

Provoke a robot to perform dangerous moves using Machine Learning

Goal

Today a robot and its surroundings need to be carefully designed with human interaction in mind. All type of hazardous scenarios between human and robot must be taken into consideration, adding safety margins in terms of space and speed where needed. To save time in the safety design phase, blunt uncollaborative solutions are often used such as fencing and emergency buttons.

What if there was an algorithm, that for a given virtual robot station and program, automatically found and corrected the possible dangerous scenarios. That algorithm would probably contain a neural network of some kind that was trained with a virtual robot inside RobotStudio.

Such an algorithm could transform traditional uncollaborative robots and its surroundings into humane environments with natural man-machine interactions. That would not only make production centers better for humans but it would also reduce the required physical size of a factory (less fences) as well as the need to produce new more collaborative robot models.

Background

Production for Future is a project that aims to disseminate knowledge about sustainability, diversity and technology. Together with numerous partner companies, the team creates small factories in order to build knowledge and show the solutions in workshops with people from industry, with school classes and teachers. In order to make a production sustainable from an ecological, economical and a social point of view, Production for Future finds solutions using digitalization. One important partner in the project is ABB because their work with collaborative robots and the focus on a sustainable future. This master thesis shall enhance the collaboration and bring important insights for both Production for Future and ABB regarding attractive workplaces in order to enhance social sustainability.

Tasks

- Your first task is to develop and train a machine learning model that provokes a virtual robot into unexpected and dangerous situations.
- We provide you with a virtual robot environment in RobotStudio, where you can control the robot and collect data (position, speed, brake distance etc.)
- Reinforcement Learning suits this task well, but you are free to elaborate with any type of Machine Learning.
- Your second task is to utilize the trained model and develop a tool that proposes changes to the robot solution to make it safer.
- The exact content and scope will be specified together with you.

Additional information

This thesis is performed in collaboration with ABB who will provide support and supervision. You will be part of the RobotStudio software team in Mölndal that will support you along the way. The location of the workplace is to be discussed together with the company and students. The thesis work needs to be conducted by two students. Preferably we are looking for students with some experience in Machine Learning. The time period of the conduction of the thesis is January to May 2021. Upon successful completion of the thesis a single payment is anticipated.

Contact

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To apply, send your CV and a cover letter to Göran with copy to Greta as soon as possible, but no later than 2020-11-30. Interviews are held continuously.

