AI5031: Machine learning, exercise sheet 8

Please download the MNIST data as described in the e-learning platform and practised numerous times so far... Load the data into Python as usual. Please always use the test data 'testd' and the test labels 'testl', both have 10.000 samples of size 28x28 and 10, respectively.

1 Exercise

Solve the following problems, where every computation is performed by TensorFlow. You can use a single session, and do everything within a single with-statement. Evidently, each sub-exercise requires a separate call to Session.run().
a) Slice out the 1000th sample and display its shape. Slice out its class vector as well and display the scalar class (argmax)!
b) Display the lowest and highest scalar class in all the labels!
c) Display the number of samples having class 9
d) Display the lowest and highest pixel value in the 10th data sample
e) Slice out the 10^{th} sample and apply any of the following modifications (i.e., not successively). Display the shape of the result for confirmation!
- just keep every 2nd row
- just keep every 2nd column
- inverse all rows and all columns
- set the 10 topmost columns to 0
- set the 10 lowermost columns to 0
- invert rows, invert colums, just take every 2th row and every 2th column

f) Extract from the data just the samples having class 4. Use tf.boolean_mask to perform mask indexing!
g) Extract from the data just the samples having class 4 or 9. You may find the function tf.logical_or quite useful for this!