TensorFlow for AI Coursera

Course 1: Introduction to tensorFlow

**Week 1**

1. Video 1: Welcome to tensorFlow

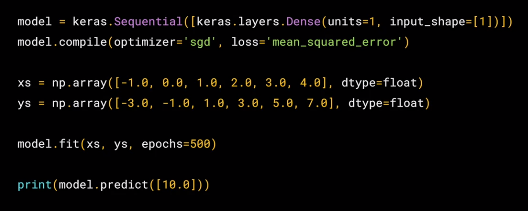
* Best tools to implement ML, DL algorithms
* Complex algo => framework save you a lot of time
* How to use tensorFlow

1. Video 2: A primer in machine learning

* Data => rules => answers
* Get the values from the data, do the calculation and return the result
* Figure out rule of game
* Traditional way
  + Rules and data go into traditional programming and we got answers
  + Rules: on programming language
* The new way
  + Answers and data go into ML Algo and we got rules
  + Developer don’t figure out the rules
* Activity recognition
* New paradigm: need a lot of labeled examples
* Algo will figure out the patterns
* Neural network
* More advanced ways to do ML is DL

1. Video 3: The Hello World of neural networks

* Computer learn the patterns that distinguish things
* Keras is an API is TensorFlow
* Keras to define neural network
* Sequential
* Dense: Fully connected neurons
* Sequential: Successive layer
* Shape of the input
* Number of units
* Functions: Optimizer and loss
* Compile
* Measure how good or bad the connection is => the loss function
* Each guess should be better than the one before
* Accuracy 100% => convergence
* Stochastic gradient descent



* Neural networks deal in probability

1. Video 4: Working through the Hello World in TensorFlow and python

* Google Colab
* Run on the browser
* Use the loss to know how you are doing
* Use the optimizer to reduce the loss

**Week 2**

* + - 1. Video 1: An introduction to computer vision
* ML paradigm
* Computer understand and label what is present in an image
* Lots of pictures
* Computer learn the pattern
* Fashion MNIST
* 28x28
* Grayscale
* ML depends on having good data to train system with
  + - 1. Video 2: Writing code to load training data
* Fashion MNIST available on tensorFlow
* Load data () method
* Train and test set
* Computers do better with numbers
* Using a number is a first step in avoiding bias instead of labeling it with words in a specific language
  + - 1. Video 3: Coding a computer vision neural network
  + Sequential with multiple layers
  + First layer: input\_shape: 28x28 size of images
  + Last layer dense: 10 => softmax
  + Hidden layers
  + Weights of neurons
  + Classification scenario
  + Change layer size to see the impact
    - 1. Video 4: Walk through a notebook for computer vision
  + Neural network work better with normalized data: divide by 255
  + Evaluate on the test set

1. Video 5: Using callbacks to control training
   * Diff number of trainings
   * Stop training when I reach a point that I want to be at
   * At every epoch callback a code function
   * Cancel the training at that points
   * The callback parameter on the fit method
   * On epoch end: don’t stop on the middle => see all the data

**Week 3**

* + - 1. Video 1: Convolutions and pooling
  + Filter kernel
  + Deep neural network
  + Condense the image
  + Detect edges
  + Convolutions: image processing
  + Pass a filter on an image
  + Look to neighbors
  + Center of the kernel
  + Change the image => get some specific features
  + Combine it with pooling
  + Pooling: compress an image
  + Ex: pick the highest value or the average
  + Conv2D
  + MaxPooling2D

1. Video 2: Implementing convolutional layers
   * Define convolutional and pooling layers
   * Number and size of filters
   * Activation and input shape
   * MaxPooling2D Max value
   * Multiple conv-pool
   * End with dense / flatten
   * Summary () method => table that shows us the layers
   * Output shape
   * Padding
   * Pixel margin
   * Stride
   * Number of parameters
   * Passing filter over an image: we reduce the amount of information
   * Extract features

**Week 4**

* + - 1. Video 1: Understanding image generator
  + Real world images
  + More complicated images
  + Need to go further with the conv net
  + Limitations: very uniform data set
  + Features not centered
  + Point at a directory, the subdirectory will automatically generate labels for you
  + Preprocessing. Image
  + The name of directories will be the label
  + Resize images
  + Binary classifier
  + Validation generator should be exactly the same
  + Flow images from a directory
  + Design neural network to handle those complex images

1. Video 2: Defining a conv net to use complex images
   * Horses vs humans
   * Binary classification
   * Sequential
   * More conv/pool
   * Color images => channels = 3
   * Dense: 1 neuron for two classes => sigmoid
   * We reduce with convolutions
   * model.fit\_generator
2. video 3: Training the conv net with model.fit\_generator
   * compile: loss + optimizer
   * Binary cross entropy
   * Rms prop
   * Adam prop
   * Training ¨training directory

Course 2: Convolutional Neural Network

**Week 1**

**At the end of the last video you saw how to explore the training history and discovered an interesting phenomenon: Even though the training data set’s accuracy went very high, we saw that after only a few epochs, the validation set levelled out. This is a clear sign that we are overfitting again. Using more data should help with this, but there are some other techniques that you can use with smaller data sets too. And we’ll see them in next week’s lesson!**