

## Regularization Methods and their effectiveness on ANNs

Group I

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We shall be studying the effects of different regularization methods on a form of artificial neural networks, a convolutional neural network. Regularization is a main method to reduce overfitting by means of placing constraints on the variance of the weights. The dataset we are aiming to train on is either of the MNIST, CIFAR10 or CIFAR100 datasets, implemented in keras. We hope to explore 2 different datasets and compare the effect of regularization on each one.

The convolutional neural net will likely consist of 1-2 convolutional layers followed by a linear layer output. In these layers, we shall introduce dropout and batchnorm layers as required by the different approaches, resulting in 4 different networks for the combinations. These networks are trained concurrently using L1,L2 in addition to the features baked into the system.

We aim for both datasets to be applied in training, such that we can compare the result of the different regularizers in a simple and more complex set, yielding comparative results.

### Outline

- Introduce Machine Learning
- Introduce Neural Networks
- Train a neural network, explain our neural network: what it is doing and why
- What is regularization and why we do it?
- What are the 4 main methods and explain each of them
- Perform regularizations and compare each of them to the non-regularized
- Compare the 4 regularized outputs:
  - Accuracy
  - Accuracy per class
  - Train loss
  - Test loss
  - Over regularization
- Optional: repeat with combinations of methods
- Conclusion, which solution is optimal. Explanation.

### Course of action for Friday:

Introduce each group member on how to code a neural network themselves. Finalise our decision on which datasets to use and start fitting our network to them.