

Representation Learning for Multiple Sensors and Domains

Proposition for internship

Welcome to ICube,

- Created in 2013, [iCube](#) laboratory brings together 650 researchers in the fields of engineering and computer science and is a major driving force for research in Strasbourg.
- [SERTIT](#), a service platform of ICube, known for its ISO certified rapid mapping service, is seeking to accelerate its mapping activities through artificial intelligence. This service assists in post-crisis emergency management (e.g. ground rescue, reconstruction efforts, etc).

Your Mission

You will exploit state-of-the-art advances in multi-modal and multi-domain representation learning made in the data science and knowledge research group (SDC) to detect objects in satellite images of different characteristics (resolution, bands, etc), i.e. modality, in collaboration with remote sensing experts in SERTIT.

These models have been developed with benchmarks and medical datasets in mind and need to be extended and refined to work with more complex, higher dimensionality data such as satellite imagery.

The work has two benefits: on the one hand, to reduce the burden of ground truth collection when sensors of different characteristics are used; and on the other to exploit the information contained in each data modality to learn representations that are more robust and general, i.e. to detect buildings/roads/trees in different countries that exhibit different characteristics.

Your contributions will be part of the global work of the SDC researchers who aim to propose and implement new generic methods and tools to exploit large sets of reference data from one domain/modality (sufficient to train an accurate detector) to train a multi-modal/domain detector that can be applied to imagery taken from another sensor for which there exists no reference data.

As such, the work tackles problems that are key to many machine learning and computer vision applications.

Your Roles

- You will join a transversal team of researchers, software engineers and geomatics specialists from SERTIT and [SDC](#) (Data Science and Knowledge research group)
- Collaborate with research teams to transfer deep learning models to applications in remote sensing
- Build deep learning pipelines for multi-modal domain adaptation
- Participate in a research and development team
- Develop experimental protocols
- Perform thorough evaluation of proposed solution

Expected Skills

- Experience with the Python (numpy, keras, tensorflow, etc.)
- Interest/experience in deep learning
- Knowledge of machine learning workflows and techniques (e.g. best practices around training data management, understand basics of numerical optimisation)
- Familiarity with Linux environments
- Have excellent communication skills and a strong team player
- Good knowledge of English (French is not mandatory)
- Be enthusiastic!

Your Profile

2nd year of a Master's in Computer Science degree or similar

Your Benefits

- Salary: 550 € / month
- Access to a state-of-the-art high performance GPU cluster
- Learn cutting edge deep learning research and apply those techniques to real world challenges

Some press about us

[Presentation of the ICube laboratory](#) (YouTube video)

Join Us

To apply, send an email to Thomas Lampert (lampert@unistra.fr), be sure to include your C.V. and a cover letter to let us know why you think you would be a good fit.

DEADLINE FOR APPLICATION: 14/02/2020 (although, if the right candidate is found, a decision may be made before this date)

STARTING DATE: First half of 2020 - to be discussed

LOCATION: ICube, Strasbourg, France

Further Reading

[1] J. Shen, Y. Qu, W. Zhang and Y. Yu, "Wasserstein Guided Representation Learning for Domain Adaptation," In Proceedings of the AAAI Conference on Artificial Intelligence, 2018.

[2] Y. Bengio, "Deep Learning of Representations for Unsupervised and Transfer Learning," In Proceedings of the Conference on Advances in Neural Information Processing Systems, 2012.

[2] K. Bousmalis, et al. "Domain separation networks," In Proceedings of the Conference on Advances in Neural Information Processing Systems, 2016.