Teaching Machine Learning at ECML2020

Abstract

Machine Learning based approaches have become ubiquitous in many areas of society, industry and academia. Understanding what Machine Learning is, providing and reproducing what it infers, has become an essential prerequisite for adoption. In this line of thought, course materials, introductory media and lecture series of a broad variety, depth, quality and public availability have come to existence. With this workshop, we want to expand on an academic discussion on what works and what doesn't in teaching machine learning. We hope, this effort helps to improve existing material and makes conceiving new material more effective for all parties involved.

With last years first edition of this workshop, we would like to commit ourselves to the cause and continue the exchange of diagnostics, experiences and knowledge in the community. In this vein of thought, we hope to establish a continuous engagement of the community colocated with an internationally respected conference.

Content

The main goal of this workshop is to motivate and nourish best practices at any stage of the teaching process. For this, we would like to cover a structured approach to teaching motivated by the carpentries, variations thereof or alternatives to it. Aspects of these modern teaching methods include: course context, pre- and post-workshop surveys, learner profiles, learning goals and objectives, giving teaching feedback. With this, we hope to equip attendees with a structured approach to teaching. In this workshop, we like to bring together practitioners to assess the usefulness of these methonds in the Machine Learning community.

The central activity of the workshop will be a (potentially parallel) **presentation of 5-10 minute lightning talks** based on the accepted papers. These contributions recruit themselves from a **call-for-papers prior to the workshop**. We like to attract at maximum 4 page long mini articles that present or discuss a teaching activity related to machine learning. These mini papers are expected to present teaching examples from various aspects of teaching ML. For example:

- a demo of how to teach backpropagation
- expectation management for non-computer science learners of ML
- a discussion of an instructive data set for teaching Convolutional Neural Networks
- an interactive web application to play with parameters of a classifier (SVM, CNN, MLP, ...)
- a teaching metaphor to illustrate time series prediction
- a (interactive) vizualisation of stochastic gradient decent

We will conduct an open peer review on all contributions and select papers based on the reviewers feedback.

Participants of our workshop will be motivated to provide feedback to their peers and to these presentations in focused discussion groups. Depending on the time and number of submissions, we will divide the presentations based on the field they focus on: vision applications, language applications, general concepts etc. Each of these working groups is asked to collect general patterns on what works and what doesn't. After this session, we will compile a report to summarize and publish the findings of this event and to lay the foundation for furture activites.

Appeal to ECML audiences

Many experts and practitioners who develop Machine Learning models or infrastructure around these models are confronted with the opportunity or duty to teach machine learning at some point in their career. Traditionally, many rely on their gut feeling to design courses that are motivated by these circumstances. The methods of choice are often Power Point or similar technologies and a lot of copy&pasting from the web.

This workshop targets those who would like to know how teachers from around the globe approach teaching Machine Learning: How deep do they dive into the matter? What mental models do they use to visualize concepts? What media is at play in teaching ML by others?

With this workshop, we hope that by the end of the day, all participants have a better feeling where they stand with their teaching. By collecting teaching examples, we also hope to lay the basis of subsequent studies on trends and directions in the field of didactics in AI.

Previous Venues

Our workshop was successfully established in 2020 at ECMLPKDD. The workshop details can be inferred on our dedicated homepage for 2020. During both events, this first-off implementation attracted 20-30 participants. In this context, the following papers were accepted and discussed:

- "Introductory Machine Learning for non STEM students" by Javier Garcia-Algarra
- "An Interactive Web Application for Decision Tree Learning" by Miriam Elia, Carola Gajek, Alexander Schiendorfer, Wolfgang Reif
- "Teaching Computational Machine Learning (without Statistics)" by Katherine M. Kinnaird
- "AI is not Just a Technology" by Claudia Engel, Nicole Coleman
- "Teaching the Foundations of Machine Learning with Candy" by Daniela Huppenkothen, Gwendolyn Eadie
- "Turning Software Engineers into Machine Learning Engineers" by Alexander Schiendorfer, Carola Gajek, Wolfgang Reif

Tentative Timetable

We aim for a workshop to last one full day. The table below lists a tentative agenda.

time	Title	Speaker
9.00 am	Welcome	Organizers
9.15 am	presentations by invited speakers	All
12.00 am	Lunch	
1.00 pm	Preface (Parallel) Teaching Example Session	Organizers
1.30 pm	How to give feedback	Organizers
2.15 pm	Teaching Example Presentations	All
2.45 pm	Coffee break	
3.15 pm	Teaching Example Presentations	All
5.00 pm	Coffee break	
5.30 pm	Summary Teaching Example Presentations	All
6.00 pm	Farewell and Next Steps	Organizers
6.30 pm	End	

The 2020 edition of this workshop was conducted purely virtually. During the edition of 2020, we split this agenda into two parts that we delivered within one weeks time difference. This separation was well received by participants to not fall victim of zoom fatique. We expect that in 2021 we will have to consider following this model.

Tentative Call for Papers

All papers will be published in with Proceedings of Machine Learning Research. The papers must be written in English and formatted according to the ICML 2019 latex template.

The maximum length of papers is 4 pages (excluding references and acknowledgements) in this format. The program chairs reserve the right to reject any over-length papers without review. Papers that 'cheat' the page limit by, including but not limited to, using smaller than specified margins or font sizes will also be treated as over-length. Note that for example negative vspaces are also not allowed.

Additional materials (e.g. proofs, audio, images, video, data, or source code) can be provided as URLs inside the paper of your submission. The reviewers and the program committee reserve the right to judge the paper solely based on the 4 pages; looking at any additional material is at the discretion of the reviewers and is not required.

We strive to pursue a double-blind review process. All papers need to be 'best-effort' anonymized. We strongly encourage to also make code and data available anonymously (e.g., in an anonymous git repository or Dropbox folder). It is allowed to have a (non-anonymous) pre-print online, but it should not be cited in the submitted paper to preserve anonymity. Reviewers will be asked not to search for submitted work.

Expected Submissions

Based on the feedback from last year, we expect again about 12-20 paper submissions. We were happy to establish a small network people interested in teaching ML in 2020. As we will build on this, we expect a larger attendance than 2020 which we hope levels at 30.

Required Logistics

As we expect to conduct the workshop purely virtually, we require no infrastructure in terms of equipment. At the moment, we expect to use a zoom license provided by the workshop chairs. If that is not possible at the time of the workshop, we will inform the conference organizers.

History

The 2020 edition of this workshop was conducted at ECML-PKDD fully virtually.

Workshop Chairs

Peter Steinbach

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organisation: HZDR

job: Team Lead AI Consultants for Matter Research

country/region: Germany

webpage: team homepage

Peter received his PhD in Particle Physics in 2012 from the TU Dresden for an experimental study of LHC data using the ATLAS experiment to reduce background contributions to Higgs Particle searches. He continued to industry as a HPC support and software engineer helping scientists push the limits of their applications in a service oriented group. In this role, he become increasingly exposed to Deep Learning applications for vision applications in biology. In 2019, he started to lead a group of AI consultants that aims to help scientists from the research field matter at Helmholtz society to use machine learning in experiment and theory. Peter has substantial experience from organizing workshops and hackathons. The 2020 edition of the teaching ML workshop marks a special example of this.

Oliver Guhr

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Oliver received a bachelor degree in business informatics in 2014 (HfT Leipzig) and holds a master degree in computer science since 2018 (HTW Dresden). From 2007 to 2018 he was working as a software engineer in the sector of information and communication technology. In 2018 he became a research fellow at the HTW Dresden in the department of artificial intelligence. His research focuses on Spoken Dialogue Systems, Machine Learning, and Natural Language Processing. He also teaches the Natural Language Processing part of the Deep Learning course at HTW Dresden. Oliver took part in the organization of several conferences. From 2015 to 2017 he was part of the team that organized "DevDay" a practitioners conference on software development. Since 2018 he is part of a team that organizes "MobileCamp" a Barcamp on mobile computing. In 2019 he was part of the project team that organized an international summer school on "Voice Interaction and Voice Assistants in Health Care".

Katherine Kinnaird

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Katherine M. Kinnaird is a computational researcher working at the intersection of machine learning, mathematics and cultural analytics. The central driving force behind her work is the building and supporting of authentic bridges between statistics, mathematics, machine learning and music information retrieval, as well as other

disciplines like biology, human computer interaction and literature. Her research program builds a methodology for comparing high-dimensional sequential data that can be broadly applied to many questions from a range of fields, such as comparing musical songs.

Supporters

Amir Farbin, afarbin@cern.ch, Associate Professor University of Texas at Arlington

Florian Huber, f.huber@esciencecenter.nl, Data Scientist/eScience Research Engineer, Netherlands eScience Center, Amsterdam, NL

References

The proceedings of 2020 were published in the open-access journal PMLR. They can be viewed on the journals homepage.