

Tensorflow Workshop

by Vitali Kaiser and Fabian Both



understand.ai

Agenda

Session I (15:00 - 16:15)


- Why Tensorflow?
- Installation
- Run Example Code
- What is a MLP?
- Tensorflow Basics
 - Computation Graph
 - The Session

Agenda

Session II (16:45 - 18:00)

- Step by step explanation
- Change code
 - Use Tensorflow API
- Experiments with parameters
 - What is good, what is bad?

Why Tensorflow?

	Languages	Tutorials and training materials	CNN modeling capability	RNN modeling capability	Architecture: easy-to-use and modular front end	Speed	Multiple GPU support	Keras compatible
Theano	Python, C++	++	++	++	+	++	+	+
Tensor-Flow	Python	+++	+++	++	+++	++	++	+
Torch	Lua, Python (new)	+	+++	++	++	+++	++	
Caffe	C++	+	++		+	+	+	
MXNet	R, Python, Julia, Scala	++	++	+	++	++	+++	
Neon	Python	+	++	+	+	++	+	
CNTK	C++	+	+	+++	+	++	+	

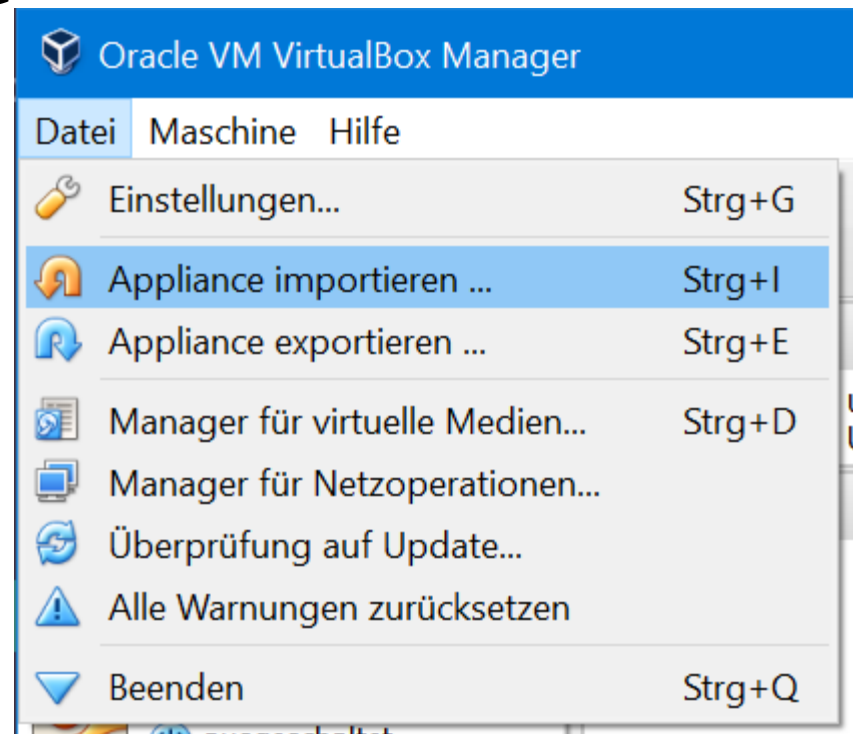
Source: <http://www.kdnuggets.com/2017/03/getting-started-deep-learning.html>

Installation

- Install VirtualBox
- Download virtual machine template
 - <https://goo.gl/UEAeBi>
 - Root password: understandai

Installation

- Start VirtualBox
- Import Appliance

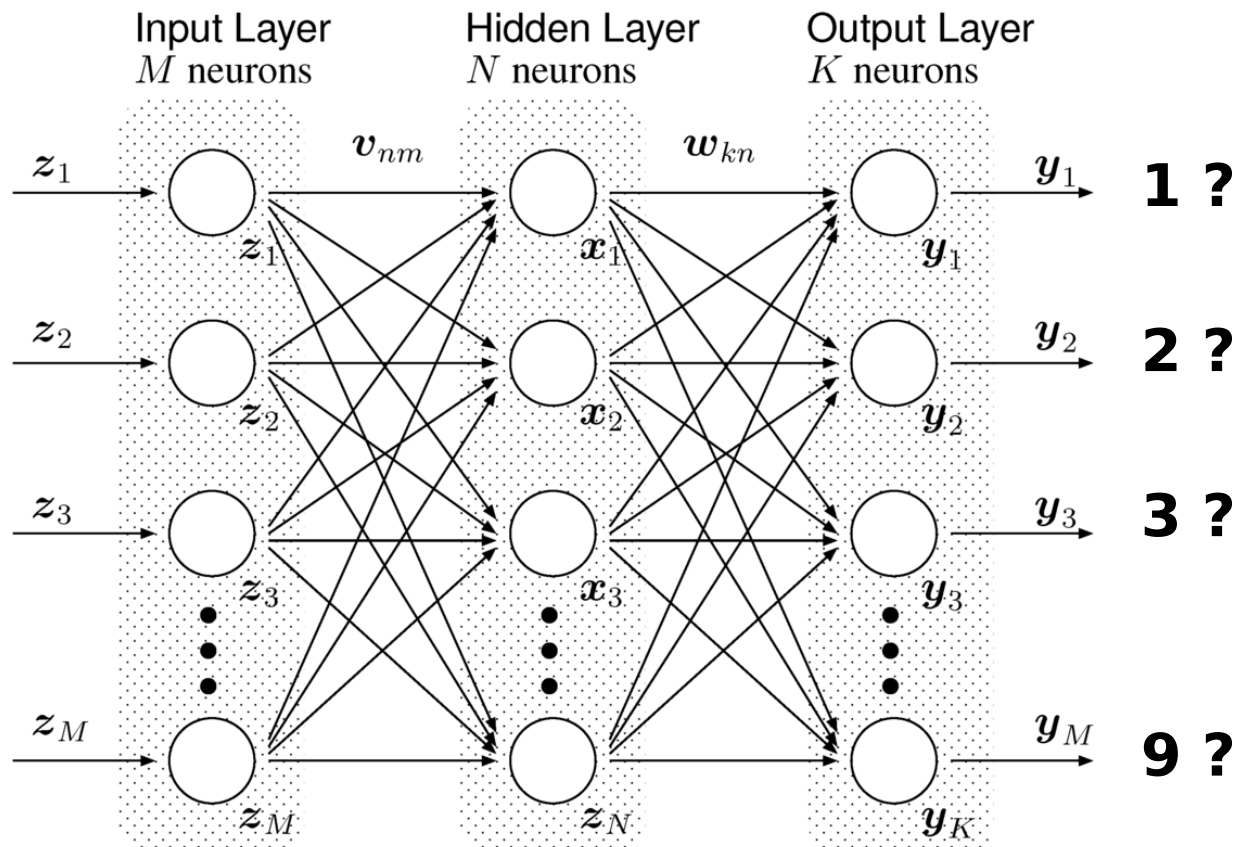
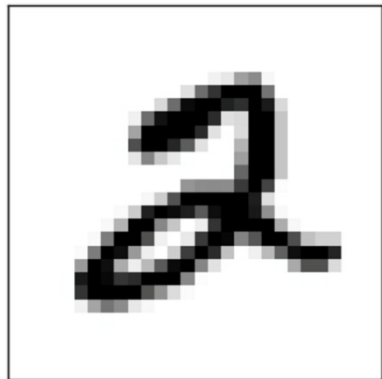


Run Example Code

- Open Pycharm
- Run the code

What is a MLP?

Input (Pixels)



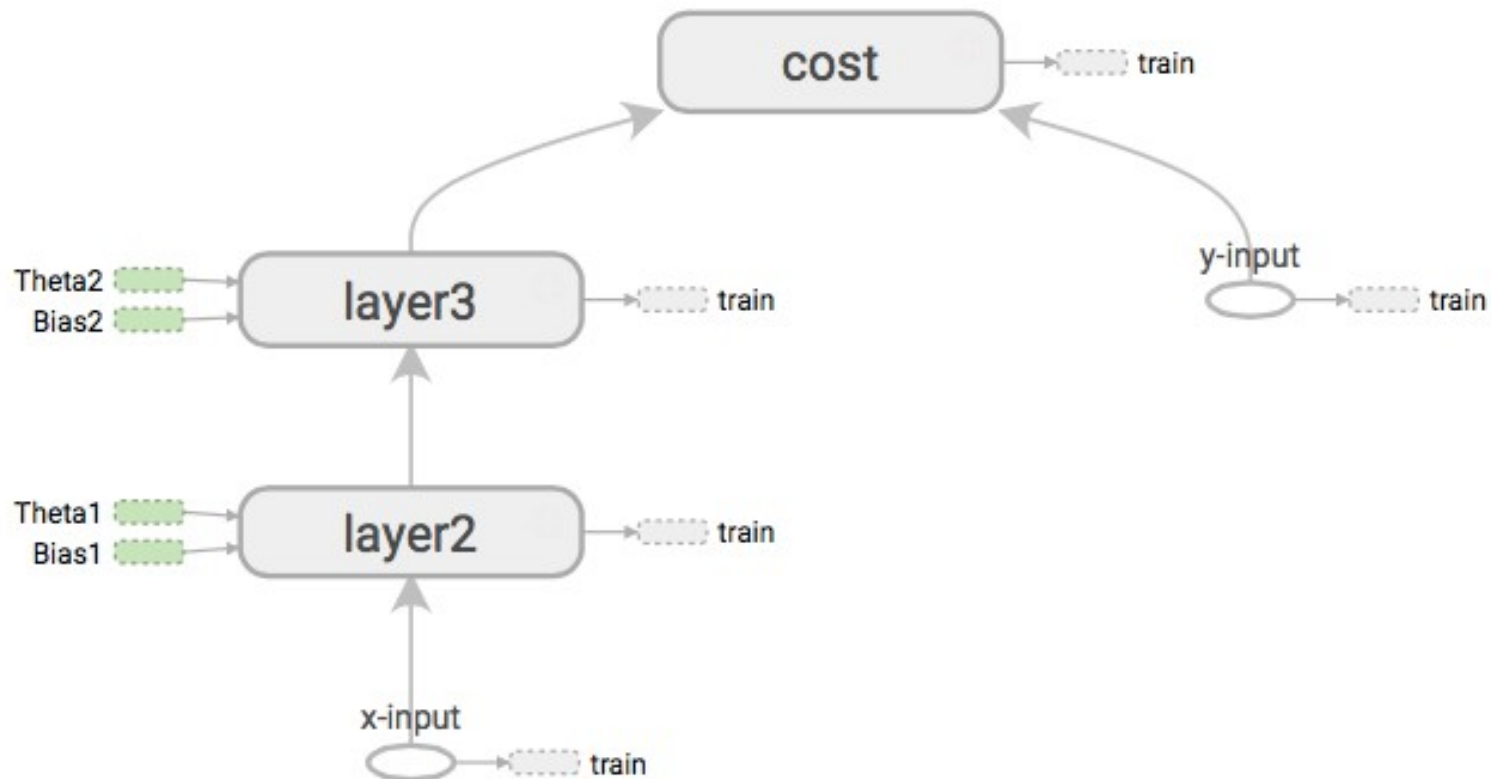
Tensorflow Basics

Computation Graph

- The Tensorflow Graph is used as node representation for your computations
- Only necessary elements for a specific operation are computed
- It is used for Gradient Propagation
- If not specified, the default graph is used

Tensorflow Basics

Computation Graph



Source: <https://aimatters.wordpress.com/2016/01/16/solving-xor-with-a-neural-network-in-tensorflow/>

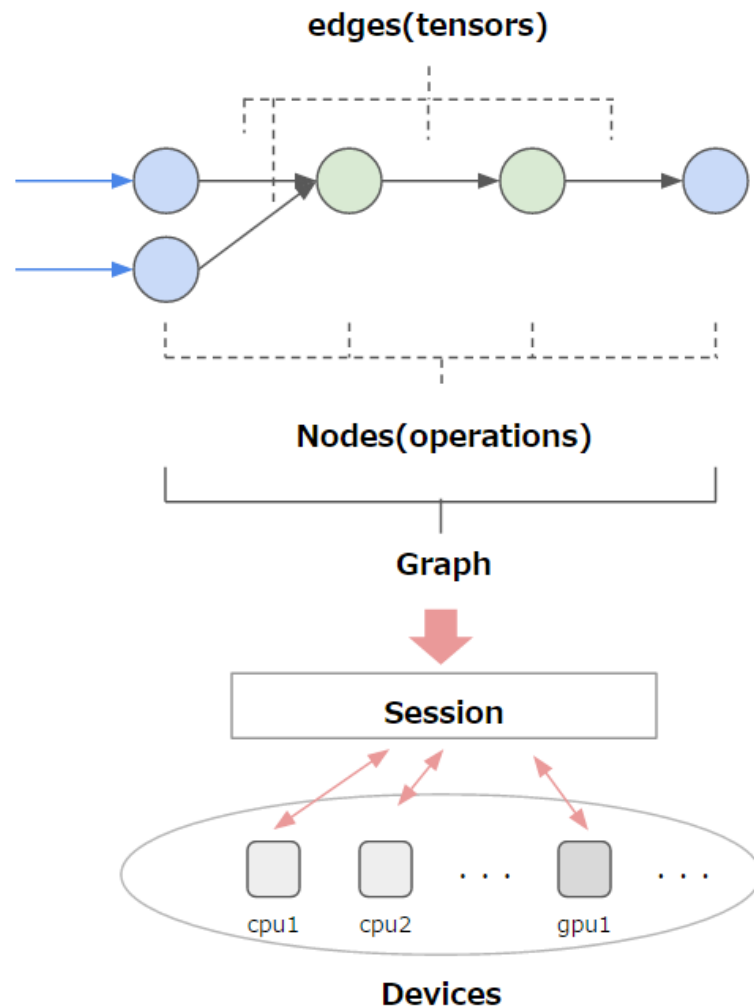
Tensorflow Basics

The Session

- In a session, graph variables are initialized
- Separate sessions (and graphs) can exist
- Sessions are used to execute operations
 - `Session.run([operations], feed_dict, ...)`
- Data can be feed through the `feed_dict`

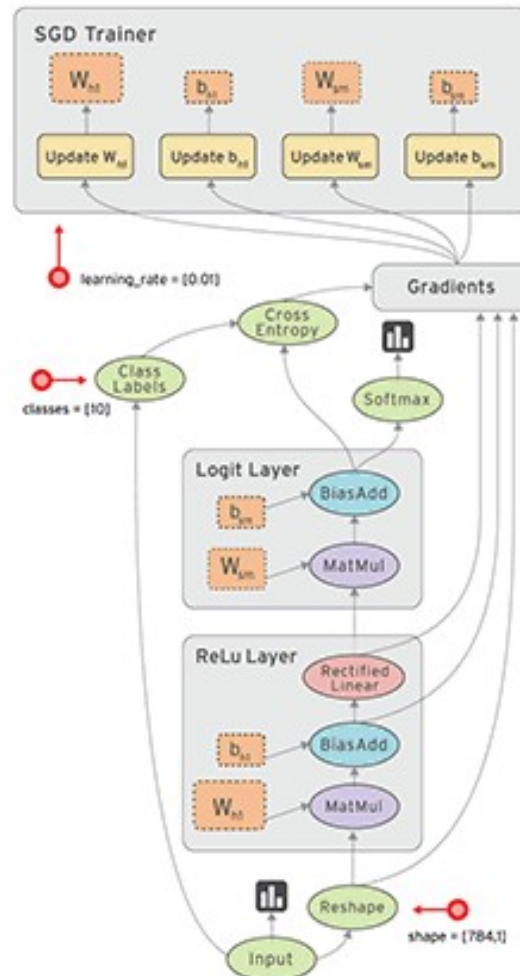
Tensorflow Basics

The Session



Tensorflow Basics

The Session



Explore Tensorboard

- Logfiles of a Run are Stored
- Invoke Tensorboard
tensorboard --logdir=/path/log/folder --port 6006

Agenda

Session II (16:45 - 18:00)

- Step by step explanation
- Change code
 - Use Tensorflow API
- Experiments with parameters
 - What is good, what is bad?

Step by step explanation

- Data Iterator
- Graph Construction
 - Model Inputs
- Loss Function
- Summaries
- Training Loop

Change Code

Use Tensorflow API

- Exchange the optimizer (AdamOptimizer)
- Adjust learning rate during training
 - After 500 steps, divide learning rate by 10

Experiments with parameters

Get the best performance!

- Change Network Architecture
- Change Training Rate
- Change dropout
- ...