

Convolutional Neural Networks

by DeepLearning.AI

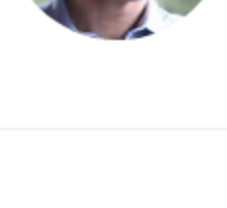
About this Course

In the fourth course of the Deep Learning Specialization, you will understand how computer vision has evolved and become familiar with its exciting applications such as autonomous driving, face recognition, reading radiology images, and more.

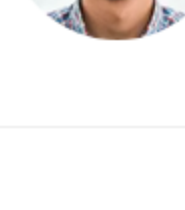
By the end, you will be able to build a convolutional neural network, including recent variations such as residual networks; apply convolutional networks to visual detection and recognition tasks; and use neural style transfer to generate art and apply these algorithms to a variety of image, video, and other 2D or 3D data.

The Deep Learning Specialization is our foundational program that will help you understand the capabilities, challenges, and consequences of deep learning and prepare you to participate in the development of leading-edge AI technology. It provides a pathway for you to gain the knowledge and skills to apply machine learning to your work, level up your technical career, and take the definitive step in the world of AI.

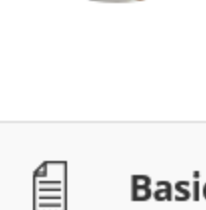
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Taught by: [Andrew Ng](#), Instructor
Founder, DeepLearning.AI & Co-founder, Coursera



Taught by: [Kian Katanforoosh](#), Senior Curriculum Developer
Founder, Workera



Taught by: [Younes Bensouda Mourri](#), Curriculum developer
Computer Science

	Basic Info	Course 4 of 5 in the Deep Learning Specialization
	Level	Intermediate
	Commitment	At the rate of 5 hours a week, it typically takes 5 weeks to complete this course
	Language	English, Subtitles: Arabic, French, Bengali, Ukrainian, Chinese (Simplified), Greek, Italian, Portuguese (Brazil), Vietnamese, Dutch, Korean, German, Pashto, Urdu, Russian, Thai, Indonesian, Swedish, Turkish, Azerbaijani, Spanish, Dari, Hindi, Japanese, Kazakh, Hungarian, Polish
	Hardware Req	None currently, unless you'd like to download Jupyter Notebooks locally for offline work.
	How To Pass	Pass all graded assignments to complete the course.
	User Ratings	Average User Rating 4.9

Syllabus

Week 1

Foundations of Convolutional Neural Networks

Implement the foundational layers of CNNs (pooling, convolutions) and stack them properly in a deep network to solve multi-class image classification problems.

12 videos, 6 readings

- Video:** [Computer Vision](#)
- Video:** Edge Detection Example
- Video:** More Edge Detection
- Video:** Padding
- Reading:** [IMPORTANT] Have questions, issues or ideas? Join our Forum!
- Video:** Strided Convolutions
- Video:** Convolutions Over Volume
- Video:** One Layer of a Convolutional Network
- Reading:** Clarifications about Upcoming Simple Convolutional Network Example Video
- Video:** Simple Convolutional Network Example
- Video:** Pooling Layers
- Reading:** Clarifications about Upcoming CNN Example Video
- Video:** CNN Example
- Reading:** Clarifications about Upcoming Why Convolutions?
- Video:** Why Convolutions?
- Reading:** Lecture Notes W1
- Reading:** (Optional) Downloading your Notebook, Downloading your Workspace and Refreshing your Workspace
- Video:** Yann LeCun Interview

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- Graded:** The Basics of ConvNets
- Graded:** Convolutional Model, Step by Step
- Graded:** Convolution Model Application

Week 2

Deep Convolutional Models: Case Studies

Discover some powerful practical tricks and methods used in deep CNNs, straight from the research papers, then apply transfer learning to your own deep CNN.

14 videos, 3 readings

- Video:** [Why look at case studies?](#)
- Video:** Classic Networks
- Video:** ResNets
- Video:** Why ResNets Work?
- Video:** Networks in Networks and 1x1 Convolutions
- Reading:** Clarifications about Upcoming Inception Network Motivation Video
- Video:** Inception Network Motivation
- Video:** Inception Network
- Video:** MobileNet
- Video:** MobileNet Architecture
- Video:** EfficientNet
- Video:** Using Open-Source Implementation
- Video:** Transfer Learning
- Video:** Data Augmentation
- Video:** State of Computer Vision
- Reading:** Lecture Notes W2
- Reading:** Note on the Upcoming Programming Assignment - Residual Networks

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- Graded:** Deep Convolutional Models
- Graded:** Residual Networks
- Graded:** Transfer Learning with MobileNet

Week 3

Object Detection

Apply your new knowledge of CNNs to one of the hottest (and most challenging!) fields in computer vision: object detection.

14 videos, 4 readings

- Video:** [Object Localization](#)
- Video:** Landmark Detection
- Video:** Object Detection
- Reading:** Clarifications about Upcoming Convolutional Implementation of Sliding Windows Video
- Video:** Convolutional Implementation of Sliding Windows
- Video:** Bounding Box Predictions
- Video:** Intersection Over Union
- Video:** Non-max Suppression
- Video:** Anchor Boxes
- Reading:** Clarifications about Upcoming YOLO Algorithm Video
- Video:** YOLO Algorithm
- Video:** Region Proposals (Optional)
- Video:** Semantic Segmentation with U-Net
- Video:** Transpose Convolutions
- Video:** U-Net Architecture Intuition
- Video:** U-Net Architecture
- Reading:** Lecture Notes W3
- Reading:** Clear Output Before Submitting (For U-Net Assignment)

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- Graded:** Detection Algorithms
- Graded:** Car detection with YOLO
- Graded:** Image Segmentation with U-Net

Week 4

Special Applications: Face recognition & Neural Style Transfer

Explore how CNNs can be applied to multiple fields, including art generation and face recognition, then implement your own algorithm to generate art and recognize faces!

11 videos, 6 readings

- Video:** [What is Face Recognition?](#)
- Video:** One Shot Face Learning
- Video:** Siamese Network
- Video:** Triplet Loss
- Reading:** Clarifications about Upcoming Face Verification and Binary Classification Video
- Video:** Face Verification and Binary Classification
- Video:** What is Neural Style Transfer?
- Video:** What are deep ConvNets learning?
- Video:** Cost Function
- Video:** Content Cost Function
- Reading:** Clarifications about Upcoming Style Cost Function Video
- Video:** Style Cost Function
- Video:** 1D and 3D Generalizations
- Reading:** Lecture Notes W4
- Reading:** [IMPORTANT] Reminder about end of access to Lab Notebooks
- Reading:** References
- Reading:** Acknowledgments

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- Graded:** Special Applications: Face Recognition & Neural Style Transfer
- Graded:** Face Recognition
- Graded:** Art Generation with Neural Style Transfer

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How It Works

General

How do I pass?

To earn your Certificate, you'll need to earn a passing

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Programming assignments

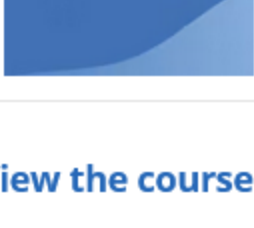
Programming assignments require you to write and run a computer program to solve a problem.

[More](#)

Course 4 of Specialization

Become a Machine Learning expert

Master the fundamentals of deep learning and break into AI. Recently updated with cutting-edge techniques!



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