ICT PHD

Research project for a PhD curriculum in ICT – Computer Engineering and Science

Tutor:

(\*) Italian [Industrial] Co-tutor:

(\*\*) Foreign Co-tutor:

Proposed Title of the research: Few shot and zero shot learning in lifelong scenarios

Keywords: (5)

Deep learning, continual learning, few shot, lifelong learning, meta-learning

Research objectives: --(max 10 rows)

The objective of the research is to investigate the adoption of meta optimization techniques in the context of few shot learning systems in which a deep learning system is trained with few unseen examples of potential novel classes. In the context existing meta learining framework (e.g. MAML based) or distance based solution (e.g. Proto-net) have bene succesfully applied. Nevertheless such systems assume the underlying data distribution does not shift in time neither evolve. The research will focus in few shot systems in which the data are feeded to the model in streams and may change and evolve during the training procedure. Meta-semi-supervised architecture based on graph learning will be employed in conjuction with pseudo-labelling techniques and generative modelling.

Proposed research activity -- (max 10 rows)

The candidate will conduct his phD at AImageab Group. First year will related to study meta-learning and few shot architectures. A baseline model will be implemented and tested using both distance based approches and pseudo labelling ones. The second part of the activity will be about designing a joint model that plug a lifelong feauture in a semi supervised few shot setting. For the purpose inference on graphs will be employed for label propagation. Eventually, the model will be integrated with rehearsal and pseudo rehearsal in order to mitigate forgetting during the continous learning process. Potentially, la bela and examples can be created be enhancing the model capability through “imagination” networks.

Supporting research projects (and Department)

EU ECSEL PROJECT INSECTT (DIEF)

Possible connections with research groups, companies, universities.

NTNU University (Ruocco), University of Bologna (Maltoni), TUM University, Leonardo Company