

Sound Studies and Sonic Arts

Summer Semester 2022

Phase Focus

Module Theory, Practice

Course Title Introduction to Machine Learning and Computational Aesthetics | Seminar

Course Times and Location Friday | 10:00 a.m. – 14:00 p.m. | LIE314

Instructor [Prof. Dr. Luc Döbereiner](#)

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Office Hours Upon request after class

Course Description

The course deals with the ubiquitous topic of machine learning (ML) and artificial intelligence from a number of different perspectives. It introduces some of the fundamental algorithmic methods used in ML today, it discusses artistic approaches, ethical, political, and aesthetic questions related to AI in general.

The first half of the course is largely theoretical, while the last three sessions consist of a hands-on-practical engagement with ML for sound processing and for developing unique and original musical instruments. No prior programming knowledge is required. The practical part will largely use *Wekinator*, a program which can be used with any music/audio software that can receive and send OSC messages. Students are encouraged to bring their existing software and instruments and develop it further using ML techniques.

After taking this class, students will have a basic understanding of how ML techniques function and what some of their most significant ethical and technical implications are. They learn to develop a precise critical perspective on these technological transformations but will also have developed ways of harnessing the potential of ML for their own artistic practice.

Requirements for Attending

Maximum of 15 students.

Exam / Credit Points

2CP (not graded: Practice, Theory): Regular attendance, submitting all exercises and assignments and short summaries of all the readings,

Passing the first assignment (handing in all exercises) is mandatory for submitting the second assignment.

Consecutive assignment leading to 4CP for the course (optional, graded: Theory, grading: mean of both grades): term paper (ca 8,000 words) due 1 Nov 2022.

OR

Consecutive assignment leading to 4CP for the course (optional, graded: Practice, grading: mean of both grades): artistic work, due 1 Nov 2022. Topic and artistic concepts need to be discussed with the teacher in advance.

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Schedule

- 1. Roots of AI and Artistic Approaches** - Texts by Russell & Norvig, Jennifer Walshe, and George Lewis
- 2. Computational Aesthetics, Music and the Sonic** - Texts by Eleni Ikoniadou and Beatrice Fazi
- 3. Cyborgs and the Ethics of AI** - Texts by Donna Haraway, Mark Coeckelbergh, and Georgina Born
- 4. How Machines Learn** - Texts by Meredith Broussard and Ethem Alpaydin
- 5. Controlling Sound using Wekinator** - Texts by Rebecca Fiebrink and Artemis Gioti
Practical application of Wekinator to Sound Processing in Pd/SuperCollider/MaxMSP or Ableton Live
- 6. Building Instruments using Wekinator** - Further hands-on work with the Wekinator software
- 7. Machine Learning for Prediction and Classification** - Practical introduction to using Python for ML

Supporting Media

Alpaydin, Ethem. *Introduction to Machine Learning*. Fourth edition. Adaptive Computation and Machine Learning Series. Cambridge, Massachusetts: The MIT Press, 2020.

Born, Georgina. "Diversifying MIR: Knowledge and Real-World Challenges, and New Interdisciplinary Futures." *Transactions of the International Society for Music Information Retrieval* 3, no. 1 (October 22, 2020): 193–204.
<https://doi.org/10.5334/tismir.58>.

Broussard, Meredith. *Artificial Unintelligence: How Computers Misunderstand the World*. First MIT Press paperback edition. Cambridge, Massachusetts London, England: The MIT Press, 2019.

Coeckelbergh, Mark. *AI Ethics*. The MIT Press Essential Knowledge Series. Cambridge, MA: The MIT Press, 2020.

Fazi, M. Beatrice. *Contingent Computation: Abstraction, Experience, and Indeterminacy in Computational Aesthetics*. Media Philosophy. Lanham: Rowman & Littlefield, 2018.

Fiebrink, Rebecca Anne. "Real-Time Human Interaction with Supervised Learning Algorithms for Music Composition and Performance." Ph.D. Dissertation, Princeton University, 2011.

Gioti, Artemi-Maria. "Artificial Intelligence for Music Composition." In *Handbook of Artificial Intelligence for Music*, edited by Eduardo Reck Miranda, 53–73. Cham: Springer International Publishing, 2021.
https://doi.org/10.1007/978-3-030-72116-9_3.

Haraway, Donna Jeanne. "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century." In *Simians, Cyborgs, and Women: The Reinvention of Nature*, Reprinted., 149–81. London: Routledge, 1991.

Ikoniadou, Eleni. *The Rhythmic Event: Art, Media, and the Sonic*. Technologies of Lived Abstraction. Cambridge, Massachusetts: MIT Press, 2014.

Lewis, George E. "'Is Our Machines Learning Yet?' Machine Learning's Challenge to Improvisation and the Aesthetic,." In *MACHINIC ASSEMBLAGES OF DESIRE Deleuze and Artistic Research 3*, edited by Paulo de Assis and Paolo Giudici, 115–28. Leuven University Press, 2021.

https://www.academia.edu/45424314/MACHINIC_ASSEMBLAGES_OF_DESIRE_Deleuze_and_Artistic_Research_3.

Russell, Stuart J., and Peter Norvig. *Artificial Intelligence: A Modern Approach*. Fourth edition. Pearson Series in Artificial Intelligence. Hoboken: Pearson, 2021.

Walshe, Jennifer. "Ghosts of the Hidden Layer." Edited by Gisela Gronemeyer and Reinhard Oehlschlägel. *MusikTexte*, no. 159 (November 2018). <https://texte.musiktexte.de/mt-159/207/ghosts-of-the-hidden-layer>.