Advanded NLP and Neural Networks

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Text Mining and NLP Overview

- What is Text Mining?
- The Common Text Mining Tasks
- What is Natural Language Processing (NLP)?
- Some of the NLP Use Cases
- Machine Learning in Text Mining and NLP
- Machine Learning in NLP
- TF-IDF
- The Feature Hashing Trick
- Stemming
- Example of Stemming
- Stop Words
- Popular Text Mining and NLP Libraries and Packages

Artificial Intelligence for Text, NLP and Forecasting

Course 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

Lab: Using Keras to implement a neural network

Introducing TensorFlow

TensorFlow intro

TensorFlow Features

TensorFlow Versions

GPU and TPU scalability

Lab: Setting up and Running TensorFlow

The Tensor: The Basic Unit of TensorFlow

Introducing Tensors

TensorFlow Execution Model

Lab: Learning about Tensors

Recurrent Neural Networks in Keras/TensorFlow

Introducing RNNs

RNNs in TensorFlow

Lab: RNN

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