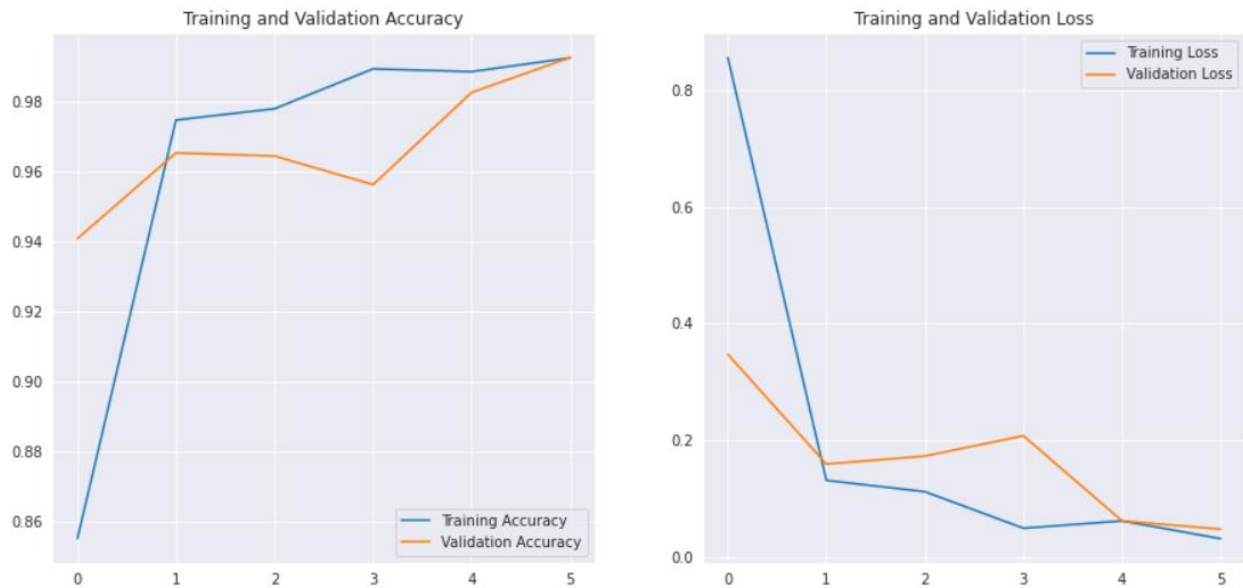


## Final results

First, we trained our AI model only on the numbers dataset. Here is the plot of our training and validation accuracy through 6 epochs.



After training it on 25 epochs, we could see that our best validation accuracy was at epoch #12 with a validation accuracy of 99.73%.

```
+ Code + Texte
non-trainable params: 55,120

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:36: UserWarning: `Model.fit_generator` is deprecated and will be removed in a
...
Epoch 1/1000
310/310 [=====] - 284s 898ms/step - loss: 0.8013 - accuracy: 0.8606 - val_loss: 0.1643 - val_accuracy: 0.9609
Epoch 2/1000
310/310 [=====] - 276s 891ms/step - loss: 0.1153 - accuracy: 0.9771 - val_loss: 0.1276 - val_accuracy: 0.9782
Epoch 3/1000
310/310 [=====] - 277s 892ms/step - loss: 0.1290 - accuracy: 0.9782 - val_loss: 0.0981 - val_accuracy: 0.9782
Epoch 4/1000
310/310 [=====] - 276s 891ms/step - loss: 0.0631 - accuracy: 0.9868 - val_loss: 0.0451 - val_accuracy: 0.9882
Epoch 5/1000
310/310 [=====] - 276s 891ms/step - loss: 0.0398 - accuracy: 0.9913 - val_loss: 0.2058 - val_accuracy: 0.9564
Epoch 6/1000
310/310 [=====] - 277s 892ms/step - loss: 0.0601 - accuracy: 0.9895 - val_loss: 0.0305 - val_accuracy: 0.9936
Epoch 7/1000
310/310 [=====] - 278s 895ms/step - loss: 0.0310 - accuracy: 0.9925 - val_loss: 0.0990 - val_accuracy: 0.9836
Epoch 8/1000
310/310 [=====] - 279s 899ms/step - loss: 0.0531 - accuracy: 0.9909 - val_loss: 0.8137 - val_accuracy: 0.9191
Epoch 9/1000
310/310 [=====] - 280s 904ms/step - loss: 0.0726 - accuracy: 0.9884 - val_loss: 0.0764 - val_accuracy: 0.9945
Epoch 10/1000
310/310 [=====] - 277s 892ms/step - loss: 0.0306 - accuracy: 0.9916 - val_loss: 0.3715 - val_accuracy: 0.9345
Epoch 11/1000
310/310 [=====] - 279s 899ms/step - loss: 0.0555 - accuracy: 0.9894 - val_loss: 0.0682 - val_accuracy: 0.9900
Epoch 12/1000
310/310 [=====] - 275s 888ms/step - loss: 0.0170 - accuracy: 0.9968 - val_loss: 0.0073 - val_accuracy: 0.9973
Epoch 13/1000
310/310 [=====] - 275s 885ms/step - loss: 0.0119 - accuracy: 0.9966 - val_loss: 0.0417 - val_accuracy: 0.9936
Epoch 14/1000
310/310 [=====] - 275s 887ms/step - loss: 0.0777 - accuracy: 0.9869 - val_loss: 0.3703 - val_accuracy: 0.9300
Epoch 15/1000
310/310 [=====] - 274s 883ms/step - loss: 0.0483 - accuracy: 0.9894 - val_loss: 0.0354 - val_accuracy: 0.9936
```

After that, we trained a new model on both the numbers dataset and the alphabet dataset. We trained it on 2 epochs and got the following results.

```
Model: "sequential_1"
Layer (type)                 Output Shape                 Param #
=====
resnet50 (Functional)        (None, 2048)                 23587712
flatten_1 (Flatten)          (None, 2048)                  0
dense_2 (Dense)               (None, 512)                 1049088
dense_3 (Dense)               (None, 39)                   20007
=====
Total params: 24,656,807
Trainable params: 24,603,687
Non-trainable params: 53,120

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:41: UserWarning: `Model.fit_generator` is deprecated and will be removed in a
Epoch 1/2
1938/1938 [=====] - 1507s 775ms/step - loss: 0.3066 - accuracy: 0.9327 - val_loss: 0.0921 - val_accuracy: 0.9710
Epoch 2/2
1938/1938 [=====] - 1445s 745ms/step - loss: 0.0580 - accuracy: 0.9840 - val_loss: 0.1916 - val_accuracy: 0.9490
```

As our best final results, we have a validation accuracy of 97.1%. We can see that the validation accuracy was better after one epoch than after 2 epoch, showing that our AI model was starting to overfit quickly.