< Data Science

Generative Adversarial Networks (GANs) Specialization

Break into the GANs space. Master cutting-edge GANs techniques through three hands-on courses!

★★★★★ **4.8** 411 ratings

Sharon Zhou   +2 more instructors

Offered By

10,331 already enrolled

About   How It Works   Courses   Instructors   Enrollment Options   FAQ

WHAT YOU WILL LEARN

✓   Understand GAN components, build basic GANs using PyTorch and advanced DCGANs using convolutional layers, control your GAN and build conditional GAN

✓   Compare generative models, use FID method to assess GAN fidelity and diversity, learn to detect bias in GAN, and implement StyleGAN techniques

✓   Use GANs for data augmentation and privacy preservation, survey GANs applications, and examine and build Pix2Pix and CycleGAN for image translation

SKILLS YOU WILL GAIN

Generator   Image-to-Image Translation

About this Specialization

103,912 recent views

About GANs

Generative Adversarial Networks (GANs) are powerful machine learning models capable of generating realistic image, video, and voice outputs.

Rooted in game theory, GANs have wide-spread application: from improving cybersecurity by fighting against adversarial attacks and anonymizing data to preserve privacy to generating state-of-the-art images, colorizing black and white images, increasing image resolution, creating avatars, turning 2D images to 3D, and more.

SHOW ALL

About this Specialization

The **DeepLearning.AI Generative Adversarial Networks (GANs) Specialization** provides an exciting introduction to image generation with GANs, charting a path from foundational concepts to advanced techniques through an easy-to-understand approach. It also covers social implications, including bias in ML and the ways to detect it, privacy preservation, and more.

Build a comprehensive knowledge base and gain hands-on experience in GANs. Train your own model using PyTorch, use it to create images, and evaluate a variety of advanced GANs.

About you

This Specialization is for software engineers, students, and researchers from any field, who are interested in machine learning and want to understand how GANs work.

This Specialization provides an accessible pathway for all levels of learners looking to break into the GANs space or apply GANs to their own projects, even without prior familiarity with advanced math and machine learning research.

Applied Learning Project

Course 1: In this course, you will understand the fundamental components of GANs, build a basic GAN using PyTorch, use convolutional layers to build advanced DCGANs that processes images, apply W-Loss function to solve the vanishing gradient problem, and learn how to effectively control your GANs and build conditional GANs.

Course 2: In this course, you will understand the challenges of evaluating GANs, compare different generative models, use the Fréchet Inception Distance (FID) method to evaluate the fidelity and diversity of GANs, identify sources of bias and the ways to detect it in GANs, and learn and implement the techniques associated with the state-of-the-art StyleGAN.
SHOW ALL

Course 3: In this course, you will use GANs for data augmentation and privacy preservation, survey more applications of GANs, and build Pix2Pix and CycleGAN for image translation.

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

- Grasp of AI, deep learning & CNNs

- Intermediate Python & experience with DL frameworks (TF / Keras / PyTorch)

Approx. 3 months to complete

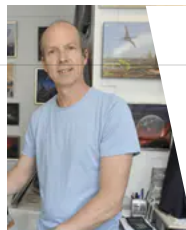Suggested 8 hours/week

English

Subtitles: English
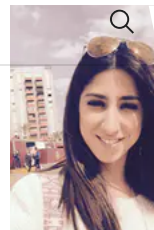
How the Specialization Works

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 3 Courses in this Specialization

Build Basic Generative Adversarial Networks (GANs)

★★★★½ **4.7** 316 ratings

In this course, you will:

- Learn about GANs and their applications - Understand the intuition behind the SHOW ALL components of GANs - Explore and implement multiple GAN architectures - Build conditional GANs capable of generating examples from determined categories The DeepLearning.AI Generative Adversarial Networks (GANs) Specialization provides an exciting introduction to image generation with GANs, charting a path from foundational concepts to advanced techniques through an easy-to-understand approach. It also covers social implications, including bias in ML and the ways to detect it, privacy preservation, and more. Build a comprehensive knowledge base and gain hands-on experience in GANs. Train your own model using PyTorch, use it to create images, and evaluate a variety of advanced GANs. This Specialization provides an accessible pathway for all levels of learners looking to break into the GANs space or apply GANs to their own projects, even without prior familiarity with advanced math and machine learning research.

Build Better Generative Adversarial Networks (GANs)

★★★★½ **4.6** 77 ratings

In this course, you will:

- Assess the challenges of evaluating GANs and compare different generative models SHOW ALL the Fréchet Inception Distance (FID) method to evaluate the fidelity and diversity of GANs - Identify sources of bias and the ways to detect it in GANs - Learn and implement the techniques associated with the state-of-the-art StyleGANs The DeepLearning.AI Generative Adversarial Networks (GANs) Specialization provides an exciting introduction to image generation with GANs, charting a path from foundational concepts to advanced techniques through an easy-to-understand approach. It also covers social implications, including bias in ML and the ways to detect it, privacy preservation, and more. Build a comprehensive knowledge base and gain hands-on experience in GANs. Train your own model using PyTorch, use it to create images, and evaluate a variety of advanced GANs. This Specialization provides an accessible pathway for all levels of learners looking to break into the GANs space or apply GANs to their own projects, even without prior familiarity with advanced math and machine learning research.

Apply Generative Adversarial Networks (GANs)

★★★★★ **5.0** 18 ratings

In this course, you will:

- Explore the applications of GANs and examine them wrt data augmentation, privacy, and anonymity - Leverage the image-to-image translation framework and identify applications to modalities beyond images - Implement Pix2Pix, a paired image-to-image translation GAN, to adapt satellite images into map routes (and vice versa) - Compare paired image-to-image translation to unpaired image-to-image translation and identify how their key difference necessitates different GAN architectures - Implement CycleGAN, an unpaired image-to-image translation model, to adapt horses to zebras (and vice versa) with two GANs in one The DeepLearning.AI Generative Adversarial Networks (GANs) Specialization provides an exciting introduction to image generation with GANs, charting a path from foundational concepts to advanced techniques through an easy-to-understand approach. It also covers social implications, including bias in ML and the ways to detect it, privacy preservation, and more. Build a comprehensive knowledge base and gain hands-on experience in GANs. Train your own model using PyTorch, use it to create images, and evaluate a variety of advanced GANs. This Specialization provides an accessible pathway for all levels of learners looking to break into the GANs space or apply GANs to their own projects, even without prior familiarity with advanced math and machine learning research.

Instructors

Sharon Zhou
Course Instructor
DeepLearning.AI

👥 **16,471** Learners
📖 **3** Courses

Eda Zhou
Curriculum Developer
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👥 **16,471** Learners

Eric Zelikman

Curriculum Developer

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10,331 already enrolled

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Frequently Asked Questions

> **What is the refund policy?**

If you subscribed, you get a 7-day free trial during which you can cancel at no penalty. After that, we don't give refunds, but you can cancel your subscription at any time. See our full refund policy.

> **Can I just enroll in a single course?**

Yes! To get started, click the course card that interests you and enroll. You can enroll and complete the course to earn a shareable certificate, or you can audit it to view the course materials for free. When you subscribe to a course that is part of a Specialization, you're automatically subscribed to the full Specialization. Visit your learner dashboard to track your progress.

> **Is financial aid available?**

Yes, Coursera provides financial aid to learners who cannot afford the fee. Apply for it by clicking on the Financial Aid link beneath the "Enroll" button on the left. You'll be prompted to complete an application and will be notified if you are approved. You'll need to complete this step for each course in the Specialization, including the Capstone Project. Learn more.

> **Can I take the course for free?**

When you enroll in the course, you get access to all of the courses in the Specialization, and you earn a certificate when you complete the work. If you only want to read and view the course content, you can audit the course for free. If you cannot afford the fee, you can apply for financial aid.

> **Is this course really 100% online? Do I need to attend any classes in person?**

This course is completely online, so there's no need to show up to a classroom in person. You can access your lectures, readings and assignments anytime and anywhere via the web or your mobile device.

> **Will I earn university credit for completing the Specialization?**

This Specialization doesn't carry university credit, but some universities may choose to accept Specialization Certificates for credit. Check with your institution to learn more. Online Degrees and Mastertrack™ Certificates on Coursera provide the opportunity to earn university credit.

> **What are GANs?**

Generative Adversarial Networks (GANs) are powerful machine learning models capable of generating realistic image, video, and voice outputs. They are algorithmic architectures that use two neural networks, pitting one against the other in order to generate new instances of data.

> **What are the applications of GANs?**

Rooted in game theory, GANs have wide-spread application: from improving cybersecurity by fighting against adversarial attacks and anonymizing data to preserve privacy to generating state-of-the-art images, colorizing black and white images, increasing image resolution, creating avatars, turning 2D images to 3D, and more.

> **Why are GANs important?**

As computing power has increased, so has the popularity of GANs and its capabilities. GANs have opened up many new directions: from generating high amounts of datasets for training machine learning models and allowing for powerful unsupervised learning models to producing sharper, discrete, and more accurate outputs. GANs have also informed research in adjacent areas like adversarial learning, adversarial examples and attacks, model robustness, etc.

> **What is the GANs Specialization about?**

The DeepLearning.AI Generative Adversarial Networks (GANs) Specialization provides an exciting introduction to image generation with GANs, charting a path from foundational concepts to advanced techniques through an easy-to-understand approach. It also covers social implications, including bias in ML and the ways to detect it, privacy preservation, and more.

Specialization: Gain practical knowledge of how generative models work. Construct and design your own generative adversarial model. Analyze how generative models are being applied in various commercial and exploratory applications. Build a comprehensive knowledge base and gain hands-on experience in GANs. By this Specialization, you would have trained your own model using PyTorch, used it to create images, and evaluated a variety of advanced GANs.

Course 1: In this course, you will understand the fundamental components of GANs, build a basic GAN using convolutional layers to build advanced DCGANs that processes images, apply W-Loss function to solve the vanishing gradient problem, and learn how to effectively control your GANs and build conditional GANs.

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Course 3: In this course, you will use GANs for data augmentation and privacy preservation, survey more applications of GANs, and build Pix2Pix and CycleGAN for image translation.

> **Who is the GANs Specialization for?**

This Specialization provides an accessible pathway for all levels of learners looking to break into the GANs space or apply GANs to their own projects. Even without prior familiarity with advanced math and machine learning research.

> **What background knowledge is necessary?**

This Specialization is for software engineers, students, and researchers from any field, who are interested in machine learning and want to understand how GANs work. This course assumes a deep learning background, and you will need to be able to confidently program in Python and deep learning framework (TensorFlow, Keras, or PyTorch). You should be proficient in basic calculus, linear algebra, and statistics.

After completing this Specialization, you will have learned how to achieve the state-of-the-art in realistic generation. You will be able to generate realistic images, edit those images by controlling the output (eg. convert a horse to a zebra or lengthen your hair or make yourself older), quantitatively compare generators, convert an image to another (eg. turning a sketch into a photo-realistic image), animate still images, solve some of the challenges that GANs are notorious for, and more.

We highly recommend taking the **Deep Learning Specialization** prior to starting the GANs Specialization.

This Specialization was created by Sharon Zhou, a CS PhD candidate at Stanford University, advised by Andrew Ng. Sharon Zhou's work in AI spans from theoretical foundations to applied, in medicine, climate, and more broadly, social good. Previously a Y...

This is a Specialization made up of 3 courses.

machine learning product manager at Google and various startups, Sharon is a Harvard graduate in CS and Classics who loves more than AI, though GANs occupy a special place in her heart.

Do I need to take the courses in a specific order?

We recommend taking the courses in the prescribed order for a logical and thorough learning experience.

Can I audit the Specialization?

You can audit the courses in the Specialization for free. You will not receive a certificate at the end if you choose to audit it for free instead of purchasing it.

How long does it take to complete the Specialization?

This specialization consists of three courses. At the rate of 5 hours a week, it typically takes 4 weeks to complete each course.

More questions? Visit the **Learner Help Center**.

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