

**AI for Text, NLP, and Forecasting**

**Course Number:** PYTH-156  
**Duration:** 3 days

**Overview**

This live, online Artificial Intelligence (AI) For Text, NLP, and Forecasting training course teaches attendees how to build Recurrent Neural Networks (RNNs) and Long Short-Term Memory networks (LSTMs) to apply sequence models to natural language processing (NLP). Participants learn how to implement these models from the ground up using Keras/TensorFlow by initially building a shallow neural network and then progressing to Deep Learning (DL) architectures.

**Prerequisites**

All students must have basic Python experience and an understanding of machine learning.

**Materials**

All AI For Text, NLP, and Forecasting training students receive comprehensive courseware.

**Software Needed on Each Student PC**

* Any Windows, Linux, or macOS operating system
* Python 3.x installed (Anaconda bundle recommended)
* An IDE with Python support (Jupyter Notebook, Spyder, or PyCharm Community Edition)

**Objectives**

* Compare AI versus ML versus DL
* Work with TensorFlow and Keras
* Use sequence algorithms
* Work with Recurrent Neural Networks (RNN)
* Implement use cases for Recurrent Neural Networks
* Use RNN variants such as Long short-term memory (LSTM)
* Discuss text and language processing applications for AI
* Implement natural language processing (NLP)

**Outline**

* Introduction
* Compare AI vs ML vs DL
* Introduction to Neural Networks
  + The math behind neural networks
  + Activation functions
  + Vanishing gradient problem and ReLU
  + Loss functions
  + Gradient descent
  + Back propagation
  + Understanding the intuition behind neural networks
* Introducing Perceptrons
  + Single Layer linear classifier
  + Step Function
  + Updating the weights
  + Linear separability and XOR problem
  + Hidden Layers: Intro to Deep Neural Networks and Deep Learning
  + Hidden Layers as a solution to XOR problem
  + The architecture of deep learning
* Introducing Keras/TensorFlow
  + What is Keras?
  + Using Keras with a TensorFlow Backend
* Introducing TensorFlow
  + TensorFlow intro
  + TensorFlow Features
  + TensorFlow Versions
  + GPU and TPU scalability
  + The Tensor: The Basic Unit of TensorFlow
* Introducing Tensors
  + TensorFlow Execution Model
  + Recurrent Neural Networks in Keras/TensorFlow
* Introducing RNNs
  + RNNs in TensorFlow
* Long Short-Term Memory (LSTM) in TensorFlow
* Text processing elements
* TF-IDF
* Word2vec
* Tokenizers, N-grams
* Stopword Removal
* Sentiment Analysis
* Text Processing Pipelines
* Natural Language Processing
  + What is NLP?
  + Sensory Acuity
  + Behavioral Flexibility
  + NLP Techniques
  + NLP and Deep Learning
* Word2vec
* Learning Word Embedding
* The Skip-gram Model
* Building the Graph
* Training the Model
* Visualizing the Embeddings
* Optimizing the Implementation
* Text classification with TensorFlow
* Automatic Translation (seq2seq)
* Text Generation with RNN
* Named Entity Extraction with RNNs (Sequence Modeling)
* Bidirectional LSTM with Attention
* Natural Language Processing Pipelines
* Conversational AI
* Introduction to the Rasa Framework
* Generating Natural Language
* Understanding Natural Language
* Chatbots
* Time Series Processing and Forecasting Elements
* Traditional Time Series forecasting with ARIMA Models
* Defining Autocorrelation
* Understanding the Dickey-Fuller Test
* Forecasting with TensorFlow and Keras
* Using RNN and LSTM in Time Series Prediction
* Validation and Metrics of Time Series Prediction Models
* References and Next steps
* Structured Activity/Exercises/Case Studies
  + Keras Hands-on
  + TensorFlow Hands-on
  + Using TensorFlow to create an RNN
  + Sentiment analysis project
  + Natural Language Processing project
* Conclusion