

# 情報分析・管理論 Report 3

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## Introduction

Although my research domain is not about classification, I am interested in the image classification, especially for the medical image classification. Identifying some special medical image can release people from low accuracy classification. While I have no medical image dataset to do the experiment, I want to use Fashion-MNIST dataset as my dataset and utilize deep learning (neural network) as method to do the image classification task.

## Approach

The image contains several pixels, and each pixel has 3 channels (red, green, blue). Fashion-MNIST has 28\*28 (width and height) pixels and just 1 channel, meanwhile, we only choose 10 classes (t-shirt, trouser, pullover, dress, coat, sandal, shirt, sneaker, bag, ankle boot) from the dataset. The dataset has been shown in Figure 1.



Figure1, Fashion MNIST dataset

<https://www.researchgate.net/publication/342801790/figure/fig2/AS:911232181735425@1594266090934/Sample-images-from-Fashion-MNIST-dataset.png>

We use deep learning method to train this dataset then give it right classification. The detail process has been shown in Figure 2.

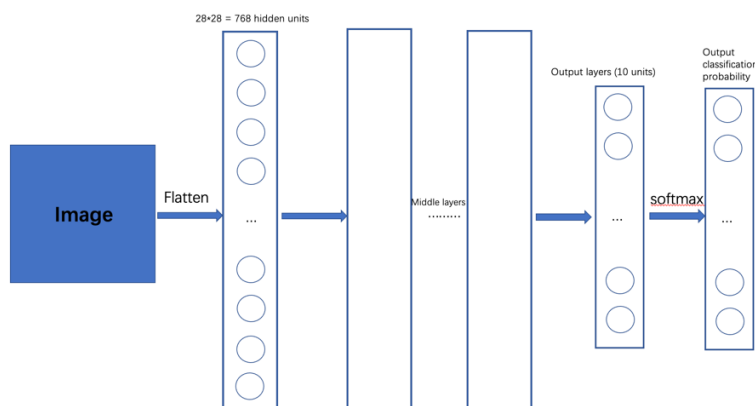


Figure 2, method process by using deep learning

## Experiment

I want to detect the the effect of hidden layers on the overall model and experimental results. Different hidden layer units and different number of layers corresponds to different results. First of all, I set the hidden units is 256 and different numbers of layers (1, 2, 3), then I set same numbers of layers (1 hidden layer) but with different units (256, 784, 1600, 3200). You can get the code from this link:

## Results

The main results have been shown in table 1 and table 2. Table 1 shows the result of the hidden units is 256 and different numbers of layers (1, 2, 3), and Table 2 shows the result of the same number of layers with different hidden units (256, 784, 1600, 3200)

Number of layers	1	2	3	4	5
Test accuracy	0.8541	0.8457	0.8177	0.8022	0.7989

Table 1, the result of the hidden units is 256 and different numbers of layers (1, 2, 3)

Hidden units	256	784	1600	3200
Test accuracy	0.8541	0.8208	0.8411	0.8174

Table 2, the result of the same number of layers with different hidden units

## Discussion

Form the result part, the best configurations are 1 layer with 256 hidden units, the reason why the result get worse when we add number of layers and hidden units is overfitting. Although this a simple experiment and test, the deep learning model can perform better than other methods like SVM and decision tree, thus I can acquire so much knowledge from the deep learning method and this course.

In the future, modify the batch size, learning rate, and model structures can help this model perform better. Meanwhile, add dropout modulus can avoid overfitting and add residual modulus can let the model has more layers. Finally, for the medical image classification, CNN (convolutional neural network) and Transformer recently can also help me a lot, I will try to do that experiments in the later time.