Subject:

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Abstract (up to 10 lines):
Learning methods have proven to be effective in image processing but their application to robotic applications remains difficult, mainly because of the learning times. The transfer of a skill acquired by one robot to another robot can reduce the teaching time. The objective of the thesis is to continue the work on the transfer of skills between robots by studying an abstract and universal representation of the state and actions of the robot.

Skills:
autonomous, curious and persevering. Knowledge in programming (C++/Python), Robotics and Artificial Intelligence.

Keywords:
Robotics, neural network, skill transfer, control, state abstraction

Description (up to 1 page):
Teaching methods have proven their effectiveness in image processing and are beginning to be applied for robot control.
Unfortunately, these methods require, for each robot and for each task, a very long training time in simulation or in real life as well as expertise to set the teaching parameters. The objective is to keep these training times as short as possible by transferring the competence related to a task from one robot to one or more other robots on the same task. Recent work in the laboratory introduces a new neural network architecture that decorates the robot and task information. They show that it is possible to learn a task with a robot and to transfer this skill to a robot with a different mechanical structure (number of joints, body length). This network is based internally on a heuristically defined representation of the robot state and the task. The contribution of this thesis will be in the continuity of recent works by finding the best abstraction of the state of the robot and of the task, as well as to propose a teaching process adapted to this type of network. The long term goal will be to allow a transfer of skills from one robot to another (or from a simulation to the robot) without the need for an adaptation phase.

Références (up to ½ page):
M. Mounsif and S. Lengagne and B. Thuilot and L. Adouane
Universal Notice Network: Transferable Knowledge Among Agents
IEEE - 6th 2019 International Conference on Control, Decision and
Information Technologies (IEEE-CoDIT 2019), Apr 23-26, 2019, Paris -
France

Mehdi Mounsif, Sébastien Lengagne, Benoit Thuilot, Lounis ADOUANE
BAM! Base Abstracted Modeling with Universal Notice Network: Fast
Skill Transfer Between Mobile Manipulators
IEEE - 7th 2020 International Conference on Control, Decision and
Information Technologies (IEEE-CoDIT 2020)

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