

the machine is learning

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Abstract. The theatrical performance *the machine is learning* questions the labour involved in the process of training a machine with realtime gestures. In an attempt to livecode with gestures, the performer finds herself directed by the machine to repetitively make movements to generate data samples for the machine to learn from.

Keywords. machine learning, realtime gesture recognition, theatre, livecoding

Program notes

The performance *the machine is learning* is a theatrical performance highlighting the process of training a machine with realtime gestures: the labour that is absent from most dialogues on machine learning. In an attempt to livecode with gestures, the performer finds herself directed by the machine to repetitively make gestures to generate time series data samples for the machine to learn from.

Machine learning is both hailed as the solution to our current day problems, as well as claimed as one of the most threatening things to life as we know it. The popular discussion on AI criticizes issues of privacy with regard to data collection and the use of this data to take decisions that affect the life of people in possibly negative ways. At the same time, with the possibilities of AI further automating work, jobs are at danger and the fear is that this will leave many without a job in the future. On the other hand, the labour involved in making machine learning algorithms work, is less prominent in the popular discussion. The labour involved in AI consists not only of designing and programming algorithms, but also in generating and categorising these data samples. The working conditions of these tasks are generally not known.

Background of the performance

the machine is learning is a performance developed in the context of creating a gestural live coding language: GeCoLa¹. The key concept of this coding language is that the code is written by gestures, rather than by written text based language. Gestures are defined for keywords/operations in the language and variable names are defined as gestures learned on the fly.

It seems to be a simple approach: just use some machine learning algorithm to detect the gestures and have detected gestures evoke keywords and variable names. But it is not that simple. Time-based gestures (rather than instantaneous poses) are not easily learned by a machine and certainly not when they are not predefined and linked to a large database of templates of said gesture.

The teaching of the machine is a lengthy process and requires a human to repeatedly make a gesture so the machine can learn to recognise the gesture and accurate labeling of type, start and end of gesture. The performance *the machine is learning* focuses on this process and the dialog of the human with the machine to record and train the machine, so that it can then recognise the gestures.

The training of machines and the hidden labour of humans involved in generating, labeling and validating the data fed into machine learning algorithms is a topic that is often missing from (even critical) dialogues about machine learning, even as awareness about assumptions in algorithms and data bias is rising.

1. For more information on this language, see <https://marijebaalman.eu/projects/gecola.html>

Though the original purpose of GeCoLa was to create a gestural language to livecode music with, the performance *the machine is learning* must be regarded as a theatrical performance.

Realisation of the performance

The performance is realised by the use of wireless motion sensors (the 3-axis accelerometer ADXL345, and later LSM9DS1 sensors, a 9 d.o.f. sensor with a 3-axis accelerometer, 3-axis gyroscope and 3-axis magnetometer) using the Sense/Stage sensing platform (Baalman 2017; Baalman et al. 2010). The data from these sensors is sent via XBee wireless communication to a laptop, where the data is received and translated to OpenSoundControl with the custom Sense/Stage software. The data is sent to SuperCollider, where it is parsed and formatted to be sent to a custom C++-program created based on the Gesture Recognition Toolkit² of Gillian 2007.

SuperCollider also generates sound and sends commands to the voice synthesis program *espeak*³.

Context

The performance fits into a series of works of the artist that take a conceptual approach to livecoding and role of the body in the practice of livecoding: *Code LiveCode Live* (2009-14), *Wezen — Gewording* (2013-17), and *Etudes pour le Live-Coding à une Main* (2019).

The performance also relates to the artist's work *The Malbody Centre* (2014/17 and onwards), which takes a critical perspective at body based sensing (the body as the last frontier between privacy and big data), the control of artificial intelligence over our experience of the world (what if not only our news sources are controlled by this, but also our bodily experiences?) and how our society deals with people who divert from the norm (diversity in terms of ability and body).

While the performance takes its context from the livecoding scene and taps into the history of gesture recognition for musical purposes, the performance takes a theatrical approach to this topic and places it in a broader, and critical context.

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References

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2. <http://www.nickgillian.com/wiki/pmwiki.php/GRT/GestureRecognitionToolkit>

3. <https://en.wikipedia.org/wiki/ESpeak>