

# Competition

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Tensorboys

May 30, 2022

Pattern Recognition

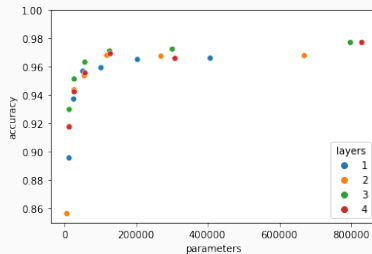
# Agenda

1. Multi-layer Perceptron
2. Convolutional Neural Network

# Multi-layer Perceptron

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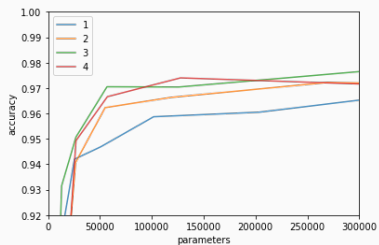
- We've tested multiple architecture from  $784 \times 2 \times 10$  to  $784 \times 512 \times 512 \times 256 \times 128 \times 10$ .
- This process was obviously automated.
- This yielded interesting results.



**Figure 1:** Relation between parameters and accuracy for different model layers. We can see a rapid performance gain in the beginning, then not much difference for many more parameters

# MLP

- 20 epochs and batch size of 128.
- Some good "light" architectures with 3-4 small layers
- For the competition:  
 $784 \times 512 \times 128 \times 64 \times 10$   
trained for 100 epochs
- Precision: 97.78%

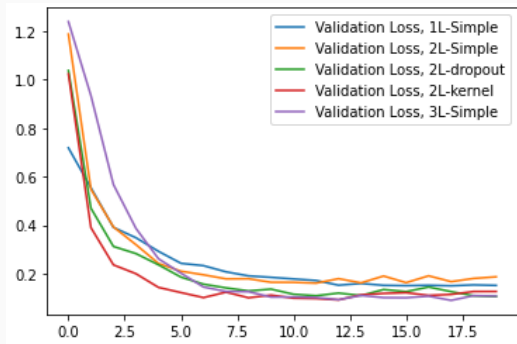


**Figure 2:** Zoomed out version. Useful to find the best ratio between performance and size of model

# Convolutional Neural Network

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- 20 epochs and batch size of 1024.
- Max Pooling after each convolution (could try without)
- one with bigger Kernel, one with a drop out layer after the flattening
- could go bigger but training time get annoying, keep things simple



**Figure 3:** Performance of the different model

- 50 epochs and batch size of 512.
- Trained on the whole training/test set available from before
- Precision: 99.34%

Layer (type)	Output Shape	Param #
conv2d_10 (Conv2D)	(None, 28, 28, 32)	320
max_pooling2d_10 (MaxPooling)	(None, 14, 14, 32)	0
conv2d_11 (Conv2D)	(None, 14, 14, 64)	18496
max_pooling2d_11 (MaxPooling)	(None, 7, 7, 64)	0
conv2d_12 (Conv2D)	(None, 7, 7, 128)	73856
max_pooling2d_12 (MaxPooling)	(None, 3, 3, 128)	0
flatten_5 (Flatten)	(None, 1152)	0
dense_5 (Dense)	(None, 10)	11530
Total params: 104,202		
Trainable params: 104,202		
Non-trainable params: 0		

**Figure 4:** Model used for the competition



Any questions?