

Chinese MNIST digits recognition

Artificial Neural Networks

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Multiclass classification for handwritten chinese digits recognition.

- Created at University of Newcastle
- 15 classes
- 1000 samples per class
- 100 volunteers (10 samples per class)
- Each picture binarized with format 64x64 pixels

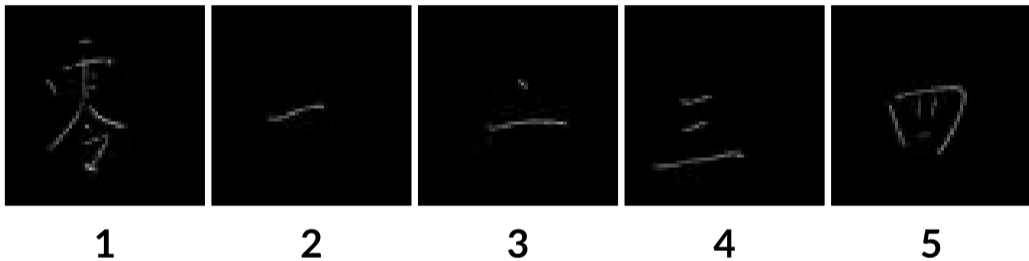


Figure: Example of the images contained in dataset.

Table: Shorten record from the dataset.

pixel 1	pixel 2	pixel 3	pixel 4	...	pixel 4096	label	character
0	0	0	1	...	0	10	X



Figure: Software used to develop program.

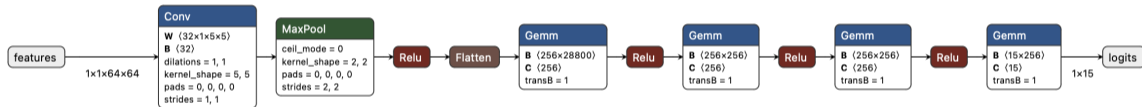


Figure: Network architecture.

```
self.model = nn.Sequential(  
    # Extract features  
    nn.Conv2d(in_channels=1, out_channels=32, kernel_size=5),  
    nn.MaxPool2d(2),  
    nn.ReLU(),  
    # Flatten the feature maps  
    nn.Flatten(1),  
    # Fully connected layers  
    # Picture are 64x64. After Conv2d there are 60x60 because of kernel  
    # size 5. After MaxPool2d there are 30x30 because of kernel size 2.  
    # 32 is the number of output channels from the Conv2d layer.  
    nn.Linear(32 * 30 * 30, 256),  
    nn.ReLU(),  
    nn.Dropout(0.3),  
    nn.Linear(256, 256),  
    nn.ReLU(),  
    nn.Dropout(0.3),  
    nn.Linear(256, 256),  
    nn.ReLU(),  
    # Maps the features to the classes  
    nn.Dropout(0.3),  
    nn.Linear(256, self.NO_CLASSES),  
)
```

Parameters:

- **Batch size:** 128
- **Epoch count:** 30
- **Learning rate (lr):** 0.002
- **Random state:** 314
- **Test subset size:** 0.1
- **Validation subset size:** 0.2

Modules:

- **Optimizer:** Adam
- **Loss criterion:** CrossEntropyLoss

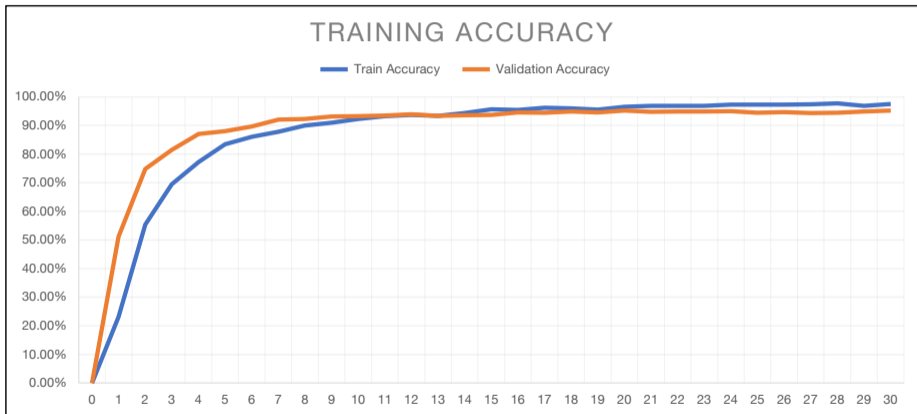
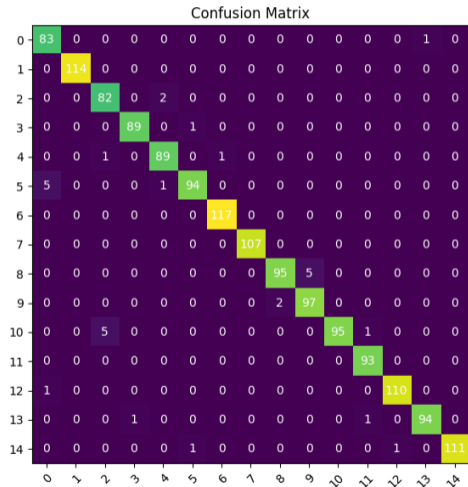


Figure: Accuracy of the training step.

Accuracy 98.0000%

Testing trained model



Wrongly Predicted Images

Predicted: 四, True: 亿



Predicted: 二, True: 三



Predicted: 二, True: 三



Predicted: 九, True: 亿



Predicted: 九, True: 亿



Predicted: 九, True: 亿





K Nazarpour and M Chen, *Handwritten Chinese Numbers*.