

Sequences, Time Series and Prediction

by DeepLearning.AI

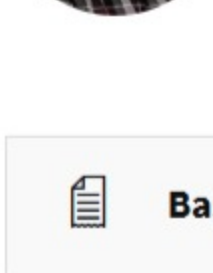
About this Course

If you are a software developer who wants to build scalable AI-powered algorithms, you need to understand how to use the tools to build them. This Specialization will teach you best practices for using TensorFlow, a popular open-source framework for machine learning.

In this fourth course, you will learn how to build time series models in TensorFlow. You'll first implement best practices to prepare time series data. You'll also explore how RNNs and 1D ConvNets can be used for prediction. Finally, you'll apply everything you've learned throughout the Specialization to build a sunspot prediction model using real-world data!

The Machine Learning course and Deep Learning Specialization from Andrew Ng teach the most important and foundational principles of Machine Learning and Deep Learning. This new DeepLearning.AI TensorFlow Developer Specialization teaches you how to use TensorFlow to implement those principles so that you can start building and applying scalable models to real-world problems. To develop a deeper understanding of how neural networks work, we recommend that you take the Deep Learning Specialization.

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Taught by:
[Laurence Moroney](#), Instructor

	Basic Info	Course 4 of 4 in the DeepLearning.AI TensorFlow Developer Specialization
	Level	Intermediate
	Commitment	4 weeks of study, 4-5 hours/week
	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
	How To Pass	Pass all graded assignments to complete the course.
	User Ratings	Average User Rating 4.7

Syllabus

Week 1

Sequences and Prediction

Hi Learners and welcome to this course on sequences and prediction! In this course we'll take a look at some of the unique considerations involved when handling sequential time series data -- where values change over time, like the temperature on a particular day, or the number of visitors to your web site. We'll discuss various methodologies for predicting future values in these time series, building on what you've learned in previous courses!

10 videos, 7 readings

- Video:** [Introduction: A conversation with Andrew Ng](#)
- Reading:** Welcome to the course!
- Video:** Time series examples
- Video:** Machine learning applied to time series
- Video:** Common patterns in time series
- Video:** Introduction to time series
- Reading:** About the notebooks in this course
- Ungraded Lab:** Introduction to time series notebook (Lab 1)
- Reading:** [IMPORTANT] Have questions, issues or ideas? Join our Forum!
- Video:** Train, validation and test sets
- Video:** Metrics for evaluating performance
- Video:** Moving average and differencing
- Video:** Trailing versus centered windows
- Video:** Forecasting
- Ungraded Lab:** Forecasting notebook (Lab 2)
- Reading:** Week 1 Wrap up
- Reading:** Lecture Notes Week 1
- Reading:** Assignment Troubleshooting Tips
- Reading:** (Optional) Downloading your Notebook and Refreshing your Workspace

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Graded: Week 1 Quiz

Graded: Working with generated time series

Week 2

Deep Neural Networks for Time Series

Having explored time series and some of the common attributes of time series such as trend and seasonality, and then having used statistical methods for projection, let's now begin to teach neural networks to recognize and predict on time series!

10 videos, 2 readings

- Video:** [A conversation with Andrew Ng](#)
- Video:** Preparing features and labels
- Video:** Preparing features and labels (screencast)
- Ungraded Lab:** Preparing features and labels notebook (Lab 1)
- Video:** Feeding windowed dataset into neural network
- Video:** Single layer neural network
- Video:** Machine learning on time windows
- Video:** Prediction
- Video:** More on single layer neural network
- Ungraded Lab:** Single layer neural network notebook (Lab 2)
- Video:** Deep neural network training, tuning and prediction
- Video:** Deep neural network
- Ungraded Lab:** Deep neural network notebook (Lab 3)
- Reading:** Week 2 Wrap up
- Reading:** Lecture Notes Week 2

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Graded: Week 2 Quiz

Graded: Forecasting Using Neural Networks

Week 3

Recurrent Neural Networks for Time Series

Recurrent Neural networks and Long Short Term Memory networks are really useful to classify and predict on sequential data. This week we'll explore using them with time series...

8 videos, 4 readings

- Video:** [Week 3 - A conversation with Andrew Ng](#)
- Video:** Conceptual overview
- Video:** Shape of the inputs to the RNN
- Video:** Outputting a sequence
- Video:** Lambda layers
- Video:** Adjusting the learning rate dynamically
- Reading:** More info on Huber loss
- Ungraded Lab:** RNN notebook (Lab 1)
- Video:** LSTM
- Reading:** Link to the LSTM lesson
- Video:** Coding LSTMs
- Ungraded Lab:** LSTM notebook (Lab 2)
- Reading:** Week 3 Wrap up
- Reading:** Lecture Notes Week 3

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Graded: Week 3 Quiz

Graded: Forecast using RNNs or LSTMs

Week 4

Real-world time series data

On top of DNNs and RNNs, let's also add convolutions, and then put it all together using a real-world data series -- one which measures sunspot activity over hundreds of years, and see if we can predict using it.

11 videos, 9 readings

- Video:** [Week 4 - A conversation with Andrew Ng](#)
- Video:** Convolutions
- Reading:** Convolutional neural networks course
- Video:** Bi-directional LSTMs
- Reading:** More on batch sizing
- Ungraded Lab:** Convolutions with LSTM notebook (Lab 1)
- Video:** Convolutions with LSTM
- Video:** Real data - sunspots
- Video:** Train and tune the model
- Video:** Prediction
- Ungraded Lab:** Sunspots notebooks (Lab 2 & Lab 3)
- Video:** Sunspots
- Video:** Combining our tools for analysis
- Reading:** Lecture Notes Week 4
- Reading:** [IMPORTANT] Reminder about end of access to Lab Notebooks
- Reading:** Wrap up
- Video:** Congratulations!
- Reading:** References
- Reading:** Acknowledgments
- Video:** Specialization wrap up - A conversation with Andrew Ng
- Reading:** What next?
- Reading:** (Optional) Opportunity to Mentor Other Learners

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Graded: Week 4 Quiz

Graded: Adding CNNs to improve forecasts

[View Less](#)

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.

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Course 4 of Specialization

Learn to build AI apps with Tensorflow

Build, train, and optimize deep neural networks and dive deep into Computer Vision, Natural Language Processing, and Time Series Analysis, along with best practices and hands-on experience in one of the most in-demand deep learning frameworks.

DeepLearning.AI TensorFlow Developer

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Learn More

[View the course in catalog](#)

Related Courses

Practical Time Series Analysis

The State University of New York

Time Series Mastery: Forecasting with ETS, ARIMA, Python

Coursera Instructor Network

Introduction to Trading, Machine Learning & GCP

Google Cloud, New York Institute of Finance

Build Basic Generative Adversarial Networks (GANs)

DeepLearning.AI