Tensorflow Tutorial

Lesson 3

- Characteristics of Tensorflow
- Simple Example

Tools and Applications

- Tensorboard (Visualization of Computation)
- Tensorflow Serving (Server solution)
- Further Tensorflow applications for..
  - Ios
  - Android
  - Linux
  - Windows

Tensorflow components

1. Core
   - Provides access to all elements of Tensorflow
2. Layer
   - Modules made up from elements from Core
3. Estimators
   - Usable components

Tensorflow

- Every tensorflow program is divided into two sections
  - Computatinal graph
  - Execution of the computational graph
- TF divides execution and computation
- The computational graph describes the algorithm

Simple example 1: Addition of two constants

- 10 + 11
- Two constants will be added
- Code:

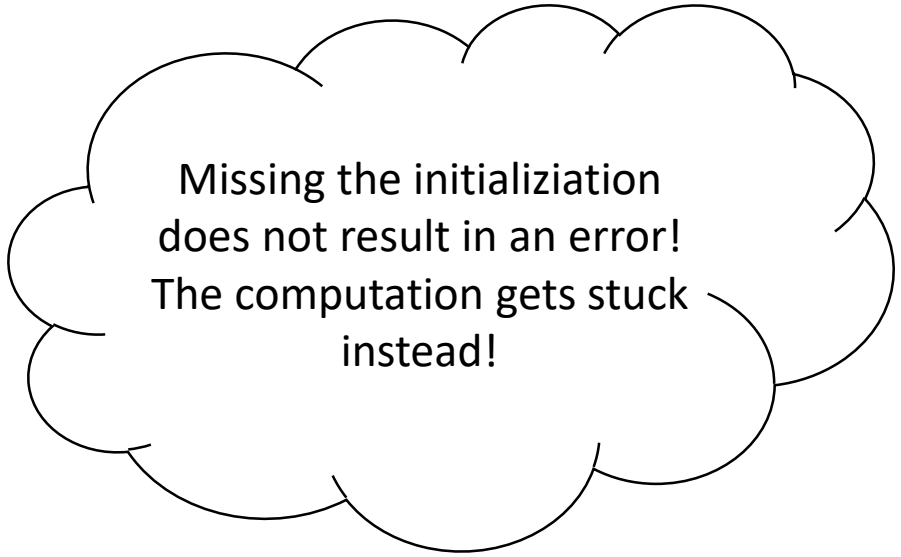
```
##Imports the Tensorflow library
import tensorflow as tf

#Define the constant, with a value, datatype, and a representive name
nc1 = tf.constant(10,tf.float32,name='const1')
nc2 = tf.constant(11,tf.float32,name='const2')

#Describe the addition
na = tf.add(nc1,nc2)


#Invoke run method
with tf.Session() as session:
 print(session.run(na))
```

Simple example 2: Addition and division

- (10 + 11) / (x – y)
- Two constants will be added, and later divided by the difference of a to b
- Tensorflow needs to distinguish between a parameter which gets its value before the computation → In this case a „placeholder“ is used
- If the value is variable during the computation → a variable is used

Simple example 2: Placeholder

- (10 + 11) / (x – y)
- A placeholder will be used for for variable x
- Placeholder with „*tf.placeholder*“
  - x = tf.placeholder(tf.float32,name='x')
- Parse the value for the placeholder during execution with a dic:
  - session.run(nd, {x:5.0})



Simple example 2: Variables

- Variables are defined with „tf.Variable“ – here with default value 5
  - y = tf.Variable(5.0,tf.float32,name='y')

- Variables must be initialized, and the initializer must be given to the session

  - init = tf.global_variables_initializer()
  - session.run(init)

Simple Example 2:

- (10 + 11) / (x – y)

```
##Imports the Tensorflow library
import tensorflow as tf

#Define the constant, with a value, datatype, and a representive name
nc1 = tf.constant(10,tf.float32,name='const1')
nc2 = tf.constant(11,tf.float32,name='const2')

#Define the place holder x
x = tf.placeholder(tf.float32,name='x')

#Define the variable y
y = tf.Variable(5.0,tf.float32,name='y')

#Describe the subtraction
ns = x - y;

#Describe the addition
na = tf.add(nc1,nc2)

#Describe the divison
nd = tf.divide(na,ns)

#Create the Session object
with tf.Session() as session:
  #Initialize variables
  init = tf.global_variables_initializer()
  #parse to session
  session.run(init) print(session.run(nd,{x:7.0}))
```

Overview of further Tensorflow commands

- For a complete overview see: https://www.tensorflow.org/api_docs/

Most common used Tensorflow-operators	
Type	Command (after tf.)
Mathematical Operators on Scalars	Add,Sub,Mul,Div,Exp,Log,Greater,Less,Equal
Mathematical Operators on Vectors	Concat, Slice, Split, Consant, Rank, Shape, Shuffle
Mathematical Operators on Matrices	MatMul, MatrixInverse, matrixDeterminant
Machine learning	SoftMax, Sigmoid, Relu, Convolution2D, MaxPool
IPC	Enqueue, Dequeue, MutexAcquire, MutexRelease
Computational Flow	Merge, Switch, Enter, Leave, NextIteration