Overview
Syllabus
FAQs
Creators
Ratings and Reviews
Go to Course
Already enrolled

Home › Data Science › Machine Learning

Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization

About this course: This course will teach you the "magic" of getting deep learning to work well. Rather than the deep learning process being a black box, you will understand what drives performance, and be able to more systematically get good results. You will also learn TensorFlow.

After 3 weeks, you will:
- Understand industry best-practices for building deep learning applications.
- Be able to effectively use the common neural network "tricks", including initialization, L2 and dropout regularization, Batch normalization, gradient checking,
- Be able to implement and apply a variety of optimization algorithms, such as mini-batch gradient descent, Momentum, RMSprop and Adam, and check for their convergence.
- Understand new best-practices for the deep learning era of how to set up train/dev/test sets and analyze bias/variance
- Be able to implement a neural network in TensorFlow.

This is the second course of the Deep Learning Specialization.

Show less

Who is this class for: This class is for: - Learners that took the first course of the specialization: "Neural Networks and Deep Learning" - Anyone that already understands fully-connected neural networks, and wants to learn the practical aspects of making them work well.

Created by: deeplearning.ai

Taught by: Andrew Ng, Co-founder, Coursera; Adjunct Professor, Stanford University; formerly head of Baidu AI Group/Google Brain

Taught by: Head Teaching Assistant - Kian Katanforoosh, Adjunct Lecturer at Stanford University, deeplearning.ai, Ecole Centrale Paris

Taught by: Teaching Assistant - Younes Bensouda Mourri, Mathematical & Computational Sciences, Stanford University, deeplearning.ai

Basic Info	Course 2 of 5 in the Deep Learning Specialization
Level	Beginner

Commitment	3 weeks, 3-6 hours per week
Language	English, **Subtitles:** Chinese (Traditional), Chinese (Simplified)
How To Pass	Pass all graded assignments to complete the course.
User Ratings	Average User Rating 4.9 See what learners said

Course 2 of Specialization

Deep Learning Specialization
Master Deep Learning, and Break into AI

Deep Learning
deeplearning.ai

Learn More

Syllabus

WEEK 1

Practical aspects of Deep Learning

15 videos

1. **Video:** Train / Dev / Test sets
2. **Video:** Bias / Variance
3. **Video:** Basic Recipe for Machine Learning
4. **Video:** Regularization
5. **Video:** Why regularization reduces overfitting?
6. **Video:** Dropout Regularization
7. **Video:** Understanding Dropout
8. **Video:** Other regularization methods
9. **Video:** Normalizing inputs
10. **Video:** Vanishing / Exploding gradients
11. **Video:** Weight Initialization for Deep Networks
12. **Video:** Numerical approximation of gradients
13. **Video:** Gradient checking
14. **Video:** Gradient Checking Implementation Notes
15. **Notebook:** Initialization
16. **Notebook:** Regularization
17. **Notebook:** Gradient Checking
18. **Video:** Yoshua Bengio interview

Show less

Graded: Practical aspects of deep learning

Graded: Initialization

Graded: Regularization

Graded: Gradient Checking

WEEK 2

Optimization algorithms

11 videos

1. **Video:** Mini-batch gradient descent
2. **Video:** Understanding mini-batch gradient descent
3. **Video:** Exponentially weighted averages
4. **Video:** Understanding exponentially weighted averages
5. **Video:** Bias correction in exponentially weighted averages
6. **Video:** Gradient descent with momentum
7. **Video:** RMSprop
8. **Video:** Adam optimization algorithm
9. **Video:** Learning rate decay
10. **Video:** The problem of local optima
11. **Notebook:** Optimization
12. **Video:** Yuanqing Lin interview

Show less

Graded: Optimization algorithms

Graded: Optimization

WEEK 3

Hyperparameter tuning, Batch Normalization and Programming Frameworks

11 videos

1. **Video:** Tuning process
2. **Video:** Using an appropriate scale to pick hyperparameters
3. **Video:** Hyperparameters tuning in practice: Pandas vs. Caviar
4. **Video:** Normalizing activations in a network
5. **Video:** Fitting Batch Norm into a neural network
6. **Video:** Why does Batch Norm work?
7. **Video:** Batch Norm at test time
8. **Video:** Softmax Regression
9. **Video:** Training a softmax classifier
10. **Video:** Deep learning frameworks
11. **Video:** TensorFlow
12. **Notebook:** Tensorflow

Show less

Graded: Hyperparameter tuning, Batch Normalization, Programming Frameworks

Graded: Tensorflow

View Less

FAQs

When will I have access to the lectures and assignments?

As soon as you enroll in a course, you'll have access to all videos, quizzes, and programming assignments (if applicable). Peer review assignments become available once your session has officially begun. If you choose to explore the course without subscribing by using the audit option, you may not be able to access certain assignments.

What will I get if I pay for this course?

If you pay for this course, you will have access to all of the features and content you need to earn a Course Certificate. If you complete the course successfully, your electronic Certificate will be added to your Accomplishments page - from there, you can print your Certificate or add it to your LinkedIn profile. Note that the Course Certificate does not represent official academic credit from the partner institution offering the course.

Can I take this course for free?

This course is offered with a 7-day full access free trial that lets you see everything a paid subscription includes for free for 7 days. You can cancel it at any time. You can also audit video lectures and certain assignments for free without subscribing or starting a free trial. If you want to complete the course and earn a Course Certificate by submitting assignments for a grade, you can upgrade your experience by subscribing to the course. You can also apply for financial aid if you can't afford the course fee.

What is the refund policy?

Subscription payments are non-refundable. We offer a 7-day free trial; if you cancel your subscription before the trial period ends, you won't be billed.

Is financial aid available?

Yes! Coursera provides financial aid to learners who would like to complete a course but cannot afford the course fee. To apply for aid, select "Learn more and apply" in the Financial Aid section below the "Enroll" button. You'll be prompted to complete a simple application; no other paperwork is required.

How It Works

Coursework

Each course is like an interactive textbook, featuring pre-recorded videos, quizzes and projects.

Help from Your Peers

Connect with thousands of other learners and debate ideas, discuss course material, and get help mastering concepts.

Certificates

Earn official recognition for your work, and share your success with friends, colleagues, and employers.

Creators

deeplearning.ai

deeplearning.ai is Andrew Ng's new venture which amongst others, strives for providing comprehensive AI education beyond borders.

Ratings and Reviews

Rated 4.9 out of 5 of 15,627 ratings

RR

Great course where we understand how to tune hyperparameters and how to improve our algorithms with regularization and optimization techniques. The basic concepts of TensorFlow and how to use it are also covered. AMAZING!

王

the tensorflow programming exercise is very helpful!

Excellent course as usual!

Very well explained with practical scenarios.

See all 1,853 reviews

Recently Viewed

deeplearning.ai

Neural Networks and Deep Learning

1 course

deeplearning.ai

Structuring Machine Learning Projects

1 course

You May Also Like

deeplearning.ai
Structuring Machine Learning Projects
1 course

deeplearning.ai
Convolutional Neural Networks
1 course

deeplearning.ai
Sequence Models
1 course

deeplea
Neu
1 cour