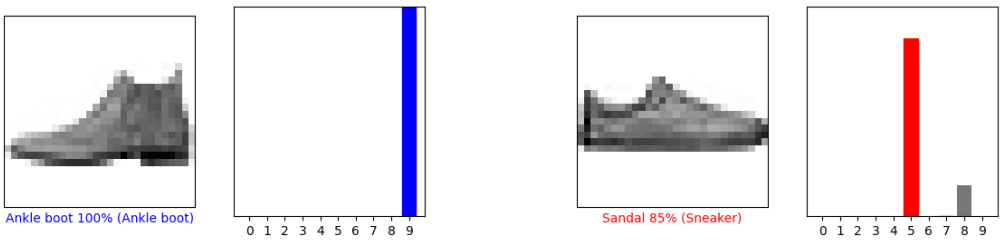
Homework #1 Due date: 2022/03/08

1. This homework is based on the sample code, classification.py, of image classification using a fully-connect neural network . In the code, you can find the parameter called, epochs, which defines the number of iterations during the optimization process.

   ```
   model.fit(train_images, train_labels, epochs=10)
   ```

   Please try the different epochs numbers: 10, 20, 30, 50, 100. Please discuss how the iteration number increase affect the accuracy as well the test accuracy.

2. In the Fig 1, it seem that the classifier has some difficulties to differentiate Ankle boot (class 9) from Sandal (class 6). Unfortunately, we can not increase training at the moment. Another possible approach to increase accuracy is the so-called data augmentation. Right now, we have 60,000 training images. Let us flip each one image horizontally (mirroring) and obtain another 60,000 training images. Therefore, we have 120,000 training images and repeat the training again. Can we increase the accuracy? Please discuss.



(a) (b)

Figure 1: (a) mri-a.256; (b) mri-b.256; (c) mri-c.256

   Simply answer "yes or no", is not acceptable. You need to prepare a detailed discussion about the results that you obtained and propose any possible improvement.

3. Does this classifier really work? As a honorable NTHU student, "to see is to believe" is the doctrine that we believe in. Therefore, you want to test this program by yourself. Please take ten photo pictures of these 10 objects and test the program using this program and report your results and observations.