Teaching Deep Learning with Low-Cost Robots

Libre Robotics
Xicohtzinco, México

August 26, 2019

Deep Learning (DL) is a branch of machine learning in Artificial Intelligence which essentially takes advantage of a huge datasets to train neural networks. The great impact of DL in recent years is also because of improvements in hardware development and mainly because of open source tools and libraries [MateLabs, 2017]. Additionally to that, there is a huge range of applications in areas such as robotics, transportation, medicine and last but not least in education. That said, we propose to use a raspberry pi, a £30 board with GNU/Linux OS, connected with a mini arduino board, £2 board, servomotors and pi camera in order to create a simple low-cost educational robot where children can learn the basics concepts of robotics and deep learning [Durr et al., 2015].

Our primary aim for Libre Robotics is to build low-cost education robots which will be helpful to teach many didactic activities where children can interact with the robot and learn concepts of robotics, linear algebra, machine learning, and deep learning. One example is the implementation of a low-cost robot with convolutional neural networks that recognise six basic face emotions: happy, sad, surprise, fear, anger and neutral [Ho, 2016, Ruiz-Garcia et al., 2016].

We believe that teaching deep learning with low-cost robots can create both economical and pedagogical impact to the community and children will be persuaded to work towards the creation of better living conditions in their community.

References

[Durr et al., 2015] Durr, O., Pauchard, Y., Browarnik, D., Axthelm, R., and Loeser, M. (2015). Deep Learning on a Raspberry Pi for Real Time Face Recognition. In Solenthaler, B. and Puppo, E., editors, *EG 2015 - Posters*. The Eurographics Association.

[Ho, 2016] Ho, J. (2016). Facial emotion recognition. `https://github.com/JostineHo/mememoji`. Accessed December 08, 2017.

[MateLabs, 2017] MateLabs (2017). Why do we need the democratization of machine learning? `https://medium.com/startup-grind/why-do-we-need-the-democratization-of-machine-learning-80104e43c76f`. April 27, 2017 (accessed December 08, 2017).

[Ruiz-Garcia et al., 2016] Ruiz-Garcia, A., Elshaw, M., Altahhan, A., and Palade, V. (2016). *Deep Learning for Emotion Recognition in Faces*, pages 38–46. Springer International Publishing, Cham.