



Post-Doctoral position Computer Vision and Historical data

in the IMAGINE group at Ecole des Ponts ParisTech

Call for a 1-year renewable Post-Doctoral position, at École des Pont ParisTech, under the supervision of [Mathieu Aubry](#), in the context of the DISCOVER ERC project on "Discovering and Analyzing Visual Structures". The goal of the position is, in interaction with the rest of the team, to develop algorithms relevant for partners working with historical data (typically manuscripts or printed documents).

1. Institution presentation

École des Ponts ParisTech is an institution of higher education and research in the field of science, engineering and economics. Under the supervision of the Ministry of Ecological and Solidarity Transition (MTES) and with an EPSCP status (Public Scientific, Cultural and Professional Establishment), its missions concern research, training and continuing education, the dissemination of knowledge, and the transfer to economic sectors and support for business creation. Its activities are national and international.

The research at École des Ponts ParisTech is characterized by a balanced effort in the following scientific activities:

- Outstanding academic research, evaluated at the highest level by the HCERES (highest council for research), with 5 ERC, more than 1000 publications of rank A per year, a hundred Ph.D. theses supported per year,
- Partnership research with companies, public entities and local authorities.

École des Ponts ParisTech, in accordance with its strategic plan, develops a long-term research activity in the field of Machine Learning and Computer Vision.

The IMAGINE team is a renowned research group in computer vision and machine learning, with seminal results in 3D reconstruction from images, scene understanding, deep learning, optimization, sparsity, etc. IMAGINE is part of the Laboratoire d'informatique Gaspard-Monge (LIGM), a top-ranked computer science lab.

The Imagine team currently includes 5 permanent researchers and about 30a dozen of PhD students. It has strong ties with both academic and industrial partners.

2. ERC DISCOVER Project

DISCOVER is an ERC starting grant project (2023-2028) led by [Mathieu Aubry](#).

The goal of this project is to develop approaches to assist experts in identifying and analyzing patterns. Indeed, while the success of deep learning on visual data is undeniable, applications are often limited to the supervised learning scenario where the algorithm tries to

infer a label for a new image based on the annotations made by experts in a reference dataset. In contrast, we will take as input images without any annotation, automatically identify consistent patterns and model their variation and evolution, so that an expert can more easily analyze them.

The key concept it will develop is the one of *visual structures*. Their key features will be their interpretability, in terms of correspondences, deformations, or properties of the observed images, and their ability to incorporate prior knowledge about the data and expert feedback. It will explore two complementary approaches to formally define and identify visual structures: one based on analyzing correspondences, the other on learning interpretable image models.

We will develop visual structures in two domains: historical documents and Earth imagery. For example, from temporal series of multispectral Earth images, we will identify types of moving objects, areas with different types of vegetation or constructions, and model the evolution of their characteristics, which may correspond to changes in their activity or life cycle. Ultimately, experts will still be needed to select relevant visual structures and perform analysis, requiring to work closely with them, to design relevant features in our algorithms and adapted interfaces for interaction.

3. Position description

The goal of this position will be to identify, design and develop all algorithms necessary for collaborators in History to leverage the tools developed within the DISCOVER project, as well as to adapt these tools to their specific needs.

The successful candidate will work closely with:

- Computer Vision PhD students from the team (~6 PhD students).
- external researchers/historians experimenting with the developed interface - in particular those of the [VHS](#) and [EIDA](#) projects, but the expectation is to develop tools that are relevant for at least 5 teams/projects we collaborate with.
- research engineers developing web tools to enable non-experts to use the developed algorithms.

The applicants should be able to work independently and in a team to produce, publish, and present research results in top quality conferences and journals. They should also be able to assist in the supervision of students, help with the preparation of reports and project deliverables, and present their research in academic conferences and seminars.

Depending on the candidate profile and interest publications might be oriented more towards either Computer Vision or Digital Humanities venues.

4. Application

The candidate should hold a PhD in either Computer Vision / Machine Learning or History/Digital Humanities. An ideal candidate with a Computer Vision background would have a track record of publications in top conferences (CVPR, ICCV, ECCV, NeurIPS) as well as a strong interest in applications to Historical data. An ideal candidate from an History

background would have past experience with programming and Computer Vision, as well as a strong interest in building an expertise in Computer Vision.

Please send a CV and a cover letter that specifies employment availability date, contact information of two academics who can provide reference letters upon request, and examples of past projects to mathieu.aubry@enpc.fr with 'DISCOVER PD application' as a topic.

Timeline: Applications expected by September 3rd, 2023. Candidate selection and interview might be conducted as soon as the application is received, and might last until September 15th. The starting date is expected between November 1st 2023 and February 1st 2024.

Contract: 1 or 2 year renewable contract. Part time position possible.

Location: Position based in CHAMPS-sur-MARNE (cité Descartes) - France Access: RER A, 25 minutes from Paris city center. Remote work possible 2 days per week.