

Internship context

Based in Saclay (Essonne), the LIST is one of the two institutes of CEA Tech, the technological research division of the CEA. Dedicated to intelligent digital systems, its mission is to carry out technological developments of excellence on behalf of industrial partners in order to create value.

Within the LIST, the Laboratory of Vision and Learning for Scene Analysis (LVA) conducts research in the field of computer vision and artificial intelligence for the perception of intelligent and autonomous systems. The laboratory's research themes include visual recognition, behavior and activity analysis, large-scale automatic annotation, and perception and decision models. These technologies are applied in major sectors such as security, mobility, advanced manufacturing, healthcare, and sports...

Missions

In recent years, deep learning models have demonstrated outstanding advances for several computer vision applications such as object detection and semantic segmentation. However, to obtain a reliable model, a massive amount of labeled data is needed. As an alternative, several research areas have raised aiming to acquire a good perception capacities with minimal or no annotations. Specifically, object discovery delivers instance segmentation without using any human annotation.

Recently, several methods demonstrated interesting results for object discovery in video data as the motion cues are used as a free source of annotations to segment objects that can move [1, 2]. On the other hand, unsupervised object-centric learning try to segment the video data into different semantic concepts by focusing in temporal similarities and using pre-trained features of foundation models [3].



Samples of results of state-of-the-art method for Object Discovery [2]

It should be noted that these methods are class agnostic as only object masks are detected without specifying the class of each segment. Several methods can be considered to add such information such as few shot learning, foundation models [4] and open vocabulary approaches [5].

Internship objectives

Different approaches can be explored during the internship:

- Study different state of the art object discovery methods;
- Design a model for object discovery while using the temporal consistencies and rich features of recent foundation models;
- Study different approaches to add the semantic information to the proposed model;
- Compare the proposed approach to previous methods on academic benchmarks;
- Depending on the obtained results, the contributions of this internship may lead to an international conference or workshop publication.

References

- [1] Sandra Kara, Hejer Ammar, Florian Chabot, Quoc-Cuong Pham, The Background Also Matters: Background-Aware Motion-Guided Objects Discovery, WACV 2024
- [2] Sandra Kara, Hejer Ammar, Julien Denize, Florian Chabot, Quoc-Cuong Pham, DIOD: Self-Distillation Meets Object Discovery, CVPR 2024
- [3] Andrii Zadaianchuk Maximilian Seitzer, Georg Martius, Object-Centric Learning for Real-World Videos by Predicting Temporal Feature Similarities,
- [4] Maxime Oquab and Timothée Darcet and Théo Moutakanni and Huy Vo and Marc Szafraniec and Vasil Khalidov and Pierre Fernandez and Daniel Haziza and Francisco Massa and Alaaeldin El-Nouby and Mahmoud Assran and Nicolas Ballas and Wojciech Galuba and Russell Howes and Po-Yao Huang and Shang-Wen Li and Ishan Misra and Michael Rabbat and Vasu Sharma and Gabriel Synnaeve and Hu Xu and Hervé Jegou and Julien Mairal and Patrick Labatut and Armand Joulin and Piotr Bojanowski, DINOv2: Learning Robust Visual Features without Supervision
- [5] Shilong Liu and Zhaoyang Zeng and Tianhe Ren and Feng Li and Hao Zhang and Jie Yang and Qing Jiang and Chunyuan Li and Jianwei Yang and Hang Su and Jun Zhu and Lei Zhang, Grounding DINO: Marrying DINO with Grounded Pre-Training for Open-Set Object Detection

Qualifications

- Students in their 4th or 5th year of studies (M1, M2 or gap year)
- Computer vision skills
- Machine learning skills (deep learning, perception models, generative AI...)
- Python proficiency in a deep learning framework (especially TensorFlow or PyTorch)

Job-related benefits

Joining the CEA List and the LVA as an intern means:

- Joining an organization that addresses societal challenges to build the world of tomorrow.
- Working in one of the most innovative research organizations in the world (ranked in the global top 100, top 3 in France).
- Discovering a rich ecosystem where the institute creates privileged links between the industrial and academic sectors.
- Conducting research in an environment where autonomy and creativity are recognized, and where valorizing results is encouraged (publication of scientific articles, patents, and sharing of open-source code whenever possible).
- Joining a young and dynamic team made up of research engineers, PhD students, post-doctoral researchers, and interns.
- Benefiting from an internal computing infrastructure equipped with around 300 state-of-the-art GPUs.
- Receiving a stipend between €1300 and €1400 per month.
- Having the opportunity to continue with a PhD or as a research engineer after the internship.
- Having the possibility of remote work, receiving a 75% (instead of 50%) reimbursement on public transportation costs, and benefiting from the "mobili-jeune" aid to reduce rent costs...