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TensorFlow: Advanced Techniques Specialization

Expand your skill set and master TensorFlow. Customize your machine learning models through four hands-on courses!

★★★★★ 4.8 492 ratings



Laurence Moroney +1 more instructor

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Starts Mar 5

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Financial aid available

5,475 already enrolled

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WHAT YOU WILL LEARN

- ✓ Understand the underlying basis of the Functional API and build exotic non-sequential model types, custom loss functions, and layers.
- ✓ Learn optimization and how to use GradientTape & Autograph, optimize training in different environments with multiple processors and chip types.
- ✓ Practice object detection, image segmentation, and visual interpretation of convolutions.
- ✓ Explore generative deep learning, and how AIs can create new content, from Style Transfer through Auto Encoding and VAEs to GANs.

SKILLS YOU WILL GAIN

- Model Interpretability
- Custom Training Loops
- Custom and Exotic Models
- Generative Machine Learning
- Object Detection
- Functional API
- Custom Layers
- Custom and Exotic Models with Functional API
- Custom Loss Functions
- Distribution Strategies
- Basic Tensor Functionality
- GradientTape for Optimization



Shareable Certificate

Earn a Certificate upon completion



100% online courses

Start instantly and learn at your own schedule.



Flexible Schedule

Set and maintain flexible deadlines.



Intermediate Level

- Basic calculus, linear algebra, stats
- Knowledge of AI, deep learning

[SHOW ALL](#)



Approximately 5 months to complete

Suggested pace of 6 hours/week



English

Subtitles: English

About this Specialization

32,441 recent views

About TensorFlow

TensorFlow is an end-to-end open-source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML, and developers easily build and deploy ML-powered applications. TensorFlow is commonly used for machine learning applications such as voice recognition and detection, Google Translate, image recognition, and natural language processing.

About this Specialization

Expand your knowledge of the Functional API and build exotic non-sequential model types. Learn how to optimize training in different environments with multiple processors and chip types and get introduced to advanced computer vision scenarios such as object detection, image segmentation, and interpreting convolutions. Explore generative deep learning including the ways AIs can create new content from Style Transfer to Auto Encoding, VAEs, and GANs.

About you

This Specialization is for software and machine learning engineers with a foundational understanding of TensorFlow who are looking to expand their knowledge and skill set by learning advanced TensorFlow features to build powerful models.

Looking for a place to start? Master foundational basics with the [DeepLearning.AI TensorFlow Developer Professional Certificate](#).

Ready to deploy your models to the world? Learn how to go live with the [TensorFlow: Data and Deployment Specialization](#).

Applied Learning Project

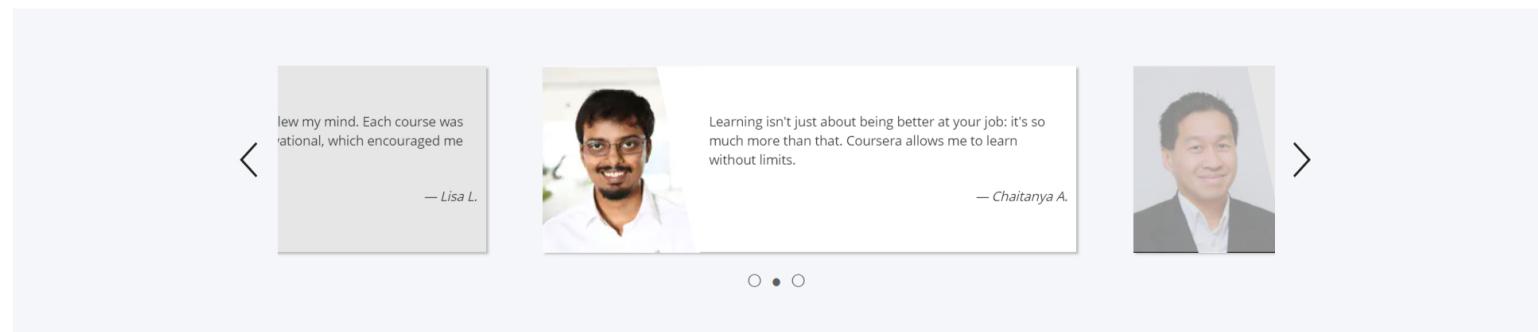
In this Specialization, you will gain practical knowledge of and hands-on training in advanced TensorFlow techniques such as style transfer, object detection, and generative machine learning.

Course 1: Understand the underlying basis of the Functional API and build exotic non-sequential model types, custom loss functions, and layers.

Course 2: Learn how optimization works and how to use GradientTape and Autograph. Optimize training in different environments with multiple processors and chip types.

Course 3: Practice object detection, image segmentation, and visual interpretation of convolutions.

Course 4: Explore generative deep learning and how AIs can create new content, from Style Transfer through Auto Encoding and VAEs to Generative Adversarial Networks.



How the Specialization Works

Take Courses

A Coursera Specialization is a series of courses that helps you master a skill. To begin, enroll in the Specialization directly, or review its courses and choose the one you'd like to start with. When you subscribe to a course that is part of a Specialization, you're automatically subscribed to the full Specialization. It's okay to complete just one course — you can pause your learning or end your subscription at any time. Visit your learner dashboard to track your course enrollments and your progress.

Hands-on Project

Every Specialization includes a hands-on project. You'll need to successfully finish the project(s) to complete the Specialization and earn your certificate. If the Specialization includes a separate course for the hands-on project, you'll need to finish each of the other courses before you can start it.

Earn a Certificate

When you finish every course and complete the hands-on project, you'll earn a Certificate that you can share with prospective employers and your professional network.



There are 4 Courses in this Specialization

COURSE

Custom Models, Layers, and Loss Functions with TensorFlow

1

★★★★★ 4.8 274 ratings • 72 reviews

In this course, you will:

- Compare Functional and Sequential APIs, discover new models you can build with the Functional API, and build a model that produces multiple outputs including a Siamese network.
- Build custom loss functions (including the contrastive loss function used in a Siamese network) in order to measure how well a model is doing and help your neural network learn from training data.
- Build off of existing standard layers to create custom layers for your models, customize a network layer with a lambda layer, understand the differences between them, learn what makes up a custom layer, and explore activation functions.
- Build off of existing models to add custom functionality, learn how to define your own custom class instead of using the Functional or Sequential APIs, build models that can be inherited from the TensorFlow Model class, and build a residual network (ResNet) through defining a custom model class.

The DeepLearning.AI TensorFlow: Advanced Techniques Specialization introduces the features of TensorFlow that provide learners with more control over their model architecture and tools that help them create and train advanced ML models.

This Specialization is for early and mid-career software and machine learning engineers with a foundational understanding of TensorFlow who are looking to expand their knowledge and skill set by learning advanced TensorFlow features to build powerful models.

COURSE

Custom and Distributed Training with TensorFlow

2

★★★★★ 4.8 88 ratings • 15 reviews

In this course, you will:

- Learn about Tensor objects, the fundamental building blocks of TensorFlow, understand the difference between the eager and graph modes in TensorFlow, and learn how to use a TensorFlow tool to calculate gradients.
- Build your own custom training loops using GradientTape and TensorFlow Datasets to gain more flexibility and visibility with your model training.
- Learn about the benefits of generating code that runs in graph mode, take a peek at what graph code looks like, and practice generating this more efficient code automatically with TensorFlow's tools.
- Harness the power of distributed training to process more data and train larger models, faster, get an overview of various distributed training strategies, and practice working with a strategy that trains on multiple GPU cores, and another that trains on multiple TPU cores.

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COURSE

Advanced Computer Vision with TensorFlow

3

★★★★★ 4.8 86 ratings • 21 reviews

In this course, you will:

- a) Explore image classification, image segmentation, object localization, and object detection. Apply transfer learning to object localization and detection.
- b) Apply object detection models such as regional-CNN and ResNet-50, customize existing models, and build your own models to detect, localize, and label your own rubber duck images.
- c) Implement image segmentation using variations of the fully convolutional network (FCN) including U-Net and d) Mask-RCNN to identify and detect numbers, pets, zombies, and more.
- d) Identify which parts of an image are being used by your model to make its predictions using class activation maps and saliency maps and apply these ML interpretation methods to inspect and improve the design of a famous network, AlexNet.

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COURSE

Generative Deep Learning with TensorFlow

4

★★★★★ 4.9 44 ratings • 5 reviews

In this course, you will:

- a) Learn neural style transfer using transfer learning: extract the content of an image (eg. swan), and the style of a painting (eg. cubist or impressionist), and combine the content and style into a new image.
- b) Build simple AutoEncoders on the familiar MNIST dataset, and more complex deep and convolutional architectures on the Fashion MNIST

dataset, understand the difference in results of the DNN and CNN AutoEncoder models, identify ways to de-noise noisy images, and build a CNN AutoEncoder using TensorFlow to output a clean image from a noisy one.
c) Explore Variational AutoEncoders (VAEs) to generate entirely new data, and generate anime faces to compare them against reference images.
d) Learn about GANs; their invention, properties, architecture, and how they vary from VAEs, understand the function of the generator and the discriminator within the model, the concept of 2 training phases and the role of introduced noise, and build your own GAN that can generate faces.

The DeepLearning.AI TensorFlow: Advanced Techniques Specialization introduces the features of TensorFlow that provide learners with more control over their model architecture, and gives them the tools to create and train advanced ML models.

This Specialization is for early and mid-career software and machine learning engineers with a foundational understanding of TensorFlow who are looking to expand their knowledge and skill set by learning advanced TensorFlow features to build powerful models.

Instructors



Laurence Moroney

Instructor

Lead AI Advocate, Google

288,084 Learners

14 Courses



Eddy Shyu

Senior Curriculum Developer

Product Lead, DeepLearning.AI

113,105 Learners

11 Courses

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DeepLearning.AI

DeepLearning.AI is an education technology company that develops a global community of AI talent.

DeepLearning.AIs expert-led educational experiences provide AI practitioners and non-technical professionals with the necessary tools to go all the way from foundational basics to advanced application, empowering them to build an AI-powered future.

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Starts Mar 5

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Frequently Asked Questions

> What is the refund policy?

> Can I just enroll in a single course?

- > Is financial aid available?
- > Can I take the course for free?
- > Is this course really 100% online? Do I need to attend any classes in person?
- > What is TensorFlow?
- > What are the applications of TensorFlow?
- > Why is TensorFlow important?
- > What is the TensorFlow specialization about?
- > I've already completed the DeepLearning.AI TensorFlow Developer Professional Certificate. What else will I learn in this Specialization?
- > What will I learn in this Specialization?
- > Who is the TensorFlow Specialization for?
- > What background knowledge is necessary?
- > What will I be able to do upon completing the Specialization?
- > Who created the TensorFlow Specialization?
- > Is this a standalone course or a Specialization?
- > Do I need to take the courses in a specific order?
- > Can I audit this Specialization?
- > How long does it take to complete the Specialization?
- > Will I earn university credit for completing the Specialization?

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