Postdoctoral job offer

Automatic fraud detection in business documents

The LabCom IDEAS calls for applications for a postdoctoral position in computer science, in the field of automatic fraud detection in business documents without *a priori* knowledge.

Duration: 18 months
Desired hiring date: February 1st, 2021 (may be modified according to the health situation)
Take-home salary: 2100 € / month
Workplace: LabCom IDEAS, in the premises of the L3i laboratory in La Rochelle, France
Specialities: Computer Science / Image processing and analysis / Signal processing / Image Forensics

---

Description of the LabCom:

The work carried out by the candidate will be a part of the LabCom IDEAS. IDEAS is co-funded by the French National Research Agency (ANR) and the Nouvelle-Aquitaine Region, and brings together the Yooz company and the L3i laboratory. The objective is to imagine, invent, design, develop, optimise and train the best algorithms for processing automatically business documents. The goal is to offer services, based on artificial intelligence, that are capable of automatically analysing and understanding various types of business documents.

The postdoc fellow will be based in the LabCom, located in the premises of the L3i laboratory, in La Rochelle, France.

The L3i laboratory, created in 1993 at La Rochelle University brings together researchers in Computer Science and Signal Processing from different faculties. The L3i brings together the skills of its researchers in order to address the issues of digital content enhancement from a systemic perspective. This relies, in particular, on a cross exploitation of interactive applications, content indexing and knowledge representation. The laboratory is structured around three scientific themes (Knowledge Engineering, Content Analysis and Management, Interactivity and Dynamic Systems), centred on the common goal of interactive and intelligent management of digital content.

Yooz, the LabCom's industrial partner, is a provider of a Cloud service for automated purchasing and payment processes. Yooz integrates Artificial Intelligence technologies to automate the processes and document processing is involved in these processes. The Yooz service is used daily by nearly 3000 users.

The research and development carried out within the LabCom focuses on 3 main areas:
- Document classification
- Document search
- Document fraud detection

Job description:

The work of the postdoc fellow will fall within the area "Document fraud detection". The aim is to develop new methods for fraud detection in document images (image forensics) without *a priori* knowledge.

Currently, there exists no reliable solution to protect the companies from document fraud. Despite the important needs, automatic fraud detection in documents is few investigated. Most of the works on the detection of falsified documents are related to graphical indices such as the difference in slope, size, alignment or noise of a character with respect to the others, to the difference in font or misalignment of characters in a word [Bertrand15], to the gap of a text line with respect to the margins or to the misalignement of the text lines with respect to the others. In these works, the starting hypothesis is that the fraudsters modify the document hastily and that the modification is not always perfect, which permits to detect it. Furthermore, this type of method needs some *a priori* knowledge on the type of realized fraud, on the mistake committed by the fraudster as well as on the document properties.

The work of the postdoc will be based on a detailed state of the art of existing approaches, in order to identify the limits and to propose innovating approaches, which permit to get around the drawbacks mentioned above. In our past works, we have developed several methods for the detection of frauded regions in document images, e.g. [Cruz17] who proposes a method with a priori knowledge based on local binary patterns (LBP). The work of this postdoc will be in the same line. More precisely, the work will aim at developing a method for fraud detection based on the discrete cosine transform (DCT). This approach of image verification starting from the DCT is common in the domain of natural scenes as it presents an excellent property of energy distribution and allows to contain the information in only a few coefficients. However, this approach has not been investigated for document images. The work will consist in learning (through deep learning approaches) the energy variations of DCT coefficient corresponding to fraud or not.

Candidate profile:

The candidate, who holds a Ph.D. in the fields of computer science, computer engineering, signal processing, or applied mathematics, must have a significant research experience in the domain of image or signal processing and analysis.

The candidate's skills will include:

- Mastering one or more programming languages (Java, Python, C/C++...)
- Very good teamwork skills, having knowledge or experience of Agile methods would be a plus (the work will be carried out both in conjunction with researchers from the L3i laboratory and the R&D department of the Yooz company).

- Good scientific writing skills, and fluency in writing and speaking English.

To apply:

Candidates for this position should send a CV and a cover letter (names and reference details would be appreciated) to:

- petra.gomez [chez] univ-lr.fr
- mickael.coustaty [chez] univ-lr.fr
- nicolas.sidere [chez] univ-lr.fr
- Vincent.PoulaindAndecy [chez] getyooz.com
- Saddok.Kebairi [chez] getyooz.com

Applications will be considered as they arise, so there is no strict deadline for applying.

References:

[Bertrand15] R. Bertrand, O. Ramos Terrades, P. Gomez-Krämer, P. Franco, J.-M. Ogier, A Conditional Random Field model for font forgery detection, ICDAR 2015, p. 576-580.

[Cruz17] F. Cruz, N. Sidere, M. Coustaty, V. Poulain D'Andecy, J.-M. Ogier, Local Binary Patterns for Document Forgery Detection. ICDAR 2017, p. 1223-1228.