

# Master 2 Internship position

## Learning representation of medical images with collective intelligence

- **Context and objective** A common problem in medicine is to stay up-to-date of recent research advances, proposed by big institutes. The goal of this project is to help the potentially isolated practitioner in her diagnostic aiding and decision making based on collective knowledge issued from expert-generated content. The basic objective of the internship is to be able to build a meaningful representation of medical images using collective intelligence: tags, discussions, regions of interest. This representation can then be used for prediction or visualization purpose. The proposed approach should be based on joint learning of convolutional networks based on this information, see references below.
- **Place** The workplace is the beautiful city of Nantes. Nantes is a city in western France, located on the Loire River, 50 km from the Atlantic coast with excellent train connection to Paris (about 2 hours) and an international airport. The city is the 6th largest in France. In 2004, the Time magazine described Nantes as « the most liveable city in Europe ». With 170 new digital tech companies per year, Nantes is also one of the top 10 digital tech cities in France.
- **Duration and grant** The student will work for 6 months, starting from February/March 2017 till July/August 2017. The monthly grant is approx. 508 €, free of charge.
- **Scientific context** The DUKe (Data User Knowledge) research group, part of the LINA laboratory (UMR CNRS 6241), University of Nantes, France, aims at proposing querying, mining and learning techniques that take into account data types (relational, spatial, graphical, temporal, stream, etc.), uncertainty, privacy expert knowledge or user interactions through adapted visual supports. The successful candidate will work under the supervision of Hoel Le Capitaine, (hoel.lecapitaine@univ-nantes.fr).
- **Background** A strong background on machine learning and data mining techniques is expected. Some knowledge on image processing would be a plus. For the technical part, Python programming.
- **How to apply** Send a CV, BS and MS transcripts, a letter of motivation, optionnaly the name of two references to hoel.lecapitaine@univ-nantes.fr

## References

- [1] Douwe Kiela and Léon Bottou. Learning image embeddings using convolutional neural networks for improved multi-modal semantics. In *EMNLP*, pages 36–45. Citeseer, 2014.
- [2] Ryan Kiros and Csaba Szepesvári. Deep representations and codes for image auto-annotation. In *Advances in Neural Information Processing Systems*, pages 908–916, 2012.
- [3] Venkatesh N Murthy, Subhransu Maji, and R Manmatha. Automatic image annotation using deep learning representations. In *Proceedings of the 5th ACM on International Conference on Multimedia Retrieval*, pages 603–606. ACM, 2015.
- [4] Hanwang Zhang, Xindi Shang, Huanbo Luan, Meng Wang, and TS Chua. Learning from collective intelligence: Feature learning using social images and tags. *ACM TOMM*, 2016.