

UC Irvine, Division of Continuing Education

Deep Learning Using TensorFlow

Spring 2019

Homework#2

Date Given: April 15, 2019

Due Date: April 21, 2019

There are 7 problems in this homework assignment.

Problem#1:

Write TensorFlow script to do the following:

- Create a constant tensor 'x' with values from 100 to 109.
- Create a constant tensor 'y' with values 34, 28, 45, 67, 89, 93, 24, 49, 11, 7
- Add tensor 'x' and 'y'

Execute the above operation in both 'Lazy' and 'Eager' mode.

Problem#2:

Suppose 'x1' a tensor of shape (2,4).

```
x1 = tf.constant([[1,2,3,4],[5,6,7,8]])
```

Create a new tensor with shape of (4,2,4) using 'tf.stack' function.

Problem#3:

Suppose 'x1' a tensor of shape (2,4).

```
x1 = tf.constant([[1,2,3,4],[5,6,7,8]])
```

Create a new tensor with shape of (1,2,4).

Problem#4:

Suppose 'x1' a tensor of shape (3,4).

```
x1 = tf.constant([[1,2,3,4],[5,6,7,8],[9,10,11,12]])
```

Re-shape this tensor into a new tensor of shape (6,2). Print the values of the new tensor.

Problem#5:

If variables a, b, c, d, and f are scalars, write TensorFlow programs to compute and display the following expressions. Test your statements for the following values.

a = 1.12, b = 2.34, c = 0.72, d = 0.81, f = 19.83

Make sure that the answers computed by your TensorFlow code matches with the given answers.

$$x = 1 + \frac{a}{b} + \frac{c}{f^2}$$

Answers

x = 1.4805

$$s = \frac{b-a}{d-c}$$

s = 13.5556

$$r = \frac{1}{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}$$

r = 0.2536

$$y = ab \frac{1}{c} \frac{f^2}{2}$$

y = 715.6766

Problem#6:

Create a DAG (Directed Acyclic Graph) using TensorBoard for each of the computation done in problem#5. Take a screenshot of the DAG and include in your answer document.

Problem#7:

Given the matrices:

$$A = \begin{bmatrix} 4 & -2 & 1 \\ 6 & 8 & -5 \\ 7 & 9 & 10 \end{bmatrix} \quad B = \begin{bmatrix} 6 & 9 & -4 \\ 7 & 5 & 3 \\ -8 & 2 & 1 \end{bmatrix} \quad C = \begin{bmatrix} -4 & -5 & 2 \\ 10 & 6 & 1 \\ 3 & -9 & 8 \end{bmatrix}$$

Write TensorFlow code to verify the following properties:

a. Associative property

$$\mathbf{A(B+C)} = \mathbf{AB + AC}$$

b. Distributive property

$$\mathbf{(AB)C = A(BC)}$$