

## **Unsupervised Continual Learning Approach for Real-Time Detection of Anomalous Events in Surveillance Videos**

**Project Description:** Anomalous events in surveillance videos are rare and challenging to define for specific scenes, leading recent models to be trained offline with large amounts of normal frames. However, this often results in false alarms because offline training frames are limited in number and less complicated than the frame-in-the-wild. Continual learning offers a solution by adapting to new information over time. Current continual learning solutions have drawbacks, such as only learning from normal frames identified with a human-in-the-loop process. We rethink such supervised setting is not necessary and propose an unsupervised continual learning approach where frames are usually observed in vast amounts and video anomalies are defined as rare observations therefore can be inherently differentiated. Moreover, our project aims to implement this approach using online clustering at video representations, enabling fast processing and potentially non-parametric solutions.

**Job Description:** We are seeking a highly motivated research fellow working in video analysis. The ideal candidate should have a strong background in computer vision and deep learning, particularly, experiences in spatio-temporal analytics are preferred. Responsibilities include designing and implementing deep learning models for our advanced surveillance system in collaboration with the Principal Investigator (PI) and other researchers. The research fellow will also contribute to research papers and submit them to reputable conferences or journals. This project is part of a larger research initiative, with the potential to publish 1-2 high-quality papers. This experience will provide valuable research skills and publication credits, enhancing your CV and competitiveness for future academic or employment opportunities. The position starts in or after Summer 2024 and spans one year, with possibilities for future contract extension or collaboration.

### **Qualifications:**

- Master's or Bachelor's degree in Computer Science, Statistics, Math, or other related majors
- Experience with deep learning models using PyTorch
- Preferred experience in spatio-temporal analysis (time-series analysis) and video analytics
- Preferred experience in unsupervised learning and continual learning strategies
- Knowledge of fast clustering techniques in latent feature space is a plus
- Preferred proficiency in English reading and writing