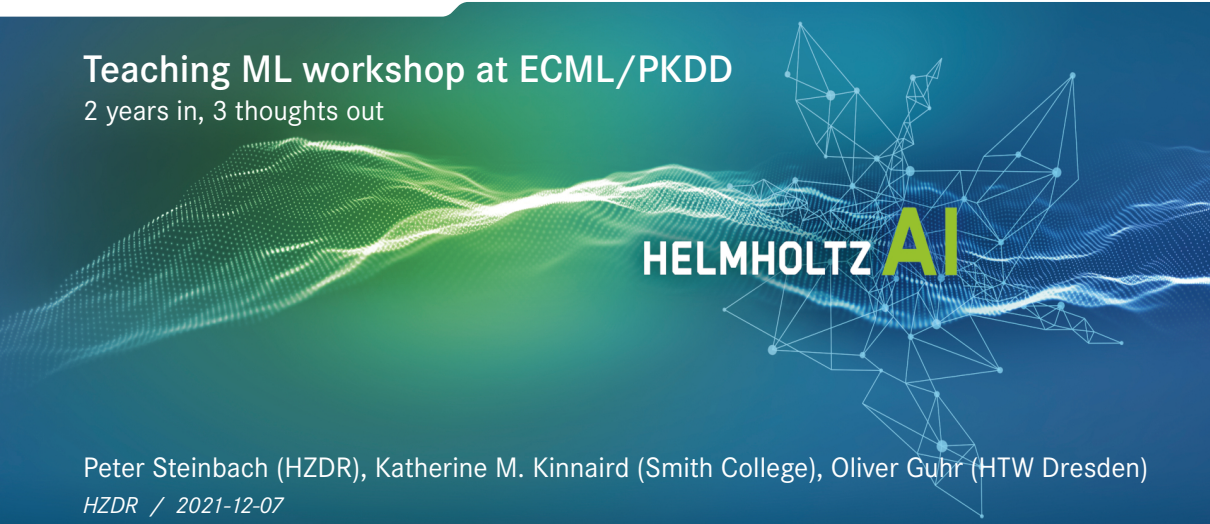
HELMHOLTZ AI | ARTIFICIAL INTELLIGENCE COOPERATION UNIT

Teaching ML workshop at ECML/PKDD

2 years in, 3 thoughts out



Peter Steinbach (HZDR), Katherine M. Kinnaird (Smith College), Oliver Guhr (HTW Dresden)

HZDR / 2021-12-07

Why a workshop?

Machine Learning everywhere in 2018/2019

Figure: from flickr

- MOOCs spurring everywhere

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- academic courses available to students during semester

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- ...

What are common methods? What are common challenges?

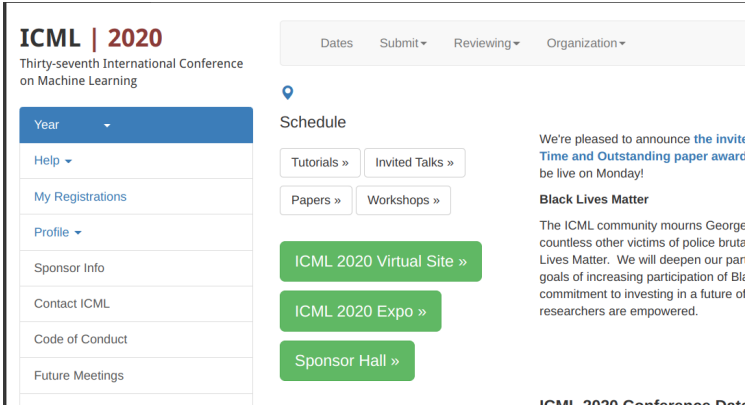


Figure: screenshot, 2021-12-06

Reject and Resubmit!

Figure: screenshot, 2021-12-06

our first workshop: 2020 edition!

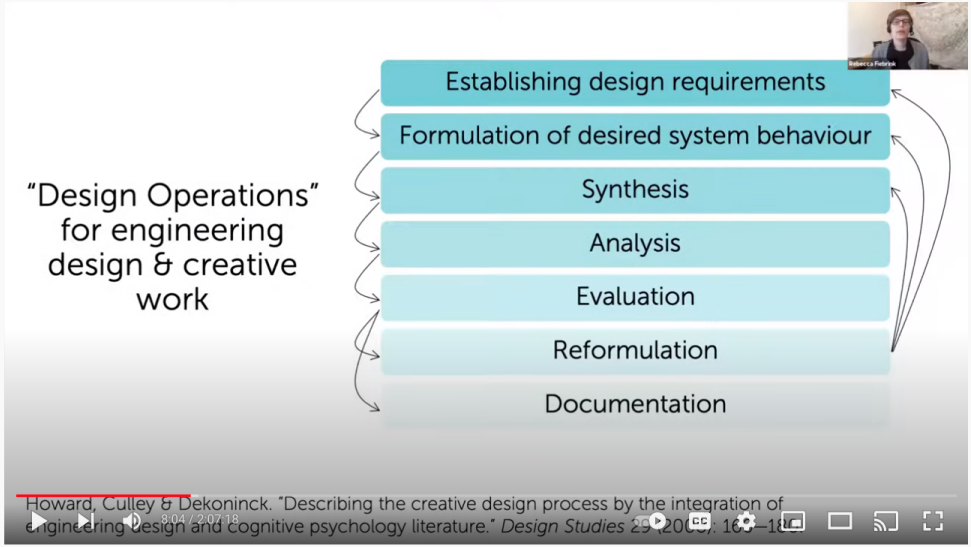
Figure: Heidi Seibold

Figure: Oliver Guhr

Figure: Peter Steinbach

teaching-ml.github.io/2020/

satellite event: presentation by Rebecca Fiebrink



Didactics of Data: Apporaches to Teaching and Pedagogical Research for Applied ML - Rebecca Fiebrink

workshop event 2020

- 9 papers received

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- regular review discussions offered
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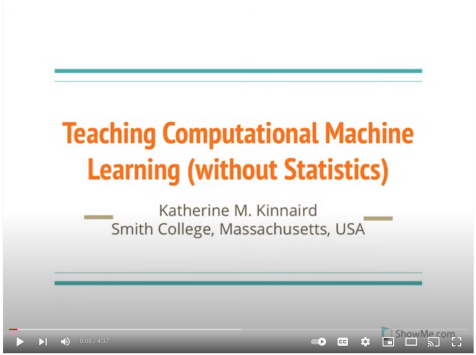
- prerecorded or live talks of the papers at the event

workshop event: my highlights



Teaching Computational Machine Learning (without Statistics) - Katherine M. Kinnaird

Figure: see paper or youtube video for details

Teaching the Foundations of Machine Learning with Candy - Daniela Huppenkothen

Figure: see paper or youtube video for details

our second workshop: 2021 edition!

Figure: Katie M. Kinnaird

Figure: Oliver Guhr

Figure: Peter Steinbach

teaching-ml.github.io/2021/

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satellite event 2021

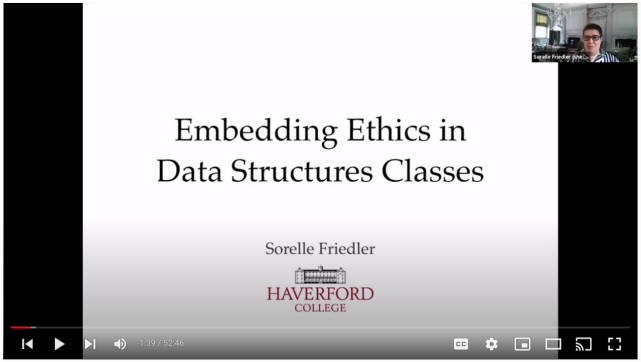
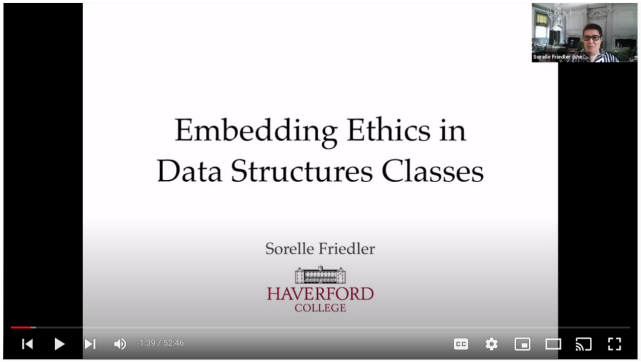


Figure: from youtube playlist

- topics of interest: MOOCs, ethics, inclusion

Diversity!

satellite event 2021



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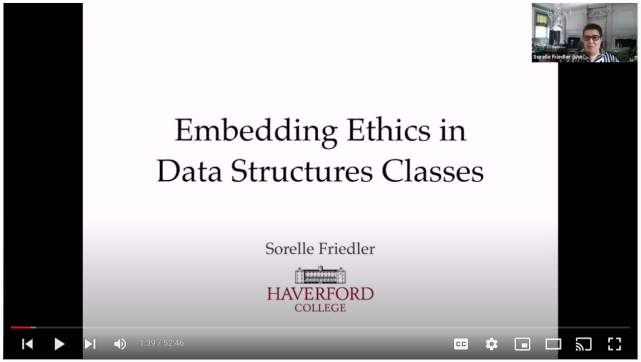

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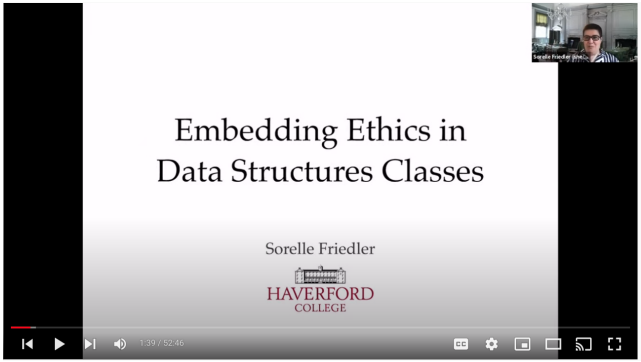

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- around 30 people connected
- videos shared on zoom
- ML is a part of CS!

Diversity!

papers 2021: common themes

- projects, projects, projects ...end-to-end projects

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- slidedecks do not make good learners
- live-coding is a central tool
- open-source platforms
- only do math if you need to

Using Matchboxes to Teach the Basics of Machine Learning: an Analysis of (Possible) Misconceptions

Erik Marx [1] **Thiemo Leonhardt** [1] **David Baberowski** [1] **Nadine Bergner** [1]

Abstract

The idea of chess-playing matchboxes, conceived by Martin Gardner as early as 1962, is becoming more and more relevant in learning materials in the area of AI and Machine Learning. Thus, it can be found in a large number of workshops and papers as an innovative teaching method to convey the basic ideas of reinforcement learning. In this paper the concept and its variations will be presented and the advantages of this analog approach will be shown. At the same time, however, the limitations of the approach are analyzed and the question of alternatives is raised.

& Lehmann also discuss other hard-to-define concepts such as difficulties, mistakes, and bugs, stating that there is no single definition (Qian & Lehman, 2017). As a definition for misconceptions in CS programming education (Sorva, 2012) states the following: “understandings that are deficient or inadequate for many practical programming contexts”. In reference to (Ohrndorf, 2016) we define misconceptions as cognitive representations of knowledge that contradict or deviate from the scientifically correct concepts.

(Heuer et al., 2021) examined machine learning tutorials for misconceptions and misleading explanations, identifying four main misconceptions: (H1) ML as adapting in response to new data and experiences to improve efficacy over time;

Deeper Learning By Doing: Integrating Hands-On Research Projects Into A Machine Learning Course

Sebastian Raschka [1]

Abstract

Machine learning has seen a vast increase of interest in recent years, along with an abundance of learning resources. While conventional lectures provide students with important information and knowledge, we also believe that additional project-based learning components can motivate students to engage in topics more deeply. In addition to incorporating project-based learning in our courses, we aim to develop project-based learning components aligned with real-world tasks, including experimental design and execution, report writing, oral presentation, and peer-reviewing. This paper

students? While we cannot answer this definitively, in this paper, we describe our DL course featuring project-based learning components, where students work on original questions and research topics that interest them.

Three years ago, we began designing ML and DL courses with substantial student project components, including an original research proposal, conference paper-style project report, oral class presentation, and paper peer-review. We have adopted and refined this approach throughout teaching six ML and DL courses. While similar project-based elements were used in different ML and DL courses, this paper will only focus on the latest DL course.

summary

three thoughts out!

- learn while you do teach!

  (on teaching methods, learner preferences/requirements, inclusion)

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- collaborate across borders

  (it is fun! and super instructive)

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  (stay humble, stay patient, your learners decide eventually)

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Thank you for your attention!

Happy to take question, feedback or concerns?