

Master internship position to fill Transfer learning for social robots

Keywords

Transfer learning, zero-shot learning, deep learning, developmental robotics, social robotics.

Subject

Deep learning provides some major machine learning achievements in the previous years [2] and leads to state of the art performances in multiple domains (object recognition, natural language processing, go, ...). However, these models need a lot of (possibly manually annotated) data examples to train. Such large database are not yet available for social robotics tasks. Moreover, autonomous robots will have to adapt to unknown situations so that representative databases cannot be constructed a priori and others solutions have to found. One of the next breakthrough in artificial intelligence will thus be the ability to incrementally construct knowledge, based on previously learned ones, and to generalize to similar situations.

This internship will study the problem of transfer learning for social robots. Previous works (based on deep learning architectures) proposed to transfer knowledge from one modality to another (e.g. visual to audio [3]) by learning the function from one representation space to another. Another approach is the zero-shot learning that targets to associate labels to examples from unseen categories. These works are based on the learning on a common embedding space, where some geometrical properties appears [1, 4]. The subject of this internship is to study these paradigms and see if they are applicable to social robots. This transfer can be considered at 3 different scales :

- Transfer the learning of one modality to solve one task to the use of another modality to solve the same task
- Transfer the knowledge to solve one task to another (similar) task
- Transfer the knowledge to solve a task on one robot to other robots (with different sensors and motors)

The intern will be part of the Behaviors.ai¹ project between the LIRIS laboratory and Hoomano and will interact with the members of the project (people and robots).

Profile

The following skills are mandatory :

- master in artificial intelligence / machine learning (or equivalent)
- good programming skills (Python, web, git)
- autonomy
- ability to work in a team
- scientific curiosity
- good written English skills

The following skills will be a plus :

- programming skills in deep learning
- previous experience with robots (especially Nao and Pepper)
- previous experience in start ups or research teams

1. <http://behaviors.ai>

Duration

The internship will begin in February-April (starting date subject to negotiation) for 5 months.

Gratification

3.6€/h, 35h/week (i.e. around 500€/month)

Localization

Lyon, France.

The intern will work alternatively in the LIRIS laboratory and Hoomano offices.

Advisors

- Mathieu Lefort : associate professor at SMA group², LIRIS laboratory
- Amélie Cordier : Chief Scientific Officer at Hoomano³

Application

To apply, please send a CV and application letter to Mathieu Lefort (mathieu.lefort@liris.cnrs.fr) and Amélie Cordier (amelie.cordier@hoomano.com). The applications will be processed on the fly until the position is filled.

If you have any question regarding this internship position, please send a mail to Mathieu Lefort.

Références

- [1] Andrea Frome, Greg S Corrado, Jon Shlens, Samy Bengio, Jeff Dean, Tomas Mikolov, et al. Devise: A deep visual-semantic embedding model. In *Advances in neural information processing systems*, pages 2121–2129, 2013.
- [2] Yann LeCun, Yoshua Bengio, and Geoffrey Hinton. Deep learning. *Nature*, 521(7553) :436–444, 2015.
- [3] Seungwhan Moon, Suyoun Kim, and Haohan Wang. Multimodal transfer deep learning with applications in audio-visual recognition. *arXiv preprint arXiv :1412.3121*, 2014.
- [4] Richard Socher, Milind Ganjoo, Christopher D Manning, and Andrew Ng. Zero-shot learning through cross-modal transfer. In *Advances in neural information processing systems*, pages 935–943, 2013.

2. <http://liris.cnrs.fr/equipes?id=74>

3. <http://hoomano.com/>