

# Deep Learning Adventures

## TensorFlow In Practice -

### Presentation 7

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How to prepare for and pass the TensorFlow Developer  
Certificate 

George Zoto

<https://www.meetup.com/Deep-Learning-Adventures>

# In the beginning...

meetup



About Events Members Photos Discussions More

## What we're about

Deep Learning Adventures is a welcoming group for anyone interested in learning more about deep learning, its foundations, its strengths and weaknesses and ever growing applications that best serve humanity and help those in need throughout the world. After participating in hundreds of meetups in the area, we have taken many lessons learned and incorporated them into this group. This group is also startup oriented in the sense that we are open minded and ready to pivot to new directions as our community and needs around the world guide us....

[Read more](#)

## Upcoming events (1)

[See all](#)

FRI, JUL 10, 7:30 PM EDT

### How to prepare for and pass the TensorFlow Developer Certificate



Online event

Join us for our 11th adventure in Deep Learning! Just bring your curiosity and get ready to meet our growing community! Join Zoom Meeting: <https://us02web.zoom.us/j/84402592502?...>



1

Attend

## Deep Learning Adventures

Washington, DC  
413 members · Public group  
Organized by George Z. and 2 others

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...

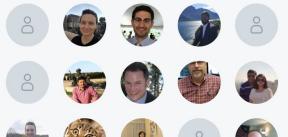
## Organizers



George Z. and 2 others  
[Message](#)

## Members (413)

[See all](#)



## Introduction to Deep Learning TensorFlow

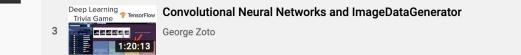


▶ PLAY ALL

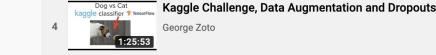
Introduction to Deep Learning TensorFlow  
George Zoto



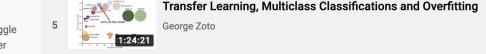
Convolutional Neural Networks TensorFlow  
George Zoto



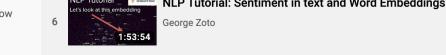
Convolutional Neural Networks and ImageDataGenerator  
George Zoto



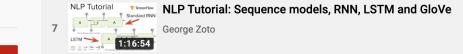
Kaggle Challenge, Data Augmentation and Dropouts  
George Zoto



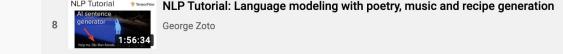
Transfer Learning, Multiclass Classifications and Overfitting  
George Zoto



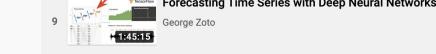
NLP Tutorial: Sentiment in text and Word Embeddings  
George Zoto



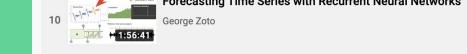
NLP Tutorial: Sequence models, RNN, LSTM and GloVe  
George Zoto



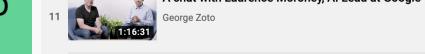
NLP Tutorial: Language modeling with poetry, music and recipe generation  
George Zoto



Forecasting Time Series with Deep Neural Networks  
George Zoto



Forecasting Time Series with Recurrent Neural Networks  
George Zoto



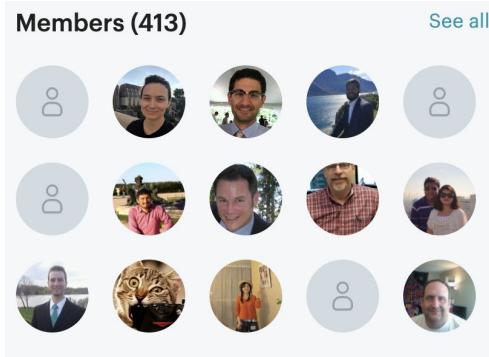
A chat with Laurence Moroney, AI Lead at Google  
George Zoto



Deep learning Adventures | Specialization and Tensorflow Developer Certificate  
George Zoto

Meetup Link | GitHub repository | Join us on Slack | Need a refresher or new to Deep Learning? | YouTube recordings of all our Meetups 😊 <https://bit.ly/deep-learning-tf>

# Get to know our community



Hello, my name is \_\_\_\_\_ and I am a new/regular member of this meetup.

I enjoy \_\_\_\_\_ and I am interested in learning more about \_\_\_\_\_

Training set 😊

Hello, my name is **George** and I am a **regular** member of this meetup. I enjoy **applying deep learning to solve interesting problems** and I am interested in learning more about **time series and forecasting**.

# Attribution to Coursera and deeplearning.ai



A screenshot of the deeplearning.ai website homepage. The header features the deeplearning.ai logo and a navigation menu with links for "Courses", "Workers", "The Batch", "Events", "Forums", "Blog", and "Company". The main section has a dark background with the text "Break Into AI" in large white letters. Below it, a paragraph reads: "Whether you want to build algorithms or build a company, deeplearning.ai's courses will teach you key concepts and applications of AI." A red button at the bottom says "Take the Deep Learning Specialization". To the right, there's a graphic of a laptop screen showing a neural network interface titled "Art Generation with Deep Learning". It displays three images: a "Content Image" of the Golden Gate Bridge, a "Style Image" of a colorful painting, and a "Generated Image" which is a composite of both, showing the bridge in the style of the painting. The deeplearning.ai logo is in the bottom right corner of the generated image.

Source:

<https://www.coursera.org/about/terms>  
<https://www.coursera.org/>  
<https://www.deeplearning.ai/>

# TensorFlow: An end-to-end open source machine learning platform

[TensorFlow](#) [Install](#) [Learn](#) [API](#) [Resources](#) [Community](#) [Why TensorFlow](#) [Search](#) [English](#) [GitHub](#) [Sign in](#)

## Solutions to common ML problems

Simple step-by-step walkthroughs to solve common ML problems with TensorFlow.



For beginners

### Your first neural network

Train a neural network to classify images of clothing, like sneakers and shirts, in this fast-paced overview of a complete TensorFlow program.



For experts

### Generative adversarial networks

Train a generative adversarial network to generate images of handwritten digits, using the Keras Subclassing API.

Find | Compare

TensorFlow  
Software

Keras  
Search term

PyTorch  
Computer application

+ Add comparison

United States

Past 12 months

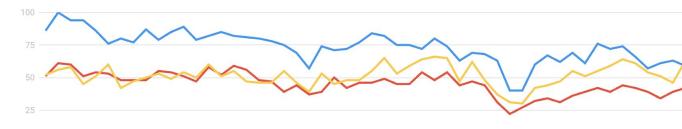
All categories

Web Search

LEARN MORE

Interest over time

Average



Source: <https://www.tensorflow.org/>

# Chapter 1 - TensorFlow in Practice Specialization

## About this Specialization

199,621 recent views

Discover the tools software developers use to build scalable AI-powered algorithms in TensorFlow, a popular open-source machine learning framework.

In this four-course Specialization, you'll explore exciting opportunities for AI applications. Begin by developing an understanding of how to build and train neural networks. Improve a network's performance using convolutions as you train it to identify real-world images. You'll teach machines to understand, analyze, and respond to human speech with natural language processing systems. Learn to process text, represent sentences as vectors, and input data to a neural network. You'll even train an AI to create original poetry!

AI is already transforming industries across the world. After finishing this Specialization, you'll be able to apply your new TensorFlow skills to a wide range of problems and projects.

Looking for more advanced TensorFlow content? Check out the new [TensorFlow: Data and Deployment Specialization](#).

# Chapter 1 - TensorFlow in Practice Specialization

There are 4 Courses in this Specialization

COURSE

1

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

★★★★★ 4.7 6,196 ratings • 1,282 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](#)



6 hours to complete

### A New Programming Paradigm

Welcome to this course on going from Basics to Mastery of TensorFlow. We're excited you're here! In week 1 you'll get a soft introduction to what Machine Learning and Deep Learning are, and how they offer you a new programming paradigm, giving you a new set of tools to open previously unexplored scenarios. All you need to know is some very basic

[SEE ALL](#)



4 videos (Total 16 min), 5 readings, 3 quizzes [SEE ALL](#)

COURSE

2

## Convolutional Neural Networks in TensorFlow

★★★★★ 4.7 2,751 ratings • 410 reviews

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[SHOW ALL](#)



7 hours to complete

### Introduction to Computer Vision

Welcome to week 2 of the course! In week 1 you learned all about how Machine Learning and Deep Learning is a new programming paradigm. This week you're going to take that to the next level by beginning to solve problems of computer vision with just a few lines of code!

[SEE ALL](#)



7 videos (Total 15 min), 6 readings, 3 quizzes [SEE ALL](#)

COURSE

3

## Natural Language Processing in TensorFlow

★★★★★ 4.6 2,037 ratings • 277 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](#)



8 hours to complete

### Enhancing Vision with Convolutional Neural Networks

Welcome to week 3! In week 2 you saw a basic Neural Network for Computer Vision. It did the job nicely, but it was a little naive in its approach. This week we'll see how to make it better, as discussed by Laurence and Andrew here.

[SEE ALL](#)



9 hours to complete

### Using Real-world Images

Last week you saw how to improve the results from your deep neural network using convolutions. It was a good start, but the data you used was very basic. What happens when your images are larger, or if the features aren't always in the same place? Andrew and Laurence discuss this to prepare you for what you'll learn this week: handling complex images!

[SEE ALL](#)

COURSE

4

## Sequences, Time Series and Prediction

★★★★★ 4.6 1,374 ratings • 223 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](#)

Source: <https://www.coursera.org/specializations/tensorflow-in-practice>

# TensorFlow in Practice Specialization

## Prerequisites

- Programming in Python
- High school level math

## Helpful but not required

- Basic linear algebra and calculus
- Basic deep learning concepts

# Setup



Colaboratory is a free Jupyter notebook environment that requires no setup and runs entirely in the cloud. You can write and execute code, save and share your analyses, and access powerful computing resources, all for free from your browser.

<https://colab.research.google.com>

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# TensorFlow Developer Certificate

## Part 1

- Overview and how to prepare
- Exam Content
- Deep Learning Adventures YouTube playlist and GitHub repository

## Part 2

- PyCharm and environment setup
- GCP and AWS deep learning virtual machines

## Part 3

- Tips and tricks

# Overview and how to prepare



## Differentiate yourself with the TensorFlow Developer Certificate

Demonstrate your proficiency in using TensorFlow to solve deep learning and ML problems. Get recognized for your skills and join our [Certificate Network](#).

[Review Candidate Handbook](#)



## Benefits

- ✓ **Learn something new.** Increase your proficiency in machine learning, and test your abilities with the TensorFlow assessment exam.
- ✓ **Receive community recognition.** Be recognized by others in the global TensorFlow community.
- ✓ **Showcase your skills.** Share your certificate on your resume and social networking platforms like LinkedIn to be recognized as a top candidate for recruiters seeking entry-level TensorFlow developers.
- ✓ **Find TensorFlow talent.** See who is a certificate holder in our [Certificate Network](#), and find help for your machine learning tasks.

## Who is the TensorFlow Certificate for?

This level one certificate exam tests a developer's foundational knowledge of integrating machine learning into tools and applications. The certificate program requires an understanding of building TensorFlow models using Computer Vision, Convolutional Neural Networks, Natural Language Processing, and real-world image data and strategies.

# Overview and how to prepare

Google Developers Certification

Search

English

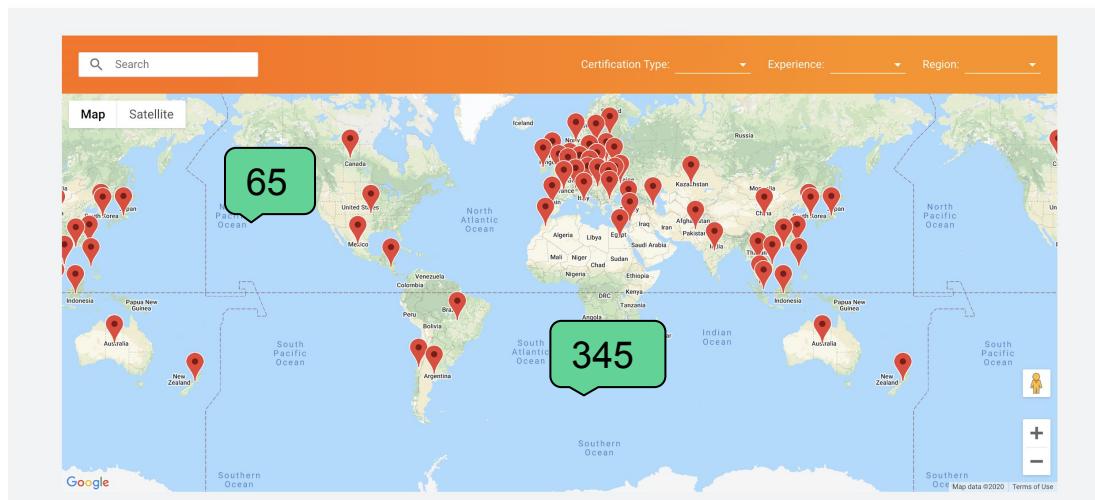


Take the TensorFlow certificate exam to get recognition for your machine learning and deep learning skills.

Learn more

## TensorFlow Certificate Network

Find TensorFlow Developers who have passed the certification exam to help you with your machine learning and deep learning tasks. This level one certificate exam tests a developer's foundational knowledge of integrating machine learning into tools and applications. The certificate program requires an understanding of building TensorFlow models using Computer Vision, Convolutional Neural Networks, Natural Language Processing, and real-world image data and strategies. You can learn more about this certificate program on [our website](#).



Source: <https://developers.google.com/certification/directory/tensorflow>

## TensorFlow Education Stipend

We believe strongly in widening access to people of diverse backgrounds, experiences, geographies, and perspectives to transform the way machine learning and its applications evolve. We're excited to offer a limited number of stipends for the educational material and/or the exam cost in order to achieve this.

[Learn more →](#)

## TensorFlow Developer Certificate program overview

Exam | \$100 USD

# Overview and how to prepare

## How it works

### Step 1

Review our [Candidate Handbook covering exam criteria and FAQs](#). Optional: Take the [deeplearning.ai TensorFlow in Practice Specialization](#). This is strongly recommended in order to prepare for the exam.

### Step 2

**Register for the exam.** Log in with a Gmail Account (if you don't have one, you can create one during the login process), upload your picture ID (such as a driver's license or passport), and provide payment information.

### Step 3

**Prepare your exam environment.** Install the TensorFlow Exam plugin using the PyCharm IDE. More details can be found [here](#).

### Step 4

**Take and submit the exam.** Sign in and take the exam at any time. You will have a maximum of five hours to complete the exam.

### Step 5

**Receive your TensorFlow Certificate.** After you have submitted your exam it will be graded, and you will be able to review the status of your submission on your Candidate Portal within 24 hours.

### Step 6

**Share your expertise with your community.** You can add the certificate and badge to your resume and public profiles, including GitHub, LinkedIn, Twitter, and join our [Certificate Network](#) to help recruiters find ML professionals like you.

# Overview and how to prepare

In order to successfully take the exam, test takers should be comfortable with:

- Foundational principles of ML and Deep Learning
- Building ML models in TensorFlow 2.x
- Building image recognition, object detection, text recognition algorithms with deep neural networks and convolutional neural networks
- Using real-world images in different shapes and sizes to visualize the journey of an image through convolutions to understand how a computer “sees” information, plot loss and accuracy
- Exploring strategies to prevent overfitting, including augmentation and dropouts
- Applying neural networks to solve natural language processing problems using TensorFlow

# Overview and how to prepare

## Don't feel ready to take the exam?

If you don't have the background above, take the [deeplearning.ai TensorFlow in Practice Specialization](#) on Coursera or the [Intro to TensorFlow for Deep Learning](#) course on Udacity to prepare for the exam. These courses require:

- Introductory Python programming skills
- Prior machine learning or deep learning knowledge is helpful, but not required
- A mathematical background in linear algebra, probability, statistics and calculus is helpful, but not required

Not there yet? [Other resources are available](#) to get you up-to-speed.

The screenshot shows the TensorFlow in Practice Specialization page on Coursera. It includes the course title, a 4.7 rating with 16,877 reviews, a 'Share' button, a profile picture of Laurence Moroney, an 'Enroll for Free' button (starts May 26), and a count of 48,828 already enrolled. The page also features sections for 'WHAT YOU WILL LEARN' and 'LEARNER CAREER OUTCOMES'.

The screenshot shows the Intro to TensorFlow for Deep Learning course page. It features the course title, a 'FREE COURSE' badge, a brief description, and a 'START FREE COURSE' button. Below the course title, there is a section titled 'LEARNER CAREER OUTCOMES' with statistics: 40% started a new career and 12% got a pay increase or promotion.

Source: <https://www.tensorflow.org/certificate> <https://www.tensorflow.org/resources/learn-ml>



**Coding skills:** Building ML models involves much more than just knowing ML concepts—it requires coding in order to do the data management, parameter tuning, and parsing results needed to test and optimize your model.



**Math and stats:** ML is a math heavy discipline, so if you plan to modify ML models or build new ones from scratch, familiarity with the underlying math concepts is crucial to the process.



**ML theory:** Knowing the basics of ML theory will give you a foundation to build on, and help you troubleshoot when something goes wrong.



**Build your own projects:** Getting hands on experience with ML is the best way to put your knowledge to the test, so don't be afraid to dive in early with a simple [colab](#) or [tutorial](#) to get some practice.

## Books

### Multi-part online courses

### Other resources

### Math concepts

### Human-centered AI



# Exam Content

## (1) Build and train neural network models using TensorFlow 2.x

You need to understand the foundational principles of machine learning (ML) and deep learning (DL) using TensorFlow 2.x. You need to know how to:

- Use TensorFlow 2.x.
- Build, compile and train machine learning (ML) models using TensorFlow.
- Preprocess data to get it ready for use in a model.
- Use models to predict results.
- Build sequential models with multiple layers.
- Build and train models for binary classification.
- Build and train models for multi-class categorization.
- Plot loss and accuracy of a trained model.
- Identify strategies to prevent overfitting, including augmentation and dropout.
- Use pretrained models (transfer learning).
- Extract features from pre-trained models.
- Ensure that inputs to a model are in the correct shape.
- Ensure that you can match test data to the input shape of a neural network.
- Ensure you can match output data of a neural network to specified input shape for test data.
- Understand batch loading of data.
- Use callbacks to trigger the end of training cycles.
- Use datasets from different sources.
- Use datasets in different formats, including json and csv.
- Use datasets from tf.data.datasets.

## (2) Image classification

You need to understand how to build image recognition and object detection models with deep neural networks and convolutional neural networks using TensorFlow 2.x. You need to know how to:

- Define Convolutional neural networks with Conv2D and pooling layers.
- Build and train models to process real-world image datasets.
- Understand how to use convolutions to improve your neural network.
- Use real-world images in different shapes and sizes..
- Use image augmentation to prevent overfitting.
- Use ImageDataGenerator.
- Understand how ImageDataGenerator labels images based on the directory structure.



# Exam Content

## (3) Natural language processing (NLP)

You need to understand how to use neural networks to solve natural language processing problems using TensorFlow. You need to know how to:

- Build natural language processing systems using TensorFlow.
- Prepare text to use in TensorFlow models.
- Build models that identify the category of a piece of text using binary categorization
- Build models that identify the category of a piece of text using multi-class categorization
- Use word embeddings in your TensorFlow model.
- Use LSTMs in your model to classify text for either binary or multi-class categorization.
- Add RNN and GRU layers to your model.
- Use RNNS, LSTMs, GRUs and CNNs in models that work with text.
- Train LSTMs on existing text to generate text (such as songs and poetry)

## (4) Time series, sequences and predictions

You need to understand how to solve time series and forecasting problems in TensorFlow. You need to know how to:

- Train, tune and use time series, sequence and prediction models.
- Prepare data for time series learning.
- Understand Mean Average Error (MAE) and how it can be used to evaluate accuracy of sequence models.
- Use RNNs and CNNs for time series, sequence and forecasting models.
- Identify when to use trailing versus centred windows.

- Use TensorFlow for forecasting.
- Prepare features and labels.
- Identify and compensate for sequence bias.
- Adjust the learning rate dynamically in time series, sequence and prediction models.

# TensorFlow in Practice Specialization

There are 4 Courses in this Specialization

COURSE

1

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

★★★★★ 4.7 6,196 ratings • 1,282 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

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COURSE

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[SHOW ALL](#)

COURSE

4

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[SHOW ALL](#)



6 hours to complete

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4 videos (Total 16 min), 5 readings, 3 quizzes SEE ALL



7 hours to complete

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7 videos (Total 15 min), 6 readings, 3 quizzes SEE ALL



8 hours to complete

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6 videos (Total 19 min), 6 readings, 3 quizzes SEE ALL



9 hours to complete

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Source: <https://www.coursera.org/specializations/tensorflow-in-practice>

# **Course 1: Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning**

**Week 1:** A New Programming Paradigm

**Week 2:** Introduction to Computer Vision

**Week 3:** Enhancing Vision with Convolutional Neural Networks

**Week 4:** Using Real-world Images

# **Course 2: Convolutional Neural Networks in TensorFlow**

**Week 1:** Exploring a Larger Dataset

**Week 2:** Augmentation: A technique to avoid overfitting

**Week 3:** Transfer Learning

**Week 4:** Multiclass Classifications

# **Course 3: Natural Language Processing in TensorFlow**

**Week 1:** Sentiment in text

**Week 2:** Word Embeddings

**Week 3:** Sequence models

**Week 4:** Sequence models and literature

# **Course 4: Sequences, Time Series and Prediction**

**Week 1:** Sequences and Prediction

**Week 2:** Deep Neural Networks for Time Series

**Week 3:** Recurrent Neural Networks for Time Series

**Week 4:** Real-world time series data

# Deep Learning Adventures YouTube playlist

YouTube recordings of all our Meetups



<https://bit.ly/deep-learning-tf>

The screenshot shows a YouTube channel page for "Deep Learning Adventures". The channel has 12 videos, each with a thumbnail, title, and duration. A red arrow points to the "PLAY ALL" button at the bottom of the video list.

Video Number	Title	Thumbnail	Duration
1	Introduction to Deep Learning and TensorFlow		1:09:17
2	Convolutional Neural Networks TensorFlow		1:25:03
3	Deep Learning Trivia Game		1:20:13
4	Kaggle Challenge, Data Augmentation and Dropouts		1:25:53
5	Transfer Learning, Multiclass Classifications and Overfitting		1:24:21
6	NLP Tutorial: Sentiment in text and Word Embeddings		1:53:54
7	NLP Tutorial: Sequence models, RNN, LSTM and GloVe		1:16:54
8	NLP Tutorial: Language modeling with poetry, music and recipe generation		1:56:34
9	Forecasting Time Series with Deep Neural Networks		1:45:15
10	Forecasting Time Series with Recurrent Neural Networks		1:56:41
11	A chat with Laurence Moroney, AI Lead at Google		1:16:31
12	Deep learning Adventures   Specialization and Tensorflow Developer Certificate		3:28

# Deep Learning Adventures GitHub repository

Repository link 😊

[https://github.com/georgezoto/  
TensorFlow-in-Practice](https://github.com/georgezoto/TensorFlow-in-Practice)

Branch: master

Go to file Add file Code

georgezoto committed b8bf9a7 2 minutes ago

53 commits 1 branch 0 tags

File	Description	Date
Presentations	Update Presentation-5	9 days ago
images	Update all 5 Presentations and pdfs, post new meetup events	9 days ago
C1W1_A_new_programming_paradigm-1	C1W1-A-new-programming-paradigm-1	last month
C1W2_Introduction_to_Computer_Vision-1	C1W2-Introduction-to-Computer-Vision-1	last month
C1W3_Convolutional_Neural_Networks	Improving Computer Vision Accuracy using Convolutions	last month
C1W3_Convolutional_Neural_Networks	Let's explore how convolutions work by creating a basic convolution o...	last month

## TensorFlow-in-Practice

Join our Deep Learning Adventures community and become an expert in Deep Learning, TensorFlow, Computer Vision, Convolutional Neural Networks, Kaggle Challenges, Data Augmentation and Dropouts Transfer Learning, Multiclass Classifications and Overfitting and Natural Language Processing NLP as well as Time Series Forecasting

😊 Join us and earn your TensorFlow Developer Certificate! All while having fun learning and participating in our Deep Learning Trivia games 🎉

Meetup page 😊

<https://www.meetup.com/Deep-Learning-Adventures>

YouTube recordings of all Meetups 🎉

<http://bit.ly/deep-learning-tf>

Join us on Slack:

[https://join.slack.com/t/deeplearninga-nmk8930/shared\\_invite/zt-d52h9mm9-h~Q0ZXw5PXsTDzPIINlvog](https://join.slack.com/t/deeplearninga-nmk8930/shared_invite/zt-d52h9mm9-h~Q0ZXw5PXsTDzPIINlvog)

TensorFlow in Practice Specialization:

<https://www.coursera.org/specializations/tensorflow-in-practice>

Visits Laurence's GitHub repository for this specialization:

<https://github.com/lmoroney/dlaicourse/>

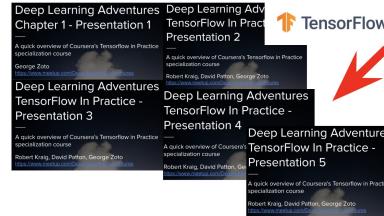
Differentiate yourself with the TensorFlow Developer Certificate:

<https://www.tensorflow.org/certificate>

# Deep Learning Adventures GitHub repository

View our interactive presentations here. If you prefer static pdf presentations, please look at our Presentations folder above. Special attribution goes to Coursera and deeplearning.ai for allowing us to borrow some of their great content.

- Deep-Learning-Adventures-Chapter-1-Presentation-1  
[https://docs.google.com/presentation/d/18nAqidaH\\_4CzZyh\\_1e23gR88algFxCuI7YmMgmnjwg/edit?  
usp=sharing](https://docs.google.com/presentation/d/18nAqidaH_4CzZyh_1e23gR88algFxCuI7YmMgmnjwg/edit?usp=sharing)
- Deep-Learning-Adventures-Tensorflow-In-Practice-Presentation-2  
[https://docs.google.com/presentation/d/1GEvillo8g\\_OFWWq7S3Ob82wRh5NroXpVSivRvVjfpm4Q/edit?  
usp=sharing](https://docs.google.com/presentation/d/1GEvillo8g_OFWWq7S3Ob82wRh5NroXpVSivRvVjfpm4Q/edit?usp=sharing)
- Deep-Learning-Adventures-Tensorflow-In-Practice-Presentation-3  
[https://docs.google.com/presentation/d/1vK0wYrAbAGCvHMM8wnK0vb6NNzfHLQREYQI2UXiFzJ0/edit  
usp=sharing](https://docs.google.com/presentation/d/1vK0wYrAbAGCvHMM8wnK0vb6NNzfHLQREYQI2UXiFzJ0/edit?usp=sharing)
- Deep-Learning-Adventures-Tensorflow-In-Practice-Presentation-4  
[https://docs.google.com/presentation/d/1DAxyuNew5YDEzSakYjvbdlvCf\\_eNbZ6s69iyDBvHT2w/edit?  
usp=sharing](https://docs.google.com/presentation/d/1DAxyuNew5YDEzSakYjvbdlvCf_eNbZ6s69iyDBvHT2w/edit?usp=sharing)
- Deep-Learning-Adventures-Tensorflow-In-Practice-Presentation-5  
[https://docs.google.com/presentation/d/1gUJsRmuc\\_7beCoS3x2BiEWjJfcenyIQiqZMcyMLL-M/edit?  
usp=sharing](https://docs.google.com/presentation/d/1gUJsRmuc_7beCoS3x2BiEWjJfcenyIQiqZMcyMLL-M/edit?usp=sharing)
- Deep-Learning-Adventures-Tensorflow-In-Practice-Presentation-6  
[https://docs.google.com/presentation/d/1KdKcq97grYYcTmkoEvwSOElk1TI\\_Son69CRae3wPk14/edit?  
usp=sharing](https://docs.google.com/presentation/d/1KdKcq97grYYcTmkoEvwSOElk1TI_Son69CRae3wPk14/edit?usp=sharing)
- Deep-Learning-Adventures-Tensorflow-In-Practice-Presentation-7  
[https://docs.google.com/presentation/d/1UiIgy06YmYx8z1o23Z7Qb9ZyIFWismF52OSBpUq8niA/edit?  
usp=sharing](https://docs.google.com/presentation/d/1UiIgy06YmYx8z1o23Z7Qb9ZyIFWismF52OSBpUq8niA/edit?usp=sharing)



Practice your skills while having fun with our Deep Learning Trivia games 🎉



- Deep Learning Trivia Game 1, covering basic TensorFlow syntax, Keras, dense network, optimizer and more:  
[https://quizizz.com/join/quiz/5e87bdbc07fa7f001b120404/start?  
from=soloLinkShare&referrer=5d921444d0fa99001a135336](https://quizizz.com/join/quiz/5e87bdbc07fa7f001b120404/start?from=soloLinkShare&referrer=5d921444d0fa99001a135336)
- Deep Learning Trivia Game 2, covering computer vision, Fashion-MNIST, sparse categorical and binary crossentropy loss, convolutional neural networks, max pooling, ImageDataGenerator and more:  
[https://quizizz.com/join/quiz/5e90e8e631fb32001f63510b/start?  
from=soloLinkShare&referrer=5d921444d0fa99001a135336](https://quizizz.com/join/quiz/5e90e8e631fb32001f63510b/start?from=soloLinkShare&referrer=5d921444d0fa99001a135336)
- Deep Learning Trivia Game 3, covering convolutional neural networks in TensorFlow, larger datasets, techniques to avoid overfitting, transfer learning, multiclass classification and more:  
[https://quizizz.com/join/quiz/5eae10a807df73001b0c59a4/start?  
from=soloLinkShare&referrer=5d921444d0fa99001a135336](https://quizizz.com/join/quiz/5eae10a807df73001b0c59a4/start?from=soloLinkShare&referrer=5d921444d0fa99001a135336)
- Deep Learning Trivia Game 4, natural language processing in TensorFlow, sentiment in text, word embeddings, sequence models, RNNs, LSTMs, sequence models applications and more:  
[https://quizizz.com/join/quiz/5eb71e0e09cdea001c916ac6/start?  
from=soloLinkShare&referrer=5d921444d0fa99001a135336](https://quizizz.com/join/quiz/5eb71e0e09cdea001c916ac6/start?from=soloLinkShare&referrer=5d921444d0fa99001a135336)
- Deep Learning Trivia Game 5, covering sequences, time series and prediction using TensorFlow, statistical methods, deep neural networks for time series, recurrent neural networks for time series, real-world time series data and more:  
[https://quizizz.com/join/quiz/5eefd13d3db4b8001bb6d72b/start?  
from=soloLinkShare&referrer=5d921444d0fa99001a135336](https://quizizz.com/join/quiz/5eefd13d3db4b8001bb6d72b/start?from=soloLinkShare&referrer=5d921444d0fa99001a135336)

# TensorFlow Developer Certificate

## Part 1

- Overview and how to prepare
- Exam Content
- Deep Learning Adventures YouTube playlist and GitHub repository

## Part 2

- PyCharm and environment setup
- GCP and AWS deep learning virtual machines

## Part 3

- Tips and tricks



# PyCharm and environment setup

## Exam environment

See "[Set up your environment to take the TensorFlow Developer Certificate Exam](#)" for more details on how to make sure your computer is ready to take the exam..

- You can take the exam from any computer that supports the [PyCharm IDE](#) requirements, anywhere there is internet, any time. There is no need to go to a test center.
- This exam is an online, performance-based test that requires implementing TensorFlow models using TensorFlow within a PyCharm environment.
- The exam is expected to take up to 5 hours.
- In order to take the exam you will install the TensorFlow Exam plugin using the PyCharm IDE. We recommend you install the PyCharm IDE and become familiar with using it prior to taking the exam. [Here](#) are the system requirements for the PyCharm IDE.

## Exam time limit

If you do not press the Submit button before the 5 hours has elapsed, your exam will be auto submitted. This in itself does not cause you to fail the exam, but you will only be graded for the questions for which you have already submitted and tested models during the course of taking the exam.

TensorFlow Developer Certificate  
[Candidate Handbook](#)

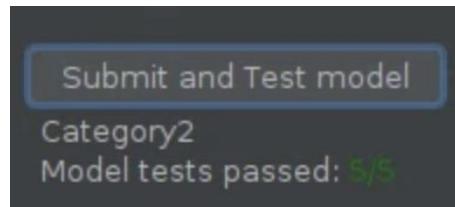
## Resources allowed during exam

You may use whatever learning resources you would normally use during your ML development work.

## Retaking the exam

## Length of validity of the certificate

Your certification expires 36 months from the date when you receive your digital badge.



# PyCharm and environment setup

## Contents

[Before you begin](#)

[Install Python 3.7](#)

[Install PyCharm](#)

[Supported versions of PyCharm](#)

[Configure PyCharm](#)

[Get your environment ready for the exam](#)

[Windows and Linux Users: Check your GPU drivers](#)

[Mac Users: Ensure you have Python 3.7](#)

[All Users: Create a Test Virtual Environment that uses TensorFlow in PyCharm](#)

[Create a new PyCharm project](#)

[Install TensorFlow](#)

[Check the supported version of Python in PyCharm](#)

[Refund policy](#)

[FAQs](#)

[How do I start the exam?](#)

[What version of TensorFlow is used in the exam?](#)

[Is there a minimum hardware requirement?](#)



Set up your environment  
to take the TensorFlow  
Developer Certificate  
Exam

Questions? Email [tensorflow-certificate-team@google.com](mailto:tensorflow-certificate-team@google.com).

Last Updated: May 26, 2020

## Supported versions of PyCharm

As of May 4 2020, the supported versions of PyCharm are:

- Version 2020.1, both PyCharm Professional and PyCharm Community Edition.
  - Download from: <https://www.jetbrains.com/pycharm/download/other.html>

# Should I use my own setup or GCP/AWS?

Branch: master → TensorFlow-in-Practice / C2W2\_Convolutional\_Neural\_Networks\_3\_Humans\_vs\_Horses\_Augmentation.ipynb Go to file ...

georgezoto 5 x Conv2D, MaxPooling2D - Humans vs Horses - Augmentation - 80% Accu... 312b233 on Jun 6 History

Latest commit 312b233 on Jun 6 History

Found 1027 images belonging to 2 classes.  
Found 256 images belonging to 2 classes.

history = model.fit(  
 train\_generator,  
 steps\_per\_epoch=8,  
 epochs=100,  
 epochs=20,  
 verbose=1,  
 validation\_data = validation\_generator,  
 validation\_steps=8)

Please use GPU for this notebook!

```
model = tf.keras.models.Sequential()  
# Note the input shape is the desired size of the image 300x300 with 3 bytes color  
# This is the first convolution  
tf.keras.layers.Conv2D(16, (3,3), activation='relu', input_shape=(300, 300, 3)),  
tf.keras.layers.MaxPooling2D(2, 2),  
# The second convolution  
tf.keras.layers.Conv2D(32, (3,3), activation='relu'),  
tf.keras.layers.MaxPooling2D(2,2),  
# The third convolution  
tf.keras.layers.Conv2D(64, (3,3), activation='relu'),  
tf.keras.layers.MaxPooling2D(2,2),  
# The fourth convolution  
tf.keras.layers.Conv2D(64, (3,3), activation='relu'),  
tf.keras.layers.MaxPooling2D(2,2),  
# The fifth convolution  
tf.keras.layers.Conv2D(64, (3,3), activation='relu'),  
tf.keras.layers.MaxPooling2D(2,2),  
# Flatten the results to feed into a DNN  
tf.keras.layers.Flatten(),  
# 512 neuron hidden layer  
tf.keras.layers.Dense(512, activation='relu'),  
# Only 1 output neuron. It will contain a value from 0-1 where 0 for 1 class ('horses') and 1 for the other ('humans')  
tf.keras.layers.Dense(1, activation='sigmoid')
```

Epoch 1/100  
8/8 [=====] - 19s 2s/step - loss: 0.6962 - accuracy: 0.5195 - val\_loss: 0.6895 - val\_accuracy: 0.5000  
Epoch 2/100  
8/8 [=====] - 22s 3s/step - loss: 0.6826 - accuracy: 0.6018 - val\_loss: 0.6498 - val\_accuracy: 0.5391  
Epoch 3/100  
8/8 [=====] - 19s 2s/step - loss: 0.6708 - accuracy: 0.5940 - val\_loss: 0.6025 - val\_accuracy: 0.6875  
Epoch 4/100  
8/8 [=====] - 19s 2s/step - loss: 0.6335 - accuracy: 0.6785 - val\_loss: 0.5389 - val\_accuracy: 0.8750  
Epoch 5/100  
8/8 [=====] - 19s 2s/step - loss: 0.6375 - accuracy: 0.6185 - val\_loss: 0.5844 - val\_accuracy: 0.6172  
Epoch 6/100  
8/8 [=====] - 19s 2s/step - loss: 0.6190 - accuracy: 0.6440 - val\_loss: 0.4991 - val\_accuracy: 0.7656  
Epoch 7/100  
8/8 [=====] - 19s 2s/step - loss: 0.5877 - accuracy: 0.6574 - val\_loss: 0.4821 - val\_accuracy: 0.7773  
Epoch 8/100  
8/8 [=====] - 19s 2s/step - loss: 0.5577 - accuracy: 0.6863 - val\_loss: 0.6892 - val\_accuracy: 0.5938  
Epoch 9/100  
8/8 [=====] - 19s 2s/step - loss: 0.5765 - accuracy: 0.7475 - val\_loss: 0.5793 - val\_accuracy: 0.6836  
Epoch 10/100  
8/8 [=====] - 22s 3s/step - loss: 0.5739 - accuracy: 0.7051 - val\_loss: 0.5110 - val\_accuracy: 0.7695  
Epoch 11/100  
8/8 [=====] - 22s 3s/step - loss: 0.5290 - accuracy: 0.7542 - val\_loss: 0.4790 - val\_accuracy: 0.8086  
Epoch 12/100  
8/8 [=====] - 19s 2s/step - loss: 0.5126 - accuracy: 0.7019 - val\_loss: 0.6556 - val\_accuracy: 0.7109

Try few of our Colab notebooks on your local computer.  
If time per epoch, accuracy and loss are comparable, use your own setup.

Source:

[https://github.com/georgezoto/TensorFlow-in-Practice/blob/master/C2W2\\_Convolutional\\_Neural\\_Networks\\_3\\_Humans\\_vs\\_Horses\\_Augmentation.ipynb](https://github.com/georgezoto/TensorFlow-in-Practice/blob/master/C2W2_Convolutional_Neural_Networks_3_Humans_vs_Horses_Augmentation.ipynb)

# GCP and AWS deep learning virtual machines

The screenshot shows the Google Cloud Platform Marketplace interface. At the top, there's a search bar labeled "Search products and resources". Below it, a card for a "Deep Learning VM" is displayed. The card includes a small icon of a hexagon with a brain-like pattern, the title "Deep Learning VM", a subtitle "Deep Learning VM (Google Click to Deploy)", and a note "Estimated costs: \$295.20/month". It also lists "Intel(R) optimized and GPU-ready machine learning frameworks". A blue "LAUNCH" button is present, along with a status indicator "1 PAST DEPLOYMENT". On the left side, there's a sidebar with sections for "Runs on Google Compute Engine", "Type Virtual machines Single VM", "Last updated 5/14/20, 11:09 PM", "Category Compute Developer tools", "Version M47", "Operating system Debian 9", "Add to Private Catalog Deployment zip file", and "Pricing".

The screenshot shows the AWS Deep Learning AMIs page. At the top, there's a navigation bar with links for "Products", "Solutions", "Pricing", "Documentation", "Learn", "Partner Network", "AWS Marketplace", "Customer Enablement", "Events", "Explore More", and "Sign In to the Console". Below the navigation, the main heading is "AWS Deep Learning AMIs" with a sub-section "Overview". A sub-headline reads "Pre-configured environments to quickly build deep learning applications". There are two buttons: "Get started with AWS Deep Learning AMIs" and "Try Amazon SageMaker for fully-managed experience". A "FEATURED DEMO" section highlights "See How Amazon Kendra is Helping Power CORD-19 Search". Another section mentions "AWS allows researchers to query tens of thousands of COVID-19 scientific and medical papers to unlock insights". A "Learn more" button is located in the bottom right of this section. To the right, there's a large orange box titled "TensorFlow" with the text "85% of TensorFlow projects in the cloud happen on AWS." and a "Learn more" button.

NVIDIA GPU purchase cost

K80	11/2014	\$0.5K
P100	4/2016	\$7K
V100	6/2017	\$10K
T4	9/2018	\$2K

## Edit quotas

## Compute Engine API

Thank you for submitting Case # (ID:23524939) to Google Cloud Platform support for the following quota:

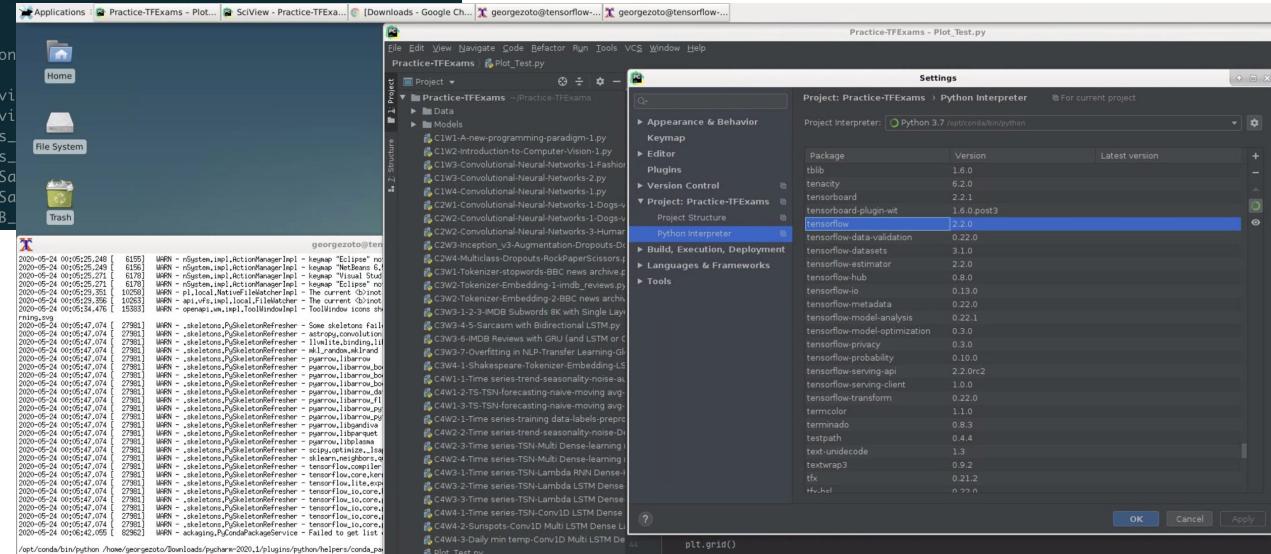
- Change NVIDIA T4 GPUs - us-west1 from 1 to 4

Your request is being processed and you should receive an email confirmation for your request. Should you need further assistance, you can respond to that email.

Source: <https://console.cloud.google.com/marketplace/details/click-to-deploy-images/deeplearning>  
<https://aws.amazon.com/machine-learning/amis>

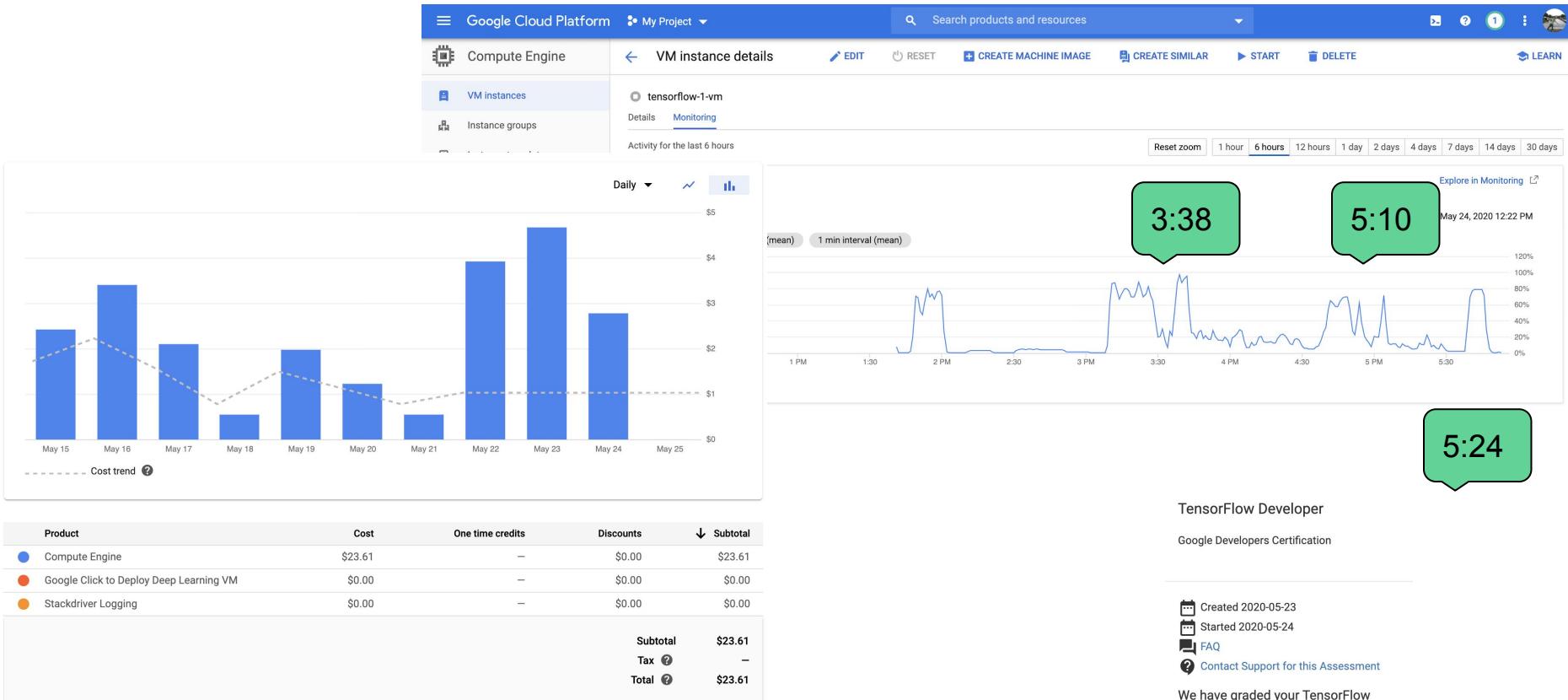
# GCP and AWS deep learning virtual machines

```
georgezoto@tensorflow-1-vm:~/Practice-TFExams$ ls Data/
total 693004
drwxr-xr-x 4 georgezoto georgezoto 4096 May 16 17:59 horse-or-human
drwxr-xr-x 4 georgezoto georgezoto 4096 May 16 17:59 validation-horse-or-human
drwxr-xr-x 3 georgezoto georgezoto 4096 May 16 18:53 cats-or-dogs
-rw-r--r-- 1 georgezoto georgezoto 68606236 May 17 01:08 cats-or-dogs.zip
drwxr-xr-x 3 georgezoto georgezoto 4096 May 17 01:36 rps
-rw-r--r-- 1 georgezoto georgezoto 200682221 May 17 01:37 rps.zip
-rw-r--r-- 1 georgezoto georgezoto 29516758 May 17 01:37 rps-test-set.zip
drwxr-xr-x 3 georgezoto georgezoto 4096 May 17 01:37 rps-test-set
-rw-r--r-- 1 georgezoto georgezoto 149574867 May 17 20:11 horse-or-human.zip
-rw-r--r-- 1 georgezoto georgezoto 11480187 May 17 20:11 validation-horse-or-human.zip
-rw-r--r-- 1 georgezoto georgezoto 5057493 May 17 21:16 bbc-text.csv
-rw-r--r-- 1 georgezoto georgezoto 5643545 May 18 02:05 sarcasm.json
-rw-r--r-- 1 georgezoto georgezoto 238942690 May 20 13:25 twitter_api_sentiment140.json
-rw-r--r-- 1 georgezoto georgezoto 93578 May 20 13:58 sonnets.txt
georgezoto@tensorflow-1-vm:~/Practice-TFExams$ ls Models/
total 454960
-rw-r--r-- 1 georgezoto georgezoto 87910968 May 17 01:08 inception
-rw-r--r-- 1 georgezoto georgezoto 27846968 May 17 01:45 rps.h5
-rw-r--r-- 1 georgezoto georgezoto 1913613 May 17 20:31 imdb_reviews.h5
-rw-r--r-- 1 georgezoto georgezoto 75846 May 17 20:31 imdb_reviews.h5
-rw-r--r-- 1 georgezoto georgezoto 183872 May 17 21:17 bbc_news.h5
-rw-r--r-- 1 georgezoto georgezoto 6529 May 17 21:17 bbc_news.h5
-rw-r--r-- 1 georgezoto georgezoto 414968 May 18 02:06 C3W3-4-Sa
-rw-r--r-- 1 georgezoto georgezoto 391016 May 18 02:07 C3W3-5-Sa
-rw-r--r-- 1 georgezoto georgezoto 347116733 May 20 13:25 glove_6B.h5
```



Source: <https://console.cloud.google.com/marketplace/details/click-to-deploy-images/deeplearning>

# GCP and AWS deep learning virtual machines



Source: <https://console.cloud.google.com/marketplace/details/click-to-deploy-images/deeplearning>

# TensorFlow Developer Certificate

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## Part 2

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## Part 3

- Tips and tricks

# Tips and tricks

Do Step 1 and 3 weeks in advance  
Do Step 2 days in advance

## Step 1

Review our [Candidate Handbook covering exam criteria and FAQs](#). Optional: Take the [deeplearning.ai TensorFlow in Practice Specialization](#). This is strongly recommended in order to prepare for the exam.

## Step 4

**Take and submit the exam.** Sign in and take the exam at any time. You will have a maximum of five hours to complete the exam.

## Step 2

**Register for the exam.** Log in with a Gmail Account (if you don't have one, you can create one during the login process), upload your picture ID (such as a driver's license or passport), and provide payment information.

## Step 5

**Receive your TensorFlow Certificate.** After you have submitted your exam it will be graded, and you will be able to review the status of your submission on your Candidate Portal within 24 hours.

Search for posts online on users taking this exam

## How it works

Medium

TensorFlow certification

Stories People Publications Tags

STORIES

## Step 3

**Prepare your exam environment.** Install the TensorFlow Exam plugin using the PyCharm IDE. More details can be found [here](#).

## Step 6

**Share your expertise with your community.** You can add the certificate and badge to your resume and public profiles, including GitHub, LinkedIn, Twitter, and join our [Certificate Network](#) to help recruiters find ML professionals like you.

# PyCharm and environment setup

## Contents

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[Install Python 3.7](#)

[Install PyCharm](#)

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[Configure PyCharm](#)

[Get your environment ready for the exam](#)

[Windows and Linux Users: Check your GPU drivers](#)

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[Install TensorFlow](#)

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  - Download from: <https://www.jetbrains.com/pycharm/download/other.html>



Set up your environment to take the TensorFlow Developer Certificate Exam

Questions? Email [tensorflow-certificate-team@google.com](mailto:tensorflow-certificate-team@google.com).

Last Updated: May 26, 2020



# TensorFlow Certificate

Creating Virtual Environments:

Preparing ./venv

Finished

Getting Requirements:

Installing package 'tensorflow==2.0.0'...

Installing package 'numpy==1.18.1'...

Installing package 'urllib3==1.25.7'...

Installing package 'tensorflow-datasets==1.3.2'...

Installing package 'Pillow==7.0.0'...

Exam environment ready.

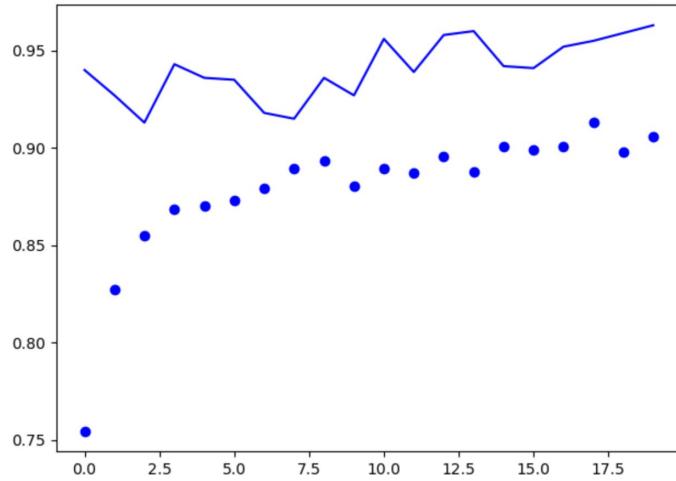
Cancel

tensorboard	2.2.1	2.2.1
tensorboard-plugin-wit	1.6.0.post3	1.6.0.post3
tensorflow	2.2.0	2.2.0
tensorflow-data-validation	0.22.0	0.22.0
tensorflow-datasets	3.1.0	3.1.0
tensorflow-estimator	2.2.0	2.2.0
tensorflow-hub	0.8.0	0.8.0
tensorflow-io	0.13.0	0.13.0
tensorflow-metadata	0.22.0	0.22.0
tensorflow-model-analysis	0.22.1	0.22.1
tensorflow-model-optimization	0.3.0	0.3.0
tensorflow-privacy	0.3.0	0.3.0
tensorflow-probability	0.10.0	0.10.0
tensorflow-serving-api	2.2.0rc2	2.2.0rc2
tensorflow-serving-client	1.0.0	1.0.0
tensorflow-transform	0.22.0	0.22.0

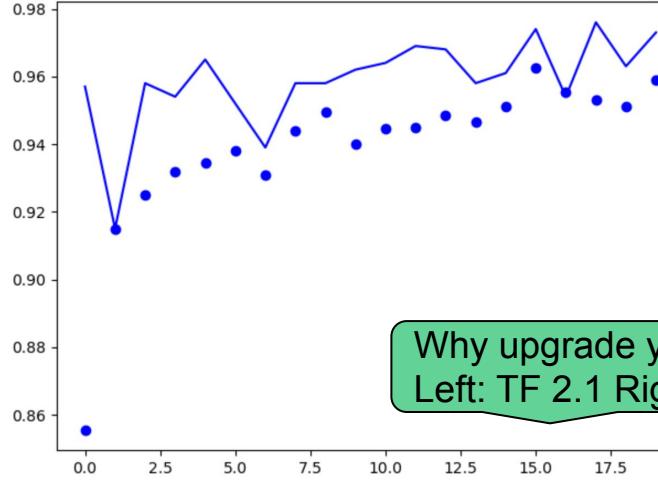
tensorboard	2.2.1	2.2.1
tensorboard-plugin-wit	1.6.0.post3	1.6.0.post3
tensorflow	2.2.0	2.2.0
tensorflow-data-validation	0.21.5	▲ 0.22.0
tensorflow-datasets	2.0.0	▲ 3.1.0
tensorflow-estimator	2.2.0	2.2.0
tensorflow-hub	0.7.0	▲ 0.8.0
tensorflow-io	0.11.0	▲ 0.13.0
tensorflow-metadata	0.21.2	▲ 0.22.0
tensorflow-model-analysis	0.21.6	▲ 0.22.1
tensorflow-probability	0.9.0	▲ 0.10.0
tensorflow-serving-api	2.1.0	▲ 2.2.0rc2
tensorflow-transform	0.21.2	▲ 0.22.0

Learn where to find  
your packages  
Learn how to upgrade  
your packages

Training and validation accuracy

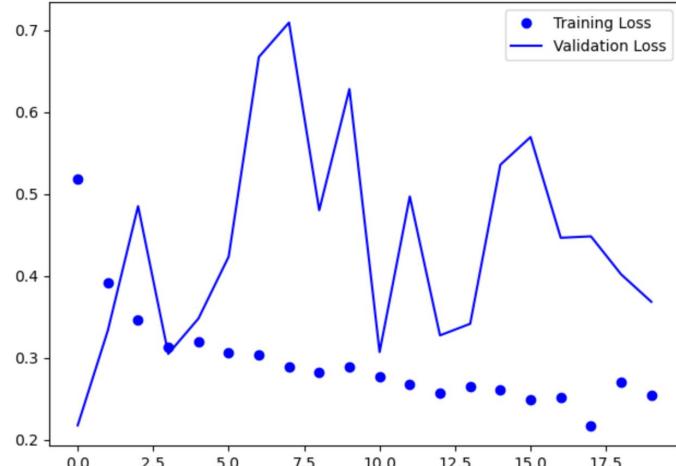


Training and validation accuracy

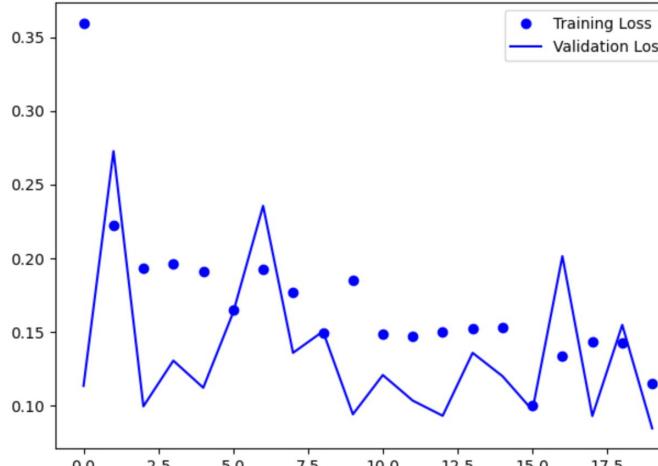


Why upgrade your packages?  
Left: TF 2.1 Right: TF 2.2

Training and validation loss



Training and validation loss



# GCP and AWS deep learning virtual machines

Download Pycharm 2020.1 for Windows/Linux/macOS

<https://www.jetbrains.com/pycharm/download/other.html>

Configure an interpreter using SSH

<https://www.jetbrains.com/help/pycharm/configuring-remote-interpreters-via-ssh.html>

Remote interpreter and matplotlib, set DISPLAY to :0

<https://intellij-support.jetbrains.com/hc/en-us/community/posts/360000017759-docker-remote-interpreter-and-matplotlib>

How to get the ssh keys for a new Google Compute Engine instance?

<https://stackoverflow.com/questions/27535945/how-to-get-the-ssh-keys-for-a-new-google-compute-engine-instance>

Setting up Chrome Remote Desktop for Linux on Compute Engine

<https://cloud.google.com/solutions/chrome-desktop-remote-on-compute-engine>

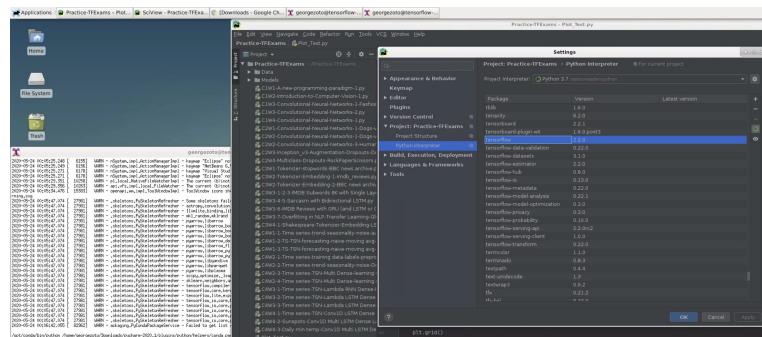
Ephemeral external IP addresses

<https://cloud.google.com/compute/docs/ip-addresses#ephemeraladdress>

Don't forget to stop/start your cloud instance when you're done each day or cost \$ will increase even if you are not actively using it

<https://cloud.google.com/compute/docs/instances/stop-start-instance>

Common issues and useful links when using GCP/AWS deep learning VMs



# TensorFlow Datasets

The TensorFlow tutorials are written in Jupyter notebooks and run directly in Google Colab, a hosted notebook environment that requires no setup.

**TensorFlow** [Install](#) [Learn](#) [API](#) [Resources](#) [Community](#) [Why TensorFlow](#)

**TensorFlow Core**

[Overview](#) [Tutorials](#) [Guide](#) [TF 1](#)

**TensorFlow tutorials**

- Quickstart for beginners
- Quickstart for experts

**BEGINNER**

- ML basics with Keras
- Load and preprocess data
- Estimator

**ADVANCED**

**For beginners**

The best place to start is with the [TensorFlow tutorials for beginners](#). After these tutorials, read the [Keras API documentation](#).

**Datasets**

[Overview](#) [Catalog](#) [Guide](#) [API](#)

**Overview**

- ▶ Audio
- ▶ Image
- ▶ Image classification
- ▶ Object detection
- ▶ Question answering
- ▶ Structured
- ▶ Summarization
- ▶ Text
- ▶ Translate
- ▶ Video

TensorFlow > Resources > Datasets > Catalog

## Datasets

**Note:** The datasets documented here are from HEAD and so not all are available in our nightly package `tfds-nightly`.

Source: <https://www.tensorflow.org/tutorials> <https://www.tensorflow.org/datasets/catalog/overview>

# TensorFlow Developer Certificate

## Part 1

- Overview and how to prepare
- Exam Content
- Deep Learning Adventures YouTube playlist and GitHub repository

## Part 2

- PyCharm and environment setup
- GCP and AWS deep learning virtual machines

## Part 3

- Tips and tricks

This was our 1st adventure together 😊  
We learned a lot, gained practical experience and  
became a stronger community and close friends!

What could our 2nd or 3rd  
adventure look like? 🎉

meetup

Start a new group Log in Sign up



**Deep Learning Adventures**

Washington, DC 377 members · Public group Organized by George Z. and 2 others

Share: [Facebook](#) [Twitter](#) [LinkedIn](#)

About Events Members Photos Discussions More Join this group

**What we're about**

Deep Learning Adventures is a welcoming group for anyone interested in learning more about deep learning, its foundations, its strengths and weaknesses and ever growing applications that best serve humanity and help those in need throughout the world. After participating in hundreds of meetups in the area, we have taken many lessons learned and incorporated them into this group. This group is also startup oriented in the sense that we are open minded and ready to pivot to new directions as our community and needs around the world guide us....

[Read more](#)

**Upcoming events (2)** See all

FRI, JUL 3, 7:30 PM EDT **A chat with Laurence Moroney, AI Lead at Google** Online event

Join us for a fun conversation with Laurence Moroney, AI Lead at Google (<https://www.linkedin.com/in/laurence-moroney/>) and developer of our TensorFlow in Practice and TensorFlow: Data and Deployment Specializations! We plan to...

**Organizers**

George Z. and 2 others [Message](#)

**Members (377)** See all



There are several option we could consider 😊

Tensorflow Tutorials and **Structured Data** - Any model

Kaggle notebooks or join an actual competition

Deep Learning Hackathon for Good

**Coding** session on real world data - Computer Vision/CNNs

**Coding** session on real world data - Sequence models/RNNs

**Coding** session on real world data - Time Series/Any model

Other **Specializations or online books**, next slide

Stanford and MIT courses on deep learning covering both computer vision and NLP

Stanford CS229: Machine Learning | Autumn 2018

stanfordonline - 1 / 20



Lecture 1 - Welcome | Stanford CS229:  
Machine Learning (Autumn 2018)

1:15:20

Machine Learning

★★★★★ 4.9 141,177 ratings • 35,696 reviews

Andrew Ng **TOP INSTRUCTOR**

CS480/680 Intro to Machine  
Learning - Spring 2019 -  
University of Waterloo

Lecture Collection | Convolutional Neural Networks fc  
Stanford University School of Engineering - 1 / 16



Lecture 1 | Introduction to  
Convolutional Neural Networks for...  
Stanford University School of Engineering

57:57

CS230: Deep Learning | Autumn 2018

stanfordonline - 1 / 10



Stanford CS230: Deep Learning |  
Autumn 2018 | Lecture 1 - Class...

stanfordonline

CS224N: Natural Language Processing with Deep Le...  
stanfordonline - 7 / 20



Stanford CS224N: NLP with Deep  
Learning | Winter 2019 | Lecture 1 - ...  
stanfordonline



Lecture Collection | Natural Language Processing wit...  
Stanford University School of Engineering - 1 / 19



Lecture 1 | Natural Language  
Processing with Deep Learning  
Stanford University School of Engineering

There are several option we can consider 😊

Other **Specializations, Courses or online books**

[TensorFlow: Data and Deployment Specialization](#)

[Natural Language Processing Specialization](#)

[Coursera's AI for Medicine](#) or [Udacity's AI for Healthcare](#)

[course.fullstackdeeplearning.com](#)

[developers.google.com/machine-learning/crash-course](#)

[introtodeeplearning.com](#)

[www.fast.ai](#)

[www.kaggle.com/learn/overview](#)

[www.manning.com/books/deep-learning-with-python-second-edition](#)

[www.deeplearningbook.org](#)

[neuralnetworksanddeeplearning.com](#)

Recommended as a  
“natural” next adventure  
on TensorFlow

# Check out these resources



## Get more from Colab

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\$9.99/month

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[Restrictions apply, learn more here](#)



### Faster GPUs

Priority access to faster GPUs and TPUs means you spend less time waiting while code is running. [Learn more](#)



### Longer runtimes

Longer running notebooks and fewer idle timeouts mean you disconnect less often. [Learn more](#)



### More memory

More RAM means better performance, and less running out of memory. [Learn more](#)

[See what Colab Pro benefits would look like](#)



Install

Learn

API

Resources

Community

Why TensorFlow

Search

## TensorFlow Core

Overview

Tutorials

Guide

TF 1

### TensorFlow tutorials

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Load and preprocess data

Estimator

#### ADVANCED

Customization

Distributed training

Images

Text

Structured data

## Text

### Word embeddings

Text classification with an RNN

Text generation with an RNN

Neural machine translation with attention

Image captioning

Transformer model for language understanding

The TensorFlow tutorials are written as Jupyter notebooks and run directly in Google Colab—a hosted notebook environment that requires no setup. Click the [Run in Google Colab](#) button.

## For beginners

The best place to start is with the user-friendly Keras sequential API. Build models by plugging together building blocks. After these tutorials, read the [Keras guide](#).

### Beginner quickstart

This "Hello, World!" notebook shows the Keras Sequential API and `model.fit`.

### Keras basics

This notebook collection demonstrates basic machine learning tasks using Keras.

### Load data

These tutorials use `tf.data` to load various data formats and build input pipelines.

## For experts

The Keras functional and subclassing APIs provide a define-by-run interface for customization and advanced research. Build your model, then write the forward and backward pass. Create custom layers, activations, and training loops.

### Advanced quickstart

This "Hello, World!" notebook uses the Keras subclassing API and a custom training loop.

### Customization

This notebook collection shows how to build custom layers and training loops in TensorFlow.

### Distributed training

Distribute your model training across multiple GPUs, multiple machines or TPUs.

The Advanced section has many instructive notebook examples, including [Neural machine translation](#), [Transformers](#), and [CycleGAN](#).

Source:

<https://colab.research.google.com/signup>

<https://www.tensorflow.org/tutorials/>

# Check out these AI for Healthcare resources



Enroll for Free  
Starts May 22

About How It Works Courses Instructors Enrollment Options FAQ

**There are 3 Courses in this Specialization**

COURSE

## AI for Medical Diagnosis

1

★★★★★ 4.6 410 ratings • 102 reviews

AI is transforming the practice of medicine. It's helping doctors diagnose patients more accurately, make predictions about patients' future health, and recommend better treatments. As an AI practitioner, you have the opportunity to join in this transformation of modern medicine. If you're already familiar with some of the math and coding behind AI

[SHOW ALL](#)

COURSE

## AI for Medical Prognosis

2

★★★★★ 4.6 113 ratings • 27 reviews

AI is transforming the practice of medicine. It's helping doctors diagnose patients more accurately, make predictions about patients' future health, and recommend better treatments. This Specialization will give you practical experience in applying machine learning to concrete problems in medicine.

[SHOW ALL](#)

COURSE

## AI For Medical Treatment

3

AI is transforming the practice of medicine. It's helping doctors diagnose patients more accurately, make predictions about patients' future health, and recommend better treatments. This Specialization will give you practical experience in applying machine learning to concrete problems in medicine.

[SHOW ALL](#)

## AI for Healthcare

Learn to build, evaluate, and integrate predictive models that have the power to transform patient outcomes. Begin by classifying and segmenting 2D and 3D medical images to augment diagnosis and then move on to modeling patient outcomes with electronic health records to optimize clinical trial testing decisions. Finally, build an algorithm that uses data collected from wearable devices to estimate the wearer's pulse rate in the presence of motion.

### PREREQUISITE KNOWLEDGE

Intermediate Python, and Experience with Machine Learning See detailed requirements.

[HIDE DETAILS](#)



### Applying AI to 2D Medical Imaging Data

Learn the fundamental skills needed to work with 2D medical imaging data and how to use AI to derive clinically-relevant insights from data gathered via different types of 2D medical imaging such as x-ray, mammography, and digital pathology. Extract 2D images from DICOM files and apply the appropriate tools to perform exploratory data analysis on them. Build different AI models for different clinical scenarios that involve 2D images and learn how to position AI tools for regulatory approval.

#### PNEUMONIA DETECTION FROM CHEST X-RAYS

### Applying AI to 3D Medical Imaging Data

Learn the fundamental skills needed to work with 3D medical imaging datasets and frame insights derived from the data in a clinically relevant context. Understand how these images are acquired, stored in clinical archives, and subsequently read and analyzed. Discover how clinicians use 3D medical images in practice and where AI holds most potential in their work with these images. Design and apply machine learning algorithms to solve the challenging problems in 3D medical imaging and how to integrate the algorithms into the clinical workflow.

#### HIPPOCAMPUS VOLUME QUANTIFICATION FOR ALZHEIMER'S PROGRESSION

### Applying AI to EHR Data

Learn the fundamental skills to work with EHR data and build and evaluate compliant, interpretable models. You will cover EHR data privacy and security standards, how to analyze EHR data and avoid common challenges, and cover key industry code sets. By the end of the course, you will have the skills to analyze an EHR dataset, transform it to the right level, build powerful features with TensorFlow, and model the uncertainty and bias with TensorFlow Probability and Aequitas.

#### PATIENT SELECTION FOR DIABETES DRUG TESTING

### Applying AI to Wearable Device Data

Learn how to build algorithms that process the data collected by wearable devices and surface insights about the wearer's health. Cover the sensors and signal processing foundation that are critical for success in this domain, including IMU, PPG, and ECG that are common to most wearable devices, and learn how to build three algorithms from real-world sensor data.

#### MOTION COMPENSATED PULSE RATE ESTIMATION

Source:

<https://www.coursera.org/specializations/ai-for-medicine>

<https://www.udacity.com/course/ai-for-healthcare-nanodegree--nd320>

# Check out this certification and books

TensorFlow Core

## Introducing the TensorFlow Developer Certificate!

March 12, 2020



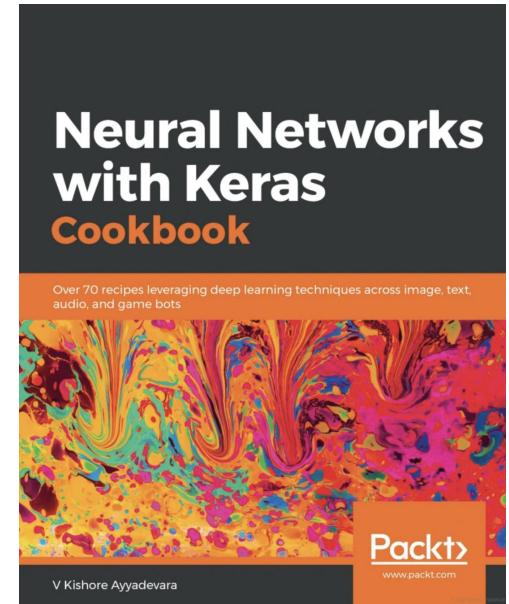
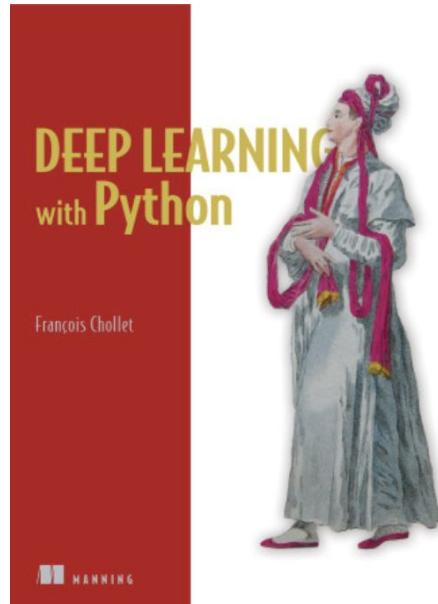
Posted by Alina Shinkarsky, on behalf of the TensorFlow Team

In the AI world today, more and more companies are looking to hire machine learning talent, and simultaneously, an increasing number of students and developers are looking for ways to gain and showcase their ML knowledge with formal recognition. In addition to the courses and learning resources available online, we want to help developers showcase their ML proficiency and help companies hire ML developers to solve challenging problems.



Source:

- <https://blog.tensorflow.org/2020/03/introducing-tensorflow-developer-certificate.html?m=1>
- <https://www.manning.com/books/deep-learning-with-python>
- [https://books.google.com/books?id=5quLDwAAQBAJ&printsec=frontcover&source=gbs\\_qe\\_summary\\_r&cad=0#v=onepage&q&f=false](https://books.google.com/books?id=5quLDwAAQBAJ&printsec=frontcover&source=gbs_qe_summary_r&cad=0#v=onepage&q&f=false)
- <https://github.com/PacktPublishing/Neural-Networks-with-Keras-Cookbook/tree/master/Chapter11>

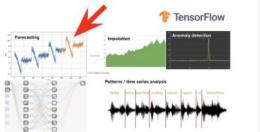


# Let's continue our Time Series adventure 😊

FRI, JUN 19, 7:30 PM EDT

## TensorFlow in Practice - C4 Week 1,2 - Forecasting and DNN for Time...

Online event



Join us for our 9th adventure in Deep Learning! Just bring your curiosity and get ready to meet our growing community 😊 We are taking Course 4 of TensorFlow in Practice Specialization available at:...



39 attendees



FRI, JUL 3, 7:30 PM EDT

## A chat with Laurence Moroney, AI Lead at Google

Online event



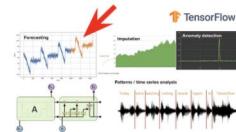
Join us for a fun conversation with Laurence Moroney, AI Lead at Google (<https://www.linkedin.com/in/laurence-moroney>) and developer of our TensorFlow in Practice and TensorFlow: Data and Deployment Specializations 🎉 We plan to...



71 attendees

2

Attend



FRI, JUN 26, 7:30 PM EDT

## TensorFlow in Practice - C4 Week 3,4 - Forecasting & RNN, Conv1D f...

Online event

Join us for our 10th adventure in Deep Learning! Just bring your curiosity and get ready to meet our growing community 😊 We are taking our last Course 4 of TensorFlow in Practice Specialization available at:...

Attend



FRI, JUL 10, 7:30 PM EDT

## How to prepare for and pass the TensorFlow Developer Certificate 🎉

Online event



Join us for our 11th adventure in Deep Learning! Just bring your curiosity and get ready to meet our growing community 😊 Join Zoom Meeting: <https://us02web.zoom.us/j/84402592502?...>



21 attendees

Attend

# Questions

# Discussion

## 2 Deep Learning representations

For representations:

- nodes represent inputs, activations or outputs
- edges represent weights or biases

Here are several examples of Standard deep learning representations

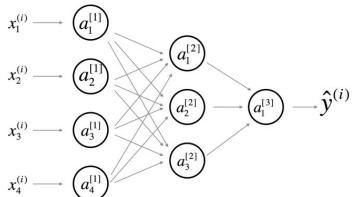


Figure 1: Comprehensive Network: representation commonly used for Neural Networks. For better aesthetic, we omitted the details on the parameters ( $w_{ij}^{[l]}$  and  $b_i^{[l]}$  etc...) that should appear on the edges

## Standard notations for Deep Learning

This document has the purpose of discussing a new standard for deep learning mathematical notations.

### 1 Neural Networks Notations.

General comments:

- superscript (i) will denote the  $i^{th}$  training example while superscript [l] will denote the  $l^{th}$  layer

Sizes:

$\cdot m$  : number of examples in the dataset

$\cdot n_x$  : input size

$\cdot n_y$  : output size (or number of classes)

$\cdot n_h^{[l]}$  : number of hidden units of the  $l^{th}$  layer

In a for loop, it is possible to denote  $n_x = n_h^{[0]}$  and  $n_y = n_h^{[\text{number of layers} + 1]}$ .

$\cdot L$  : number of layers in the network.

Objects:

$\cdot X \in \mathbb{R}^{n_x \times m}$  is the input matrix

$\cdot x^{(i)} \in \mathbb{R}^{n_x}$  is the  $i^{th}$  example represented as a column vector

$\cdot Y \in \mathbb{R}^{n_y \times m}$  is the label matrix

$\cdot y^{(i)} \in \mathbb{R}^{n_y}$  is the output label for the  $i^{th}$  example

$\cdot W^{[l]} \in \mathbb{R}^{\text{number of units in next layer} \times \text{number of units in the previous layer}}$  is the weight matrix, superscript [l] indicates the layer

$\cdot b^{[l]} \in \mathbb{R}^{\text{number of units in next layer}}$  is the bias vector in the  $l^{th}$  layer

$\cdot \hat{y} \in \mathbb{R}^{n_y}$  is the predicted output vector. It can also be denoted  $a^{[L]}$  where  $L$  is the number of layers in the network.

Common forward propagation equation examples:

$a = g^{[l]}(W_x x^{(i)} + b_1) = g^{[l]}(z_1)$  where  $g^{[l]}$  denotes the  $l^{th}$  layer activation function

$\hat{y}^{(i)} = \text{softmax}(W_h h + b_2)$

· General Activation Formula:  $a_j^{[l]} = g^{[l]}(\sum_k w_{jk}^{[l]} a_k^{[l-1]} + b_j^{[l]}) = g^{[l]}(z_j^{[l]})$

·  $J(x, W, b, y)$  or  $J(\hat{y}, y)$  denote the cost function.

Examples of cost function:

$\cdot J_{CE}(\hat{y}, y) = -\sum_{i=0}^m y^{(i)} \log \hat{y}^{(i)}$

$\cdot J_1(\hat{y}, y) = \sum_{i=0}^m |y^{(i)} - \hat{y}^{(i)}|$

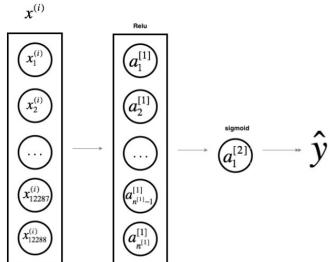


Figure 2: Simplified Network: a simpler representation of a two layer neural network, both are equivalent.