 (Housing Prices)
3 S

📖 **Lesevorgang:** Week 1 Resources
10 min

Optional: Ungraded Google Colaboratory environment

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

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Option 2

You use the *Audit* mode in your personal Coursera program

About   How It Works   Courses   Instructors   Enrollment Options   FAQ

COURSE

1

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SHOW ALL

COURSE

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SHOW ALL

COURSE

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SHOW ALL

COURSE

4

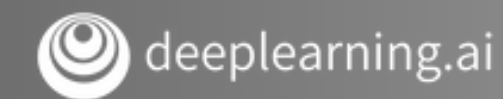### Sequences, Time Series and Prediction

★★★★★ **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.

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Blättern › **Datenverarbeitung** › **Maschinelles Lernen**

von

Dieser Kurs ist Teil der Spezialisierung **DeepLearning.AI TensorFlow Developer Zertifikat über berufliche Qualifikation**

🌀 deeplearning.ai

Convolutional Neural Networks in TensorFlow

⭐⭐⭐⭐⭐ **4.7** 5.658 Bewertungen | 👍 97 %

👤 Laurence Moroney

Kostenlos anmelden
Beginnt am 10. Nov.

Testen Sie unser Angebot kostenlos: Melden Sie sich an, um Ihren 7-tägigen kostenlosen Testzeitraum mit vollem Zugriff zu starten.
Finanzielle Unterstützung verfügbar

78.579 bereits angemeldet

Info   Die Dozenten   Lehrplan   Bewertungen   Anmeldeoptionen   Häufig gestellte Fragen

Über diesen Kurs
380.595 kürzliche Aufrufe

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.

In Course 2 of the deeplearning.ai TensorFlow Specialization, you will learn advanced techniques to improve the computer vision model you

Alle anzeigen

WAS SIE LERNEN WERDEN
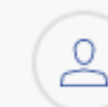
✓ Handle real-world image data   ✓ Plot loss and accuracy

	Karriereergebnisse der Lernenden
💲 **11%**	erhalten Sie eine Gehaltserhöhung oder Beförderung

📋 **Zertifikat zur Vorlage**
Erhalten Sie nach Abschluss ein Zertifikat

🌐 **100 % online**
Beginnen Sie sofort und lernen Sie in Ihrem eigenen

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Suchen

Was möchten Sie lernen?

Für Unternehmen | Für Kursteilnehmer

Steffen Brandt (priv...

Blättern > Datenverarbeitung > Maschinelles Lernen

von

Dieser Kurs ist Teil der Spezialisierung DeepLearning.AI TensorFlow Developer Zertifikat über berufliche Qualifikation

Convolutional Neura TensorFlow

★★★★½ **4.7** 5.658 Bewertungen | 👍 97 %

👤 Laurence Moroney

Kostenlos anmelden
Beginnt am 10. Nov.

78.579 bereits angemeldet

Testen Sie
Sie sich a
Testzeitra
Finanzielle Unte

Info   Die Dozenten   Lehrplan   Bewertung

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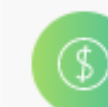
Alle anzeigen

7-tägiger kostenloser Testzeitraum

Convolutional Neural Networks in TensorFlow ist Teil der größeren DeepLearning.AI TensorFlow Developer Zertifikat über berufliche Qualifikation. Ihr 7-tägiger kostenloser Testzeitraum beinhaltet:

✓ **Unbegrenzter Zugriff auf alle Kurse dieses Zertifikats**
Sehen Sie sich Vorträge an, testen Sie Aufgaben, nehmen Sie an Diskussionen in Foren teil und mehr.

✓ **Sie können jederzeit kündigen.**
Keine Strafen – Kündigen Sie einfach vor Ende des Testzeitraums, wenn es nicht das Richtige für Sie ist.

✓ **41 € im Monat, um nach Ende des Testzeitraums weiter zu lernen**
Versuchen Sie, Kurse so schnell wie möglich abzuschließen – je schneller Sie sind, desto mehr sparen Sie.

✓ **Bei Abschluss eines Kurses erhalten Sie ein Zertifikat.**
Geben Sie dieses in Ihrem Lebenslauf oder in LinkedIn an.

Starten Sie Ihren kostenlosen Testzeitraum

Audit diesen Kurs

---

arriereergebnisse der Lernenden

11% erhalten Sie eine Gehaltserhöhung oder Beförderung

🏅 **Zertifikat zur Vorlage**
Erhalten Sie nach Abschluss ein Zertifikat

🌐 **100 % online**
Beginnen Sie sofort und lernen Sie in Ihrem eigenen

WAS SIE LERNEN WERDEN

✓ Handle real-world image data   ✓ Plot loss and accuracy
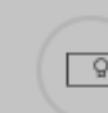
Introduction

Larger Dataset

Weekly Exercise- Attempt the cats vs. dogs Kaggle challenge!

🔒 **Labor:** Exercise 1 - Cats vs. Dogs
1 h

🔒 **Programmierungsaufgabe:** Exercise 1 - Cats vs. Dogs
3 S

Optional: Ungraded Google Colaboratory environment

↗ **Nicht bewertetes externes Tool:** Exercise 1 - Cats vs. Dogs
1 h

Exercise 1 - Cats vs. Dogs

This is the same exercise and notebook as provided <u>here</u>. This button below will take you to the Google Colaboratory environment, in case you would like to use it to follow along with the course videos. In order to pass the graded item, you will still need to submit your work via the Coursera-hosted Jupyter Notebook.

This week you explored a reduced version of the Cats v Dogs dataset and used it to train a convolutional neural network. You saw that it overfit very quickly, despite great results with the training set. One solution to overfitting is to use more data for both training and validation, and that's this week's exercise -- to build a classifier using the full Cats v Dogs dataset of 25k images!

Note again that when loading the images, you might get warnings about EXIF data being missing or corrupt. Don't worry about this -- it is missing data in the images, but it's not visual data that will impact the training.

Let's start building a classifier using the full Cats v Dogs dataset of 25k images.

In diesem Kurs wird ein Drittanbieter-Tool, Exercise 1 - Cats vs. Dogs, verwendet, um Ihr Lernerlebnis zu verbessern. Über das Tool werden keine personenbezogenen Daten weitergegeben.

☑ Ich bin einverstanden, dieses Tool verantwortungsbewusst einzusetzen.

[↗ Tool öffnen]

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Welcome To Colaboratory

File   Edit   View   Insert   Runtime   Tools   Help

+ Code   + Text   Copy to Drive   Connect ▾   Editing

Getting Started

The document you are reading is a Jupyter notebook, hosted in Colaboratory. It is not a static page, but an interactive environment that lets you write and execute code in Python and other languages.

For example, here is a **code cell** with a short Python script that computes a value, stores it in a variable, and prints the result:

```
[ ]  seconds_in_a_day = 24 * 60 * 60
     seconds_in_a_day
```

86400

To execute the code in the above cell, select it with a click and then either press the play button to the left of the code, or use the keyboard shortcut "Command/Ctrl+Enter".

All cells modify the same global state, so variables that you define by executing a cell can be used in other cells:

```
[ ]  seconds_in_a_week = 7 * seconds_in_a_day
     seconds_in_a_week
```

604800

For more information about working with Colaboratory notebooks, see Overview of Colaboratory.

- **Checkout [this](#) tutorial on Medium**

Setup Hardware Accelerator GPU in Colab

Steps to setup GPU:

- Go to Runtime → Change runtime type.

- Select "**GPU**" from the popup

Notebook settings

Hardware accelerator

[GPU   ⌄] ⑦

To get the most out of Colab, avoid using
a GPU unless you need one. Learn more

☐ Omit code cell output when saving this notebook

CANCEL   SAVE
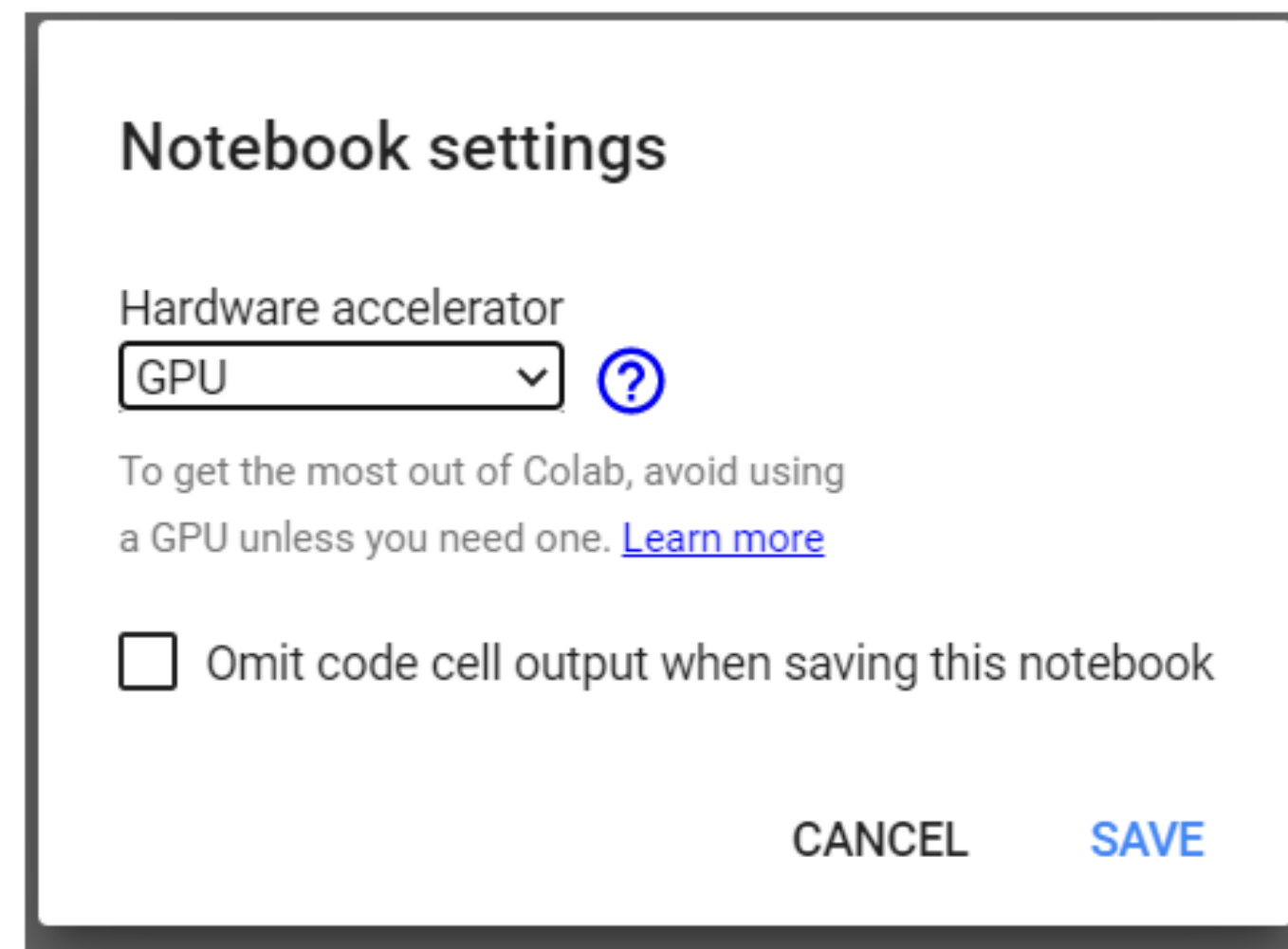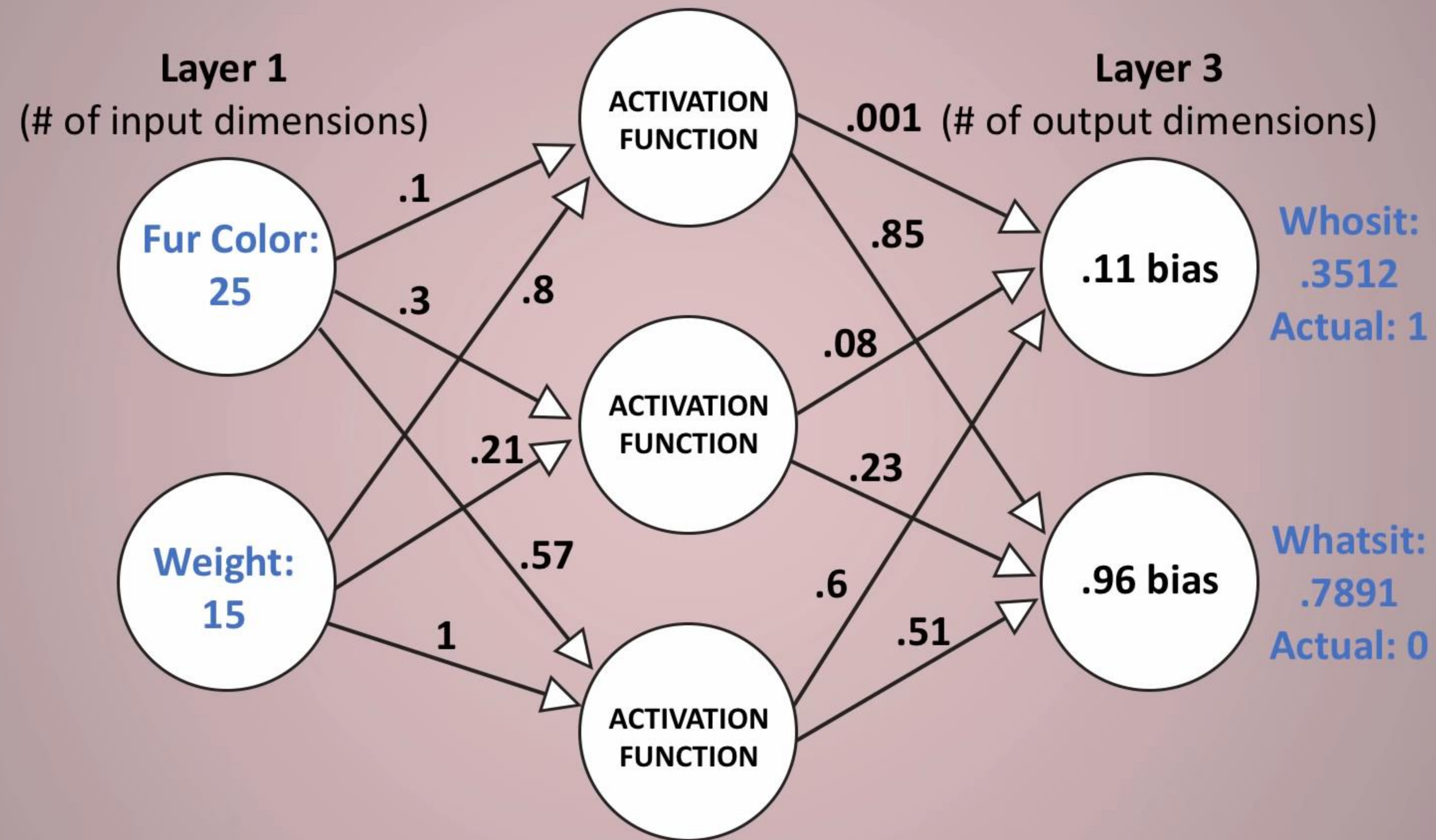
Figure 14: Screenshot of GPU's accelerator selection.

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)

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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)**

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Course Projects

There are different options:

- Your own data and project

- Pick a challenge from the list in **Gitbook**

- Talk to a company or a chair at your local higher education institutions for possible projects

- Look for a dataset on the Internet and define a challenge

Powered by GitBook

Possible Projects

You are very welcome to bring your own data and project idea to a course. Simply talk to your course lead about your idea and the goal of the project until the end of the semester.

Further, we are offering a list of possible projects with corresponding datasets, you can use as project (see table below). Please, also talk to your course lead if you want to work on oe of these challenges as your course project.

A further option is that you talk to local companies or chairs at your local higher education institutions if they are interested in a machine learning protoytpe 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.

A final option is that you 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 Interenet (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.

Title	Description	Dataset
	On a good surfing day for a particular surf spot, the number of pageviews on the site with the forecasts for that spot usually increases. The number of pageviews shall be used as a proxy for the quality of	Weather station data of 7 popular surf spots (Kiel Lighthouse, Skt. Peter-Ording, Warnemünde, Port Said Airport

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Requirements

In order to receive ECTS for a course you have to complete a machine learning project by yourself or preferably in a team with a maximum of 4 participants.

Typically the project work starts in the middle of the course.

The requirement for this semester are:

1. Presentation of a detailed Jupyter Notebook with code and comment
   - including the definition of the environment
   - including required sections (Introduction, Data and Methods, Results, Baseline)
2. A small video, accompanying, for example, a screen recording of the notebook with an explanation of the challenge of the project, the used approach, and the results.
3. A statement that the code is released as open source software.
   The data you use in your project can remain private if you wish.

Details about the requirements of the project will additionally be discussed in the course.

Please ask about whatever may be unclear, preferably before you start the project.

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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**

❑ **Bring questions considering the learning content**

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