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Unsupervised Learning Methods of Real-Time Anomaly Detection for Data Selection and Detector Monitoring in Liquid Argon Time Projection Chambers

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Unsupervised learning algorithms enable insights from large, unlabeled datasets, allowing for feature extraction and anomaly detection that can reveal latent patterns and relationships often not found by supervised or classical algorithms. Modern particle detectors, including liquid argon time projection chambers (LArTPCs), collect a vast amount of data, making it impractical to save everything for offline analysis. As a result, these experiments need to employ real-time analysis techniques during data acquisition. In this talk, I will present developments in building real-time, intelligent computer vision programs with unsupervised learning, both for selection of "rare signals" in the data and for detector monitoring applications in LArTPCs.

Focus areas

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Session Classification: Lighting talks