

Teaching ML workshop at ECML/PKDD

2 years in, 3 thoughts out

HELMHOLTZAI

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HZDR / 2021-12-07

Why a workshop?

Machine Learning everywhere in 2018/2019



- MOOCs spurring everywhere

Figure: from flickr

Machine Learning everywhere in 2018/2019



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- academic courses available to students during semester

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- intensive courses to academics (upper graduate, PhD level)
- industry courses for engineers

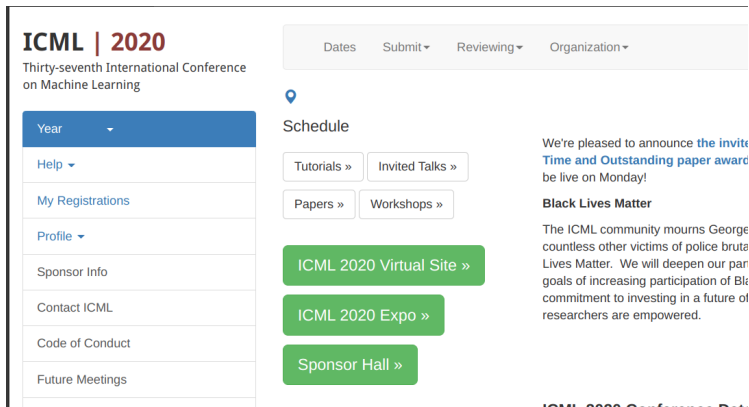
Machine Learning everywhere in 2018/2019



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- academic courses available to students during semester
- intensive courses to academics (upper graduate, PhD level)
- industry courses for engineers
- ...

What are common methods? What are common challenges?



The screenshot shows the ICML 2020 website. The header includes the ICML 2020 logo and the text "Thirty-seventh International Conference on Machine Learning". A navigation bar contains links for Dates, Submit, Reviewing, and Organization. A left sidebar lists various user options like Year, Help, My Registrations, Profile, Sponsor Info, Contact ICML, Code of Conduct, and Future Meetings. The main content area features a "Schedule" section with buttons for Tutorials, Invited Talks, Papers, and Workshops. Below this are three green buttons: "ICML 2020 Virtual Site", "ICML 2020 Expo", and "Sponsor Hall". To the right, there is an announcement about the "the invite Time and Outstanding paper award" and a section titled "Black Lives Matter" with a statement from the ICML community.

ICML | 2020
Thirty-seventh International Conference
on Machine Learning

Year ▾
Help ▾
My Registrations
Profile ▾
Sponsor Info
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Schedule

Tutorials » Invited Talks »
Papers » Workshops »

ICML 2020 Virtual Site »
ICML 2020 Expo »
Sponsor Hall »

We're pleased to announce [the invite Time and Outstanding paper award](#) be live on Monday!

Black Lives Matter

The ICML community mourns George countless other victims of police brutal Lives Matter. We will deepen our par goals of increasing participation of Bl: commitment to investing in a future of researchers are empowered.



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

"Design Operations"
for engineering
design & creative
work

Establishing design requirements

Formulation of desired system behaviour

Synthesis

Analysis

Evaluation

Reformulation

Documentation

Howard, Culley & Dekoninck. "Describing the creative design process by the integration of engineering design and cognitive psychology literature." *Design Studies* 29 (2008): 163–180

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

workshop event 2020

- 9 papers received

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- prerecorded or live talks of the papers at the event

workshop event: my highlights

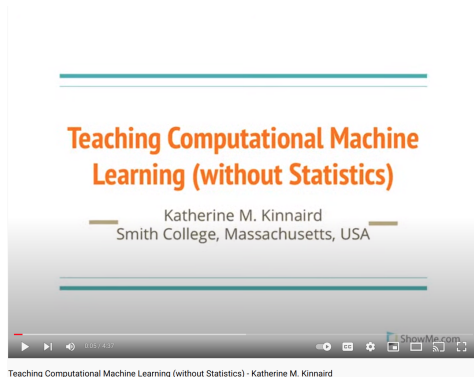


Figure: see [paper](#) or [youtube video](#) for details



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/

papers 2021

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(again: consultation with support multiple times)
- **16 papers accepted**

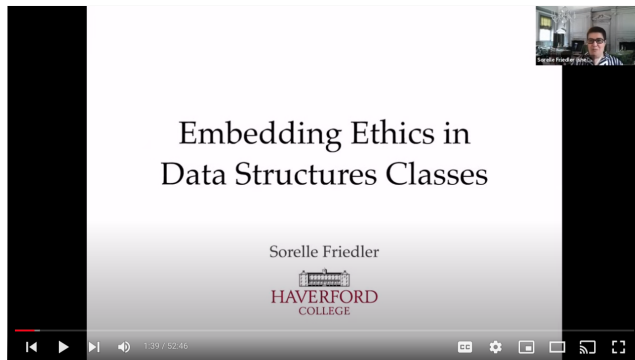


Figure: from [youtube playlist](#)

- topics of interest:
MOOCs, ethics,
inclusion

Diversity!

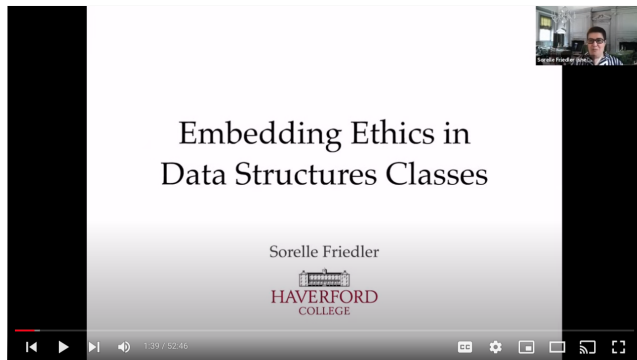


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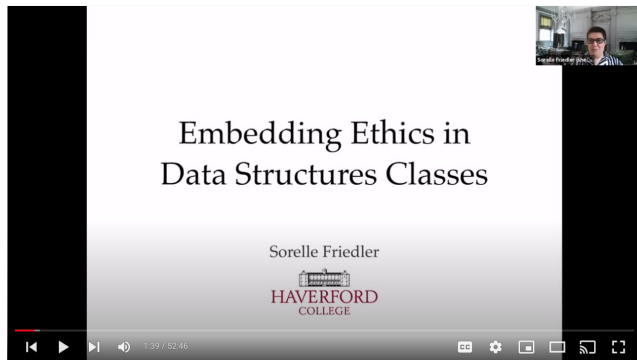


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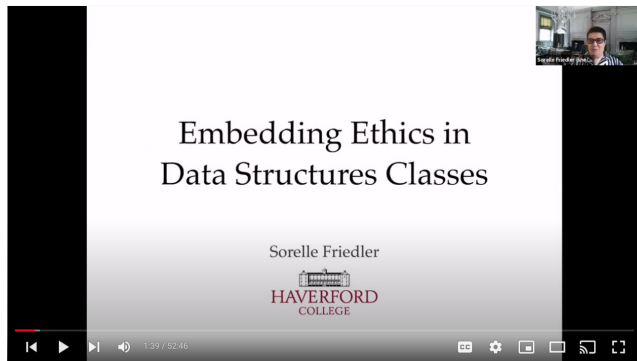


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- videos shared on zoom
- ML is a part of CS!

Diversity!

papers 2021: common themes

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

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- slidedecks do not make good learners

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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 Marx¹ Thiemo Leonhardt¹ David Baberowski¹ Nadine Bergner¹

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 Raschka¹

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)

three thoughts out!

- **learn while you do teach!**
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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?