

Internship Project

Machine Learning with Lego Mindstorms

This project aims at developing a machine learning tutorial for teenagers that can be implemented with Lego Mindstorms. The tutorial should inspire teenagers to experiment with machine learning algorithms, learn about programming, and robotics. The project is a collaboration with the Makerspace, a public engagement initiative from Cyber Valley.

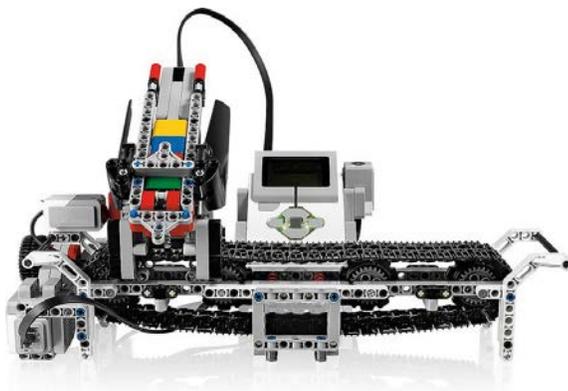


Photo: Example of a color-sorting machine, see <https://education.lego.com/en-us/lessons/ev3-cim/make-a-sorting-machine#lesson-plan>.

The primary target group of the tutorial will be teenagers of age 15-18 that are interested in learning more about machine learning. A potential project could be the design of a sorting machine that is able to recognize and sort different Lego parts by means of a camera and a convolutional neural network. The tutorial should highlight fundamental aspects of machine learning, e.g., how to design a convolutional neural network for object recognition, how stochastic gradient descent works, how to collect test and training data. It should also show the limitations of pattern recognition algorithms (what if a new Lego part arrives that has never been seen before).

The successful candidate will design a tutorial with step-by-step instructions for building a robotic system with Lego. The system serves as a testbed for machine learning and pattern recognition experiments. If time permits, the tutorial will be evaluated with teenagers at Cybervalley's Makerspace.

Learning and Dynamical Systems Group

The project will be carried out at the Learning and Dynamical Systems Group, which is part of the Max Planck Institute for Intelligent Systems in Tübingen, Germany. Our research lies at the intersection between machine learning, dynamical systems, and mathematical optimization. Further information can be found here: <https://lds.is.mpg.de/>.

Prerequisites

Strong analytical skills and programming experience (Python, MATLAB, C/C++ or similar). Willingness to engage in teaching and outreach aspects. Background in machine learning, control theory, statistics, or mathematical optimization is a plus.

Contact

If you have any questions do not hesitate to contact us. When applying for a project, please include your CV, bachelor's and master's transcripts, and a one-page letter of motivation describing your research interests and educational background.

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