

6.9.2021

UNIVERSITY OF  
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## Short-course on evaluation of machine learning algorithms

KUBIAC will organize an intensive course about hands on convolutional neural networks for image analysis on Monday 11th October (10 – 14 – with a lunch break) and Thursday 14th October (10 – 14 with a lunch break) [approximately 2x 3 h of lectures]. The instructors will be Jussi Tohka and Riccardo De Feo. Please register via below link:

<https://forms.office.com/r/ktMkGzWfXY>

### Course description:

**Synopsis:** During this course we will introduce the methods for the evaluation of machine learning algorithms and demonstrate their implementation in Python.

**Schedule:** Mon 11th October 2021 10.00 - 14.00

Thu 17th June 2021 10.00 - 14.00

Instructor: Jussi Tohka (lectures), Riccardo De Feo (demonstrations)

**Preliminary knowledge:** Participants should have basic knowledge of some programming language and machine learning to benefit from the course

**Platform:** Zoom. The zoom link will be sent to the participants by email few days before the first lecture

**Material:** The course is based on a recent tutorial article:

J. Tohka, M. van Gils. Evaluation of machine learning algorithms for health and wellness applications: A tutorial. Computers in Biology and Medicine, Volume 132, May 2021, 104324.

<https://doi.org/10.1016/j.combiomed.2021.104324>

Content:

- Day 1:

- 1) Bayes optimality and generalization error in classification,
- 2) Cross-validation to estimate the generalization error,
- 3) Cross-validation for model selection and error estimation (nested cross validation),



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#### 4) Common pitfalls

#### 5) Practical cross-validation in Python (Riccardo),

- Day 2:

1) Performance measures for classification, confusion matrix,

2) Performance measures for regression,

3) Image segmentation performance measures

4) Caveats of counting based estimates of the generalization error

5) Alternatives to Cross-validation

Potential questions can be addressed to [jussi dot tohka at uef dot fi](mailto:jussi.tohka@uef.fi)