

ML in Fundamental Physics

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Exercise Sheet 10

Submission by Thursday 1th of July 12:00 via gitlab and Moodle.

Format for all questions: individual Jupyter notebooks .ipynb.

Submissions after the deadline will not be accepted. (The solution will be discussed in the tutorial at 12:00)

1 Variational Autoencoder (autograded)

The aim of this exercise is to implement the variational autoencoder and to test it on the polynomial dataset from the previous exercise sheet.

- Implement the loss function of the variational autoencoder in your previous architecture.
- Compare the performance and the latent space representations of the traditional autoencoder and your variational autoencoder.
- * There is a quicker way of implementing the variational autoencoder using the tensorflow probability package. Using this package implement your variational autoencoder. As indicated, this exercise is optional.

Follow the instructions in the jupyter notebook.

2 Self implemented training procedure (peer corrected)

Take your favourite data class of MNIST from one of the past sheets. Write a classification model of your choice and fit it with the in-built fit function `model.fit()`. Then write a custom training loop and fit your model with it. Compare the performance and timing.

Consider using `@tf.function`.