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Stochastics

In the summer term 2021 I am teaching the course (**module M39**)

Mathematics for machine learning

The course will be taught in English to facilitate participation by international students.

Contents:

This course gives an introduction into mathematical methods and theory for machine learning. We will follow for a large part the book by Shalev-Schwartz and Ben-David, starting from probably-approximately-correct (PAC) learning models, including methods like boosting, support vector kernels, stochastic gradient descent, decisions trees, neural networks (just briefly). As time permits, further topics may include: Gaussian processes in ML for regression and classification, re-inforcement learning for Markov decision processes.

Prerequisites:

Content from compulsory modules at HU for bachelor degree (mono), incl. measure theory and Stochastics-I. Recommend is Stochastics-II (i.e. the BMS-course stochastic processes I), as you will need knowledge about conditional expectations, regular conditional distributions, or Markov chains, as in textbooks by A.Klenke or Meintrup/Schäffler, at some point.

References: Further references will be given in the lecture.

- Shai Shalev-Shwartz and Shai Ben-David. Understanding Machine Learning: From Theory to Algorithms. Cambridge Univ. Press, 2014. (authors' web link)

Lecture: *Tuesday, 11 – 13, digital.*
Class: *Thursday, 09 – 11, digital* (bi-weekly or by announcement).

First lecture (class): April 13 (resp. April 22).

The **Moodle** course page will provide all current information about times for lectures, classes or lab sessions and possible changes, if any. Moodle access is to be send through AGNES. Check www.math.hu-berlin.de/~becherer for further information.

Teaching assistant: Ms. Martha Nansubuga (nansubum+at+hu-berlin.de)
Office hours by appointment.