

# Deep Learning Engineer Test

The field of machine learning and, more specifically, deep learning is growing tremendously fast. Year by year, a number of new operators appear claiming notable improvements on datasets like ImageNet and CIFAR. In this test, we will study the paper [Batch Normalization: Accelerating Deep Network Training by Reducing Internal Covariate Shift](#).

Theoretical part:

1. Read the paper and explain the main motivation of their work.
2. Describe the processing block that they propose and enumerate the operations that are involved.

Practical part:

3. [LeNet](#) is a well-known architecture from Yann LeCun for digit recognition. Look for an implementation on the internet in keras+tensorflow and evaluate its performance on MNIST dataset.
4. Implement the proposed Batch Normalization (BN) block in keras+tensorflow.  
**NOTE: Do not import Keras BatchNormalization layer. Instead, implement your own BN layer using Keras and/or Tensorflow.**
5. Modify the LeNet architecture to include one or multiple BN blocks where you consider it useful and evaluate the new performance on MNIST.
6. Explain the results and your conclusions.

Evaluation criteria (in this order):

- Good practices on coding for **production**.
- Correct **use of the frameworks** (keras/tensorflow).
- **Understanding** of the problem.