

# MAIS 202 Assignment 4

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## I – Implementation of the model

I chose to use a convolutional neural network for this problem since this is image recognition. However, to boost the performances I implemented the same logic as the random forest algorithm, meaning I have multiple classifiers all making their prediction on the data, and the final prediction is made following a majority vote logic.

Every model has 5 convolutional layers with 64 filters each and a 3x3 kernel, 1 stride, padding and a relu activation function. There is a 2x2 max-pooling layer between each convolutional layer. Then at the very end of the network we have the classifier, made of 64 perceptron with linear activation, before the output layer of 10 neurons with softmax activation to give us a probability distribution of what the actual thing in the picture is.

We train every model on 5 epochs using the training dataset. The validation is performed on a different part of the dataset for each model, so each one has a slightly different training set, and all the training data is used.

To determine the prediction of each model we take the output with the highest probability. Then we compare it to the prediction of every other model and pick the final answer based on majority vote.

## II – Results

Individual models seem to perform marginally better with more filters per layer and more convolutional layers. However, we are limited by the fact that we are training 10 models each time, making big models not worth the time they take to train since the improvement in performance does not match the majority vote of 10 slightly less precise models.

Creating this majority vote system makes a somewhat significant improvement in the performances of the whole, as it goes from 84% for an individual model to about 87.7% for 25 together. Increasing the number of models is expected to improve performances further, but training gets proportionally longer with diminishing returns.

## III – Challenges

The most significant challenge was learning the existence of this assignment at 12 the day it was due, and therefore being forced to come up with a satisfying solution in an extremely short time span. Furthermore, implementing an efficient majority-vote system that takes a reasonable time to output values required some tricky matrix manipulations.

## IV - Conclusion

I learned to pay more attention to my upcoming deadlines. Also, that its actually shockingly quick to come up with a decent image recognition model.

## V- Individual contribution

I did everything

Github: [Scezaquer/Kaggle-competition-MAIS-2022: Cloth image recognition \(github.com\)](https://github.com/Scezaquer/Kaggle-competition-MAIS-2022: Cloth image recognition)