

# PHD PROPOSAL FOR 2017

L3i laboratory



## PhD title:

Unified structuration of heterogeneous and multimodal content for interactive mining

## Keywords:

Big data / Heterogeneous content indexing / Document image analysis / Community detection / DeepLearning

## Context:

Paper documents and native digital documents are daily massively produced by private and public institutions. Retrieving information and the global consistency of this mass of documents is always a hard task in particular because of the heterogeneity of the content to deal with (images, structured text, raw information).

In this PhD, the combination of information spotting techniques and information retrieval will be studied in order to propose new ideas for retrieving the global consistency of all these contents in an interactive way. Two main ideas will be studied:

- Automatic extraction of feature/descriptor from heterogeneous contents (scanned documents, structured information, images) in order to organize all these data in a unified representation space
- Data organization using complex data set and structures (like graphs and hypergraphs) in order to represent all the possible links between two similar contents (same kind of information, data related to the same topic...)

A last step will be related to the visualization of the final structure in order to help users navigating into them.

This PhD position is clearly at the interface between two research fields: pattern recognition and indexing on the one hand, and the analysis of communities in network. Some skills in Deep Learning techniques will be an advantage.

## References:

- [1] Jon Almazán, Albert Gordo, Alicia Fornés, Ernest Valveny: Word Spotting and Recognition with Embedded Attributes. *IEEE Trans. Pattern Anal. Mach. Intell.* 36(12): 2552-2566 (2014)
- [2] Jon Almazán, Albert Gordo, Alicia Fornés, Ernest Valveny: Segmentation-free word spotting with exemplar SVMs. *Pattern Recognition* 47(12): 3967-3978 (2014)
- [3] David Aldavert, Marçal Rusiñol, Ricardo Toledo, Josep Lladós: A study of Bag-of-Visual-Words representations for handwritten keyword spotting. *IJDAR* 18(3): 223-234 (2015)
- [4] Nhu-Van Nguyen, Mickaël Coustaty, Jean-Marc Ogier: Multi-modal and Cross-Modal for Lecture Videos Retrieval. *ICPR 2014*: 2667-2672

- [5] Stable community cores in complex networks. Massoud Seifi, Jean-Loup Guillaume, Ivan Junier, Jean-Baptiste Rouquier, Svilen Iskrov. 3rd Workshop on Complex Networks (CompleNet 2012), Floride
- [6] Qi Song, Bo Li, Weiren Yu, Jianxin Li, Bin Shi: NSLPA: A Node Similarity Based Label Propagation Algorithm for Real-Time Community Detection. UCC 2014: 896-901
- [7] Qi Song, Yinghui Wu, Xin Luna Dong: Mining Summaries for Knowledge Graph Search. ICDM 2016: 1215-1220
- [8] LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436-444.

## Contact

Please send applications by email before August, 31th at:

**Email:** [mickael.coustaty@univ-lr.fr](mailto:mickael.coustaty@univ-lr.fr)