

Summer Internship Offer – Master M1

CONTEXT AND MOTIVATIONS

CONTEXT:

With the rapid proliferation of video content across numerous platforms, detecting rare events within these videos is of paramount importance for multiple domains. These domains include public safety and surveillance, media content management, environmental monitoring, and even healthcare diagnostics. Traditional algorithms for rare event detection have been constrained by their inability to process large-scale data efficiently, their sensitivity to false positives, and their reliance on hand-crafted features.

The field of rare event detection in video has seen significant advancements recently. Leading the charge are Transformers and diffusion models. Research by Madan et al. [1] presented a novel self-supervised masked convolutional transformer block (SSMCTB) for event detection, establishing a new benchmark in the domain. However, challenges remain, such as detecting events in complex motion patterns, crowded scenes, and real-time events. Notably, Bansod et al. [2] demonstrate superior detection accuracy of their model by leveraging Transfer learning through a pre-trained VGG16 model; this might offer a promising avenue for further progress. Shao et al. [3] proposed a framework called Interpretable Sensor Fusion Transformer (InterFuser) for safety-enhanced autonomous driving

In their recent work on video object detection, Fujitake et al. [4] proposed a new method for video object detection called Video Sparse Transformer with Attention-Guided Memory (VSTAM). The proposed method addresses the challenge of appearance changes over time by enhancing features element-wise before object candidate region detection.

OUR INTERNSHIP PROGRAM/TASK

We are seeking bright and highly motivated master student(s), who can work in the field of artificial intelligence. The project will develop **A new advanced approach based on recent advances in deep learning (Transformers models) for rare event detection in video**. More details about the project will be given during the interview for confidentiality reasons.

BENEFITS

- Gain hands-on experience in implementing state-of-the-art transformers models.
- Work in a collaborative and innovative environment, applying cutting-edge technologies.
- Learn and collaborate with experienced professionals in the field of data science.
- Opportunity to contribute to real-world projects with tangible impact.

- The selected candidate will have the chance to work in an interdisciplinary team.

ELIGIBILITY CRITERIA

- The candidate must be an M1 Master student or in 4th year of an engineering school, in computer science, applied mathematics or electrical engineering, with a focus on machine learning.
- Experience in Deep learning and data analysis.
- Experience in signal and image processing.
- Demonstrated record of high-performance programming skills in python.
- Demonstrated analytical, verbal, and scientific writing skills in English.

DURATION

The internship duration will be 2 to 3 months starting from June 2024.

HOW TO APPLY

If you are passionate about data science and excited to work on cutting-edge recommendation models, please send your CV and a cover letter to alice.othmani@u-pec.fr and yahaya.idris-abubakar@u-pec.fr and mamadou.dia@u-pec.fr with the subject line "Summer Internship Offer - Data Scientist – Rare Events Detection." Don't forget to include any relevant projects or work samples and school reports (relevés de notes).

REFERENCES

- [1] N. Madan et al., 'Self-Supervised Masked Convolutional Transformer Block for Anomaly Detection'. arXiv, Sep. 25, 2022. Accessed: Jul. 23, 2023. [Online]. Available: <http://arxiv.org/abs/2209.12148>
- [2] S. Bansod and A. Nandedkar, 'Transfer learning for video anomaly detection', J. Intell. Fuzzy Syst., vol. 36, no. 3, pp. 1967–1975, Jan. 2019, doi: 10.3233/JIFS-169908.
- [3] H. Shao, L. Wang, R. Chen, H. Li, and Y. Liu, 'Safety-Enhanced Autonomous Driving Using Interpretable Sensor Fusion Transformer', in Proceedings of The 6th Conference on Robot Learning, PMLR, Mar. 2023, pp. 726–737. Accessed: Sep. 20, 2023. [Online]. Available: <https://proceedings.mlr.press/v205/shao23a.html>
- [4] M. Fujitake and A. Sugimoto, 'Video Sparse Transformer With Attention-Guided Memory for Video Object Detection', IEEE Access, vol. 10, pp. 65886–65900, 2022, doi: 10.1109/ACCESS.2022.3184031.