Project 2 CNN MNIST

My Tensorflow’s version is the newest 2.1 and the function set\_random\_seed() is no long exist in it. Hence, I change line 9-10 to make the example code work in version 2.1.

A screenshot of a cell phone

Description automatically generated

Network:

Layer 0: Input layer

Layer 1: MaxPolling2D layer with pool size (4, 4)

Layer 2: Conv2D layer with 33 filters and kernel size (3, 3). The padding method is “same”

Layer 3: Conv2D layer with 68 filters and kernel size (3, 3). The padding method is “same”

Layer 4: Conv2D layer with 20 filters and kernel size (3, 3). The padding method is “same”

Layer 5: MaxPolling2D layer with pool size (2, 2)

Layer 6: Flatten layer

Layer 7: Dense layer of 1000 nodes

Layer 8: SoftMax

Design:

Since a MaxPolling2D layer is required before Conv2D layers, the data remained is quite limited. Extra MaxPolling2D layer would help little in increasing the final accuracy rate. This was also proved in my later attempts. What I find improve the result most is adding extra Conv2D layers. However, the number of extra layers is also limited, and adding another layer after reaching a certain number of layers would backfire. I also tried to add extra Dense layer and Dropout layer, but they did not work either. I also tried other train samples and my final accuracy rate is above 88% and preferably above 89%.

Results:

Accuracy rate in different stages:

|  |  |
| --- | --- |
| Version | Accuracy |
| Example version: original proj-tf1.py | 0.8348 |
| Optimal result for 1 Conv2D layer | 0.8698 |
| Optimal result for 2 Conv2D layer | 0.8868 |
| Optimal result for 3 Conv2D layer | 0.8888 |
| Final result after refining Dense layer | 0.8908 |

A screenshot of a social media post

Description automatically generated

Accuracy rate for different seeds:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Seed | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Accuracy | 0.8908 | 0.8835 | 0.8887 | 0.8907 | 0.8882 | 0.8899 | 0.8880 | 0.8893 |

From this, I would guess that the default train sample’s seed is equal to 1.