Introduction to Deep Learning

This Deep Learning Training equips junior data scientists with the skills to implement deep learning solutions for image data, text classification, and time-series predictive modeling. Learn to use TensorFlow for computer vision (CV), natural language processing (NLP), and explore Large Language Models (LLMs). Ideal for onboarding new data scientists or as a data science reference resource.

CBT Nuggets course material →

STUDY PLAN

WEEK 1

Explore Deep Learning Foundational Concepts — 158 min.

What is An Artificial Neuron?	8
What is Deep Learning?	5
Neural Network Basics	7
Convolutional Neural Networks (CNNs)	6
Natural Language Processing (NLP)	7
Challenge	1

Set Up a Deep Learning Development Environment

Google Colab	8
Anaconda and Conda	11
Jupyter Notebook	7
PyCharm	4
Visual Studio Code	5
Challenge	4

Explore Computer Vision Foundational Concepts

What is Computer Vision(CV)?	6
Explore CV with the fashion MNIST dataset	10
How does SoftMax work?	7
Normalizing and Standardization	5
Challenge	15

Examine TensorFlow Convolutional Neural Networks

Introduction	1
Load & EDA MNIST Dataset	5
Callbacks	16
Convolution & Pooling	20

WEEK 2

162 min.

Challenge	18

Build a Computer Vision Model with TensorFlow

Explore the Food 101 dataset on Kaggle	5
Explore the modified ramen sushi dataset	9
Load dataset using ImageDataGenerator	14
Visualize random images with the labels	9
Challenge	26

Compare Deep and Convolutional Neural Networks

Explore CNNs in a Browser	11
What is a baseline model?	8
Deep Neural Networks (DNNs)	9
Convolutional Neural Networks (CNNs)	16
Challenge	19

Ingest Real-world Image Data with TensorFlow

Real-world scenario: Teachable Machine Proof of Concept	18

WEEK 3

184 min.

Real-world scenario: Acquire and Upload Images	20
Challenge	7

Improve CNN Model Performance with TensorFlow

Baseline Model	24
CNN Model	7
Improvements	9
Challenge	14

Visualize to Avoid CNN Overfitting with TensorFlow

Explore Overfitting	8
Load Dataset	7
Challenge 1: Build and Train a Baseline Model from Pseudocode	14
Plot Training Curves	7
Reducing Overfitting	2
Challenge	11

Build a Multi-Class CNN Classifier with TensorFlow

Binary to Multi-Class Classification | EDA	6
Milestone Challenge 1	48

WEEK 4

Write an Algorithm to Classify Dog or Cat Images 162 min.

Kaggle Milestone Challenge Overview	12
Load Dataset with ImageDataGenerator	13
Challenge	16

Explore Transfer Learning with TensorFlow

Explore Dataset and Clone Repo from CBTN GitHub	6
Prepare Train Dataset for Reduction	10
Reduce Train Dataset by 90% and Only Keep 10%	10
CHALLENGE	13

Leverage Various Callbacks for Transfer Learning

Review Reduced Food 10 Dataset (10%)	6
Custom Callbacks	8
TensorBoard Callbacks	3
Checkpoint Callbacks	5
Early Stopping Callbacks	4
Callback Lists	5
CHALLENGE	6

Reuse Pre-Trained TensorFlow Hub Models of Kaggle

Review Transfer Learning, Feature Extraction, and Fine-Tuning	8
Review Food_10 Dataset	5
Exploring Pre-Trained Models	12
Apply Transfer Learning, Feature Extraction, and Fine-tuning	5
Challenge	15

WEEK 5

Build TensorFlow Hub Feature Extraction Models 159 min.

Clone and Create Reduced Food_10 Dataset	16
Apply Data Augmentation	9
Create a custom function to build Keras models simply using URLs	8
Build, compile, and train resnet_model	6
Challenge	6

Compare ResNet and EfficientNet Pre-Trained Models

Explore Reduced Food_10 Dataset for Transfer Learning	6
Create re-useable custom functions for rapid testing	10
Import custom functions from CBT Nuggets GitHub repo	6
Double Challenge	6
Build a tensorflow/resnet model from scratch	9
Build a tensorflow/efficientnet model from scratch	8

Implement Fine-Tuning with TensorFlow Hub Models

Explore Fine-Tuning	6
Explore Food_10 Dataset	5
Import custom functions with !wget or !clone	4
Create ResNet50 Model	13
Train the Fine-Tuning layers of the model	11
Challenge	9

Fine-Tune TensorFlow Hub Models on Large Datasets

Explore Fine-Tuning	4
Explore Food_10 Dataset in three sizes	3
Explore a new TensorFlow methods	14

WEEK 6

154 min.

Explore Keras Applications Vs TensorFlow Hub	16
Fine-Tune the Top 10 Unfrozen Layers	7
Challenge	7
Update: Completed ResNet50 Training & EfficientNetB0 Code	8

Learn Natural Language Processing with TensorFlow

From Pixels and CNN to Characters with NLP	5
What is ASCII? and Why Isn't Great for Encoding in NLP?	7

Using Basic Sequences to Understand Basic Encoding Principles	5
What are Tokens and Tokenizers?	12
CHALLENGE ⊠	2
Challenge Solution Video	9

Train Machines to Read with Token Sequences & More

Explore Similarities in Reading for Humans and Machines	4
Apply Token Sequences Aiming for Coherent Outputs	10
Handling Out-of_Vocabulary words with OOV Tokens	7
Adding Uniformity to Sentences with Padding	6
CHALLENGE	10

Build an Enhanced Vocabulary with News Headlines

Review Limitations of Song Lyrics Generator Bot	5
Explore News Category Dataset and Preprocessing	8
Apply Sequencing, OOV, and Padding	11
Test User Article Title Input on Our Vocabulary with OOV in Mind	7
CHALLENGE	8

WEEK 7

Apply Sentiment Insights with Text Embeddings 158 min.

Review Previous NLP Neural Network Classifier	3
Explore TensorFlow Datasets and New Dataset	6
Load IMDB Dataset and Convert to DataFrames	7
Convert Data to Numpy Arrays and review sentences and labels	6
Tokenizer, Sequences, OOV, and Padding and Embeddings	12
CHALLENGE	7

Analyze Sentiments in Vector Spaces and Embeddings

Use Numpy instead of Pandas to Load Dataset	8
Deep Dive Into Hyperparameters Tuning	8
Deep Dive Into Text Embeddings	8
Plot Loss and Accuracy Curves	9
Analyze Sentiment with Embedding Projector	10
CHALLENGE	6

Apply Real-World Sentiment Analysis with Yelp Data

Review TensorFlow Datasets & Explore Subwords and BSE	8
CHALLENGE	7
Solution Video A	19
Solution Video B	11
Solution Video C	3

Transition from Tokenization to Sequence Models

From Token Semantics to Sequential Coherence	10
What is RNN and LSTM?	10

WEEK 8

156 min.

The Heart of Sequence Models: Sequence Problems	8
TensorFlow Modeling Action Steps	12
Delve Deeper Into RNN and LSTM	6
CHALLENGE	5

Apply TensorFlow NLP to Classify Disaster Tweets

Static Token Vs Dynamic Embeddings	4
NLP with Kaggle's Disaster Tweets Contest	8
Exploratory Data Analysis with Pandas	10
Data Visualization with Matplotlib and Seaborn	9
CHALLENGE	5

Optimize TensorFlow NLP Disaster Binary Classifier

Review Baseline TensorFlow Binary Disaster Classifier	10
Load and Preprocess Dataset	4
Clean Data Before Improving Model Architecture	9
Clean Data Part 2	14
CHALLENGE	7

Submit Your Tweet Classifier Into a Kaggle Contest

Review Baseline Model: Accuracy & Loss	11
Add Random Dataset Shuffle & Hyperparameters	8
Leverage Custom Functions	3
Prepare Competition Output File: submission.csv	4
CHALLENGE	19

WEEK 9

Transition from SimpleRNN to Bidirectional LSTM — 154 min.

Explore RNNs Models and the Vanishing Gradients Problem	9
Explore Long Short-Term Memory (LSTM) Models	5
Build a Single Layer Bidirectional LSTM Model	9
Build a Multiple Layer Bidirectional LSTM Model	4
Add Convolutions to LSTM Models to Capture Sequences of Words	4
CHALLENGE	12

Compare LSTM, GRU, and Convolutional LSTM Networks

Contrast LSTM, GRU, and Convolutional LSTM	13
Build LSTM model	7
Build GRU model	3
Build Convolutional LSTM model	7
CHALLENGE	1
Solution Video	5

Move from LSTM to Fine-Tune TensorFlow Hub Models

Review Transfer Learning	11
Searching for Models on TensorFlow Hub	7
CHALLENGE	6
Challenge Solution Video Part 1	6
Challenge Solution Video Part 2	9

Explore Generative Text Sequence Models in NLP

Explore Generative Text Prediction	8
Initialize and Fit Tokenizer	4
Convert to Numerical Representation of the Corpus	4
Generate and Return N-Gram Sequences	5
Convert Padding Sequences to X and y	10
Explore Tokenized Word Index	5

WEEK 10

166 min.

CHALLENGE	1
Solution Video	2

Generate Text with Recurrent Neural Networks(RNNs)

Build, Compile and Train Model	8
Plot the Accuracy and Loss Curves	5
Add Bidirectional(LSTM) and Plot Curves	7
Create a Text Prediction Sequence Model	11
CHALLENGE	2
Solution Video	3

Explore Types of Time Series and Temporal Patterns

What is Univariate Time Series?	8
What is Multivariate Time Series?	8
Trends	5
Seasonality	6
Autocorrelation	4
Noise	6
CHALLENGE	1
Question 1	1
Question 2	1
Question 3	1
Question 4	1

Time Series Forecasting with Deep Neural Networks

Explore Time Series Forecasting Basics	3
Create and Visualize Synthetic Dataset	4
Prepare Data for Training using a windowed_dataset	13
Review Model Architecture	6
CHALLENGE	3
Challenge Solution Video	13

Explore Time Series with Recurrent Neural Networks

Review DNN Forecasting	2
CHALLENGE 1	19
Review Recurrent Neural Networks	4
CHALLENGE 2	18

WEEK 11

Explore Time Series with DNN, RNN, and LSTM — 84 min.

Review DNN Model Architecture	2
CHALLENGE 1: Build DNN Forecasting Model	20
Review RNN Model Architecture	4
CHALLENGE 2: Build RNN Forecasting Model	5
Review LSTM Model Architecture	3
CHALLENGE 3: Build LSTM Forecasting Model	5

Build a DNN, LSTM, and CNN Sunspot Forecast Model

Review Kaggle Sunspot Dataset & CBT Nuggets GitHub Repo	4
Build Baseline DNN Forecasting Model	19
Review LSTM/CNN Model Architecture	6
CHALLENGE: Build LSTM/CNN Forecasting Model	16