Chap 8 - TensorFlow Math

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0.1 TensorFlow Math

We already know how to pass tensors objects to the TensorFlow session either constants or variables.

In [1]:
```
import tensorflow as tf

        # Create a 0-D TensorFlow constant object
        const_value = tf.constant(123)

        # Create a 0-D variable object
        var_value = tf.placeholder(tf.int32)

        with tf.Session() as sess:
            # Evalute the tensor and return the result
            output1 = sess.run(const_value)
            output2 = sess.run(var_value, feed_dict={var_value: 123})
            print('const_value = {}'.format(output1))
            print('var_value = {}'.format(output2))
```

```
/home/supannee/tensorflow/lib/python3.5/site-packages/h5py/__init__.py:36: FutureWarning: Conver
  from ._conv import register_converters as _register_converters


const_value = 123
var_value = 123
```

Next, we are going to use math functions i.e. add, sibtract, multiply and divide, with tensors. Additional math functions can be found in the link.

0.1.1 Addition, Subtraction, Multiplication and Divide

Addition : `tf.add()`
Subtraction : `tf.subtract()`
Multiply : `tf.multiply()`
Divide :
`tf.div(a,b)` ~ `a/b`; If both `a` and `b` are integers, the output will be a floored integer. If `a` and `b` are different type i.e. float and integer, this will require type conversion.
`tf.divide(a,b)` ~ `a//b`

```
In [2]: import tensorflow as tf

        # Define constant
        a = tf.constant(10)
        b = tf.constant(20)

        # Define arithmatic operations
        x1 = tf.add(a,b) # 10+20 = 30
        x2 = tf.subtract(b,a) # 20-10 = 10
        x3 = tf.multiply(a,a) # 10*10 = 100
        x4 = tf.div(a,b) # 10//20 = 0
        x5 = tf.divide(a,b) # 10/20 = 0.5

        with tf.Session() as sess:
            out1 = sess.run(x1)
            print('tf.add(a,b) = {}'.format(out1))
            out2 = sess.run(x2)
            print('tf.subtract(b,a) = {}'.format(out2))
            out3 = sess.run(x3)
            print('tf.multiply(a,a) = {}'.format(out3))
            out4 = sess.run(x4)
            print('tf.div(a,b) = {}'.format(out4))
            out5 = sess.run(x5)
            print('tf.divide(a,b) = {}'.format(out5))

tf.add(a,b) = 30
tf.subtract(b,a) = 10
tf.multiply(a,a) = 100
tf.div(a,b) = 0
tf.divide(a,b) = 0.5
```

The code below will show an error saying a type conversion is required.

ValueError: Tensor conversion requested dtype float32 for Tensor with dtype int32: 'Tensor("Const_22:0", shape=(), dtype=int32)'

```
In [ ]: import tensorflow as tf

        # Define constant
        a = tf.constant(10.0)
        b = tf.constant(20)

        # Define division operations
        x1 = tf.div(a,b)
        x2 = tf.divide(a,b)

        with tf.Session() as sess:
            out1 = sess.run(x1)
```

```
        print('tf.div(a,b) = {}'.format(out1))
        out2 = sess.run(x5)
        print('tf.divide(a,b) = {}'.format(out2))
```

0.1.2 Converting types

The code above required a type conversions.
a = tf.constant(10.0) b = tf.constant(20
Replace `x1 = tf.div(a,b)` with `x1 = tf.div(a, tf.cast(b, tf.float32))`
(we could also convert to tf.float64)

```
In [3]: import tensorflow as tf

        a = tf.constant(10.0)
        b = tf.constant(20)

        x1 = tf.div(a,tf.cast(b, tf.float32))

        with tf.Session() as sess:
            out1 = sess.run(x1)
            print('tf.div(a,b) = {}'.format(out1))
```

```
tf.div(a,b) = 0.5
```

0.1.3 Quiz

Convert the following code to TensorFlow and print the results of the session.

```
   x = 10
y = 2
z = x/y - 1
```

```
In [4]: import tensorflow as tf

        x = tf.constant(10)
        y = tf.constant(2)
        z = tf.subtract( tf.div(tf.cast(x, tf.float32), tf.cast(y, tf.float32)), tf.cast(tf.cons

        with tf.Session() as sess:
            output = sess.run(z)
            print(output)
```

```
4.0
```