Convolutional Neural Networks

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About this Course

This course will teach you how to build convolutional neural networks and apply it to image data. Thanks to deep learning, computer vision is working far better than just two years ago, and this is enabling numerous exciting applications ranging from safe autonomous driving, to accurate face recognition, to automatic reading of radiology images.

❤ More

You will:

- Understand how to build a convolutional neural network, including recent variations such as residual networks.
- Know how to apply convolutional networks to visual detection and recognition tasks.
- Know to use neural style transfer to generate art.
- Be able to apply these algorithms to a variety of image, video, and other 2D or 3D data.

This is the fourth course of the Deep Learning Specialization.

Basic Info   Course 4 of 5 in the Deep Learning Specialization

Level	Intermediate
Commitment	4 weeks of study, 4-5 hours/week
Language	English Volunteer to translate subtitles for this course
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	★★★★⯪ 4.8 stars

Syllabus

WEEK 1

Foundations of Convolutional Neural Networks

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

▤ 11 videos expand

1. **Video:** Computer Vision
   Graded: The basics of ConvNets
2. **Video:** Edge Detection Example
   Graded: Convolutional Model: step by step
3. **Video:** More Edge Detection
   Graded: Convolutional model: application
4. **Video:** Padding
5. **Video:** Strided Convolutions
6. **Video:** Convolutions Over Volume

WEEK 2   7. **Video:** One Layer of a Convolutional Network
8. **Video:** Simple Convolutional Network Example

How It Works
9. **Video:** Pooling Layers

Deep convolutional models: case studies
10. **Video:** CNN Example

GENERAL Learn about the practical tricks and methods used in deep CNNs straight from the research papers. 11. **Video:** Why Convolutions?

How do I pass the course? 12. **Notebook:** Convolutional Model: step by step

▤ 11 videos expand

13. **Notebook:** Convolutional Model: application

To earn your Course Certificate, you'll need to earn a passing grade on each of the required
1. **Video:** Why look at case studies?
assignments—these can be quizzes, peer-graded assignments, or programming assignments. Videos,
   Graded: Deep convolutional models
readings, and practice exercises are there to help you prepare for the graded assignments.
2. **Video:** Classic Networks
✓ More
   Graded: Residual Networks
3. **Video:** ResNets
What do start dates and end dates mean?

4. **Video:** Why ResNets Work
Most courses have sessions that run multiple times a year — each with a specific start and end date.
PROGRAMMING ASSIGNMENTS
Once you 5. **Video:** Networks in Networks and 1x1 Convolutions, quizzes, and programming assignments (if
enroll, you'll have access to all videos, readings, quizzes, and programming assignments (if
WEEK 3
applicable). Peer-graded assignments can only be submitted and reviewed once your session has
Programming assignments require you to write and run a computer program to solve a
begun. If you choose to explore the course without purchasing, you may not be able to access certain
6. **Video:** Inception Network Motivation
problem.
assignments. If you don't finish all graded assignments before the end of the session, you can enroll in
7. **Video:** Inception Network
the next session. Your progress will be saved and you'll be able to pick up where you left off when the
8. **Video:** Using Open-Source Implementation
What are programming assignments?
next session begins.

9. **Video:** Transfer Learning
✓ More
What are due dates? Is there a penalty for submitting my work after a due date?
Programming assignments require you to apply your knowledge of CNNs to one of the toughest but hottest field of computer
may include executable code, a common starter package that includes starter code, detailed guidelines,
10. **Video:** Data Augmentation
and other resources. Assignment parts are similar to individual quiz questions. Each part is a single
With in-lesson integrated due dates to help you manage your schedule and keep
11. **Video:** State of Computer Vision
coding task that can be completed one at a time.
Coursework On Spi cial (quizzes and programming assignments can be submitted late without
12. **Notebook:** Keras Tutorial - The Happy House (not graded)
consequence. However it is possible that you won't receive a grade if you submit your peer-graded
How are programming assignments graded?
13. **Notebook:** Residual Networks
assignment too late because classmates are usually review assignment within three days of the
Deep Learning Specialization: Master Deep Learning, and Break into AI
2. **Video:** Landmark Detection
Programming assignments are graded automatically. If they use a built-in-algorithm you'll see your
   Graded: Car detection with YOLOv2
grade with 3. **Video:** Object Detection a custom grader, you may need to wait up to an hour.
Can I re-attempt an assignment?

Deep Learning

5. **Video:** Bounding Box Predictions

6. **Video:** Intersection Over Union

7. **Video:** Non-max Suppression

Special applications: Face recognition & Neural style transfer

8. **Video:** Anchor Boxes

Discover how CNNs can be applied to multiple fields, including art generation and face recognition. Implement your own algorithm to generate art and recognize faces!

9. **Video:** YOLO Algorithm

10. **Video:** (Optional) Region Proposals

Related Courses

11. **Notebook:** Car detection with YOLOv2

1. **Video:** What is face recognition?

Special applications: Face recognition & Neural style transfer

2. One Shot Learning

Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization

3. Siamese Network

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Face Recognition for the Happy House

4. **Video:** Triplet Loss

5. **Video:** Face Verification and Binary Classification

Structuring Machine Learning Projects

What is Neural Style Transfer?

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What are deep ConvNets learning?

Cost Function

9. **Video:** Content Cost Function

Style Cost Function

Neural Networks and Deep Learning

1D and 3D Generalizations

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Notebook: Art generation with Neural Style Transfer

13. **Notebook:** Face Recognition for the Happy House

Introduction to Deep Learning

National Research University Higher School of Economics

How to Win a Data Science Competition: Learn from Top Kagglers

National Research University Higher School of Economics