MVA-MP1

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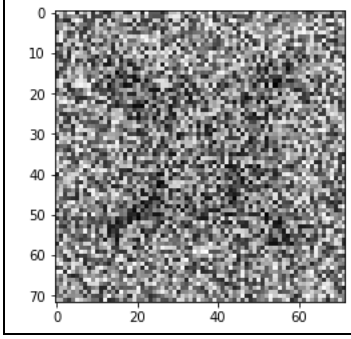
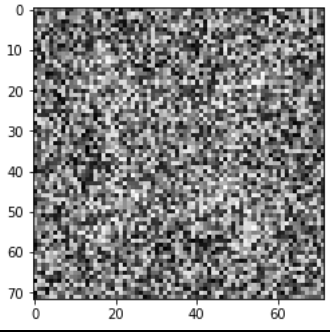
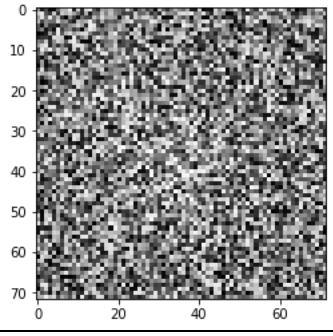
3. Simple Classification + 4. Visualization of the Solution

(a) Stochastic gradient descent optimizer

```
Epoch 30/30
300/300 [==============================] - 0s 178us/step - loss: 11.0140 - acc: 0.3167
```

The final value of loss function is high and accuracy rate is low, so the result is not good. As we can see from the Visualization of the Solution:

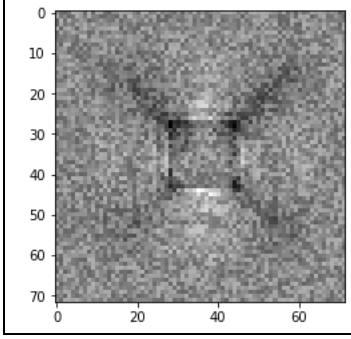
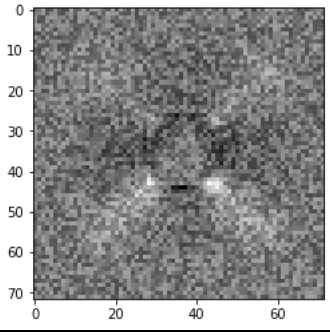
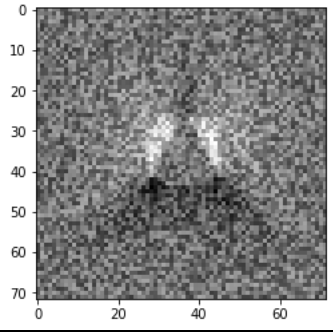
Rectangle	Disk	Triangle
		

It is hard to distinguish.

(b) Adam optimizer

```
Epoch 30/30
300/300 [==============================] - 0s 178us/step - loss: 0.0569 - acc: 0.9933
```

The value of loss function decreases a lot using Adam optimizer and the accuracy rate is increasing a lot too.

Rectangle	Disk	Triangle
		

It is much clearer to distinguish.

5. A More Difficult Classification Problem

```
Epoch 10/10
300/300 [==============================] - 22s 72ms/step - loss: 0.0405 - acc: 0.9967 - val_loss: 0.7711 - val_acc: 0.79
33
```

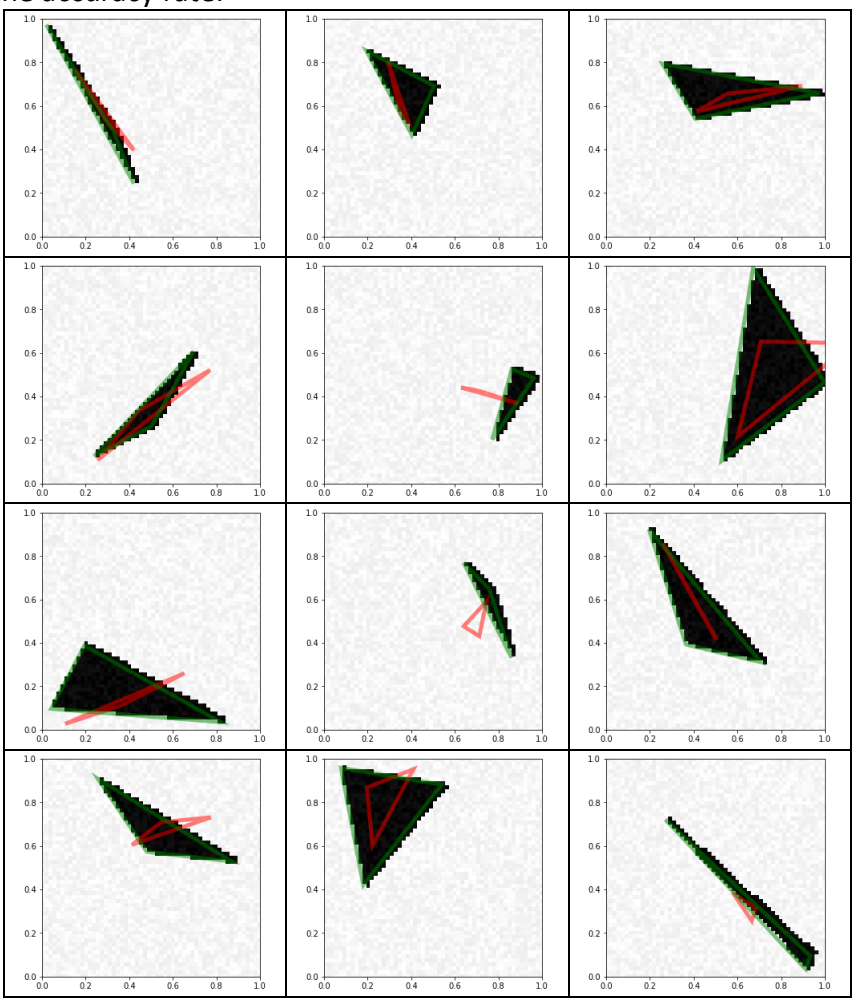
We can see that finally in the training set we will get the value of loss function of 0.0405 and the accuracy rate of 0.9967.

6. A Regression Problem

```
Epoch 6/6
300/300 [==============================] - 19s 62ms/step - loss: 0.0251 - acc: 0.7133 - val_loss: 0.0328 - val_acc: 0.62
67
```

The final result shows that the value of loss function is 0.0251, the accuracy rate is 0.7133. The result is not so perfect, and it will also reflect in the visualization of the solution, I take a 12 samples to present the solut

We can see from the picture that, green part is the actual image, and the red part is the prediction. The result of the prediction are not so perfect, which can also be observed according to the accuracy rate.



7. Image Denoising

```
Epoch 10/10
300/300 [==============================] - 31s 103ms/step - loss: 0.0176 - acc: 0.9934 - val_loss: 0.0161 - val_acc: 0.9
942
```

We can see that the final value of loss function is 0.0176 and the accuracy rate is 0.9934. Also I take some samples to compare the denoising solution with with-noising solution, we can observe that denoised results are less clear than the nosiy ones.

Noisy	Original	Denoised