Spatio-temporal Encoder-Based Anomaly Detection

BATCH: A6

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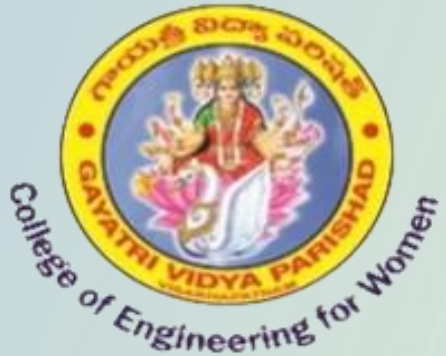

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PRESENTATION OUTLINE

- Concise summary of the Project

Abstract

Introduction

- Introduction
- How this is different from others!

- Base Paper Reference
- Literature Survey

References

ABSTRACT

In this presentation, we introduce a novel approach for detecting anomalies in videos employing spatio-temporal autoencoders.
Our method involves a multi-step process: first, videos are converted into frames using FFmpeg, and then each frame is further converted into cuboids, which are organized into separate folders. Subsequently, a spatio-temporal autoencoder is trained for each cuboid folder individually. During the testing phase, videos are once again converted into frames and then cuboids, which are then tested with their corresponding autoencoder models. By comparing the recreated cuboids with the input cuboids and calculating the loss, anomalies are identified if the loss exceeds a predefined threshold.
This methodology enables the precise identification of anomalous areas within specific frames, offering a robust solution for anomaly detection in video data.

INTRODUCTION

The widespread adoption of video surveillance systems across sectors like public safety, traffic management, and industrial production has led to a surge in video data. Effective analysis of this data is crucial for enhancing safety and efficiency. Anomaly detection in videos, vital for identifying potential threats or malfunctions, has garnered significant interest.

Traditional methods relying on handcrafted features have limitations in capturing the intricate spatial and temporal patterns in video data. To address this, a novel approach using spatiotemporal autoencoders and cuboid-based representation is proposed.

This involves converting videos into frames, dividing frames into cuboids, and training separate autoencoders for each cuboid folder. During testing, cuboids are reconstructed and compared against trained models, with anomalies detected based on a predefined threshold.

OUR APPROACH

- Firstly, the use of cuboids for processing the frames, which helps in capturing the spatio-temporal features of the frames more accurately.
- Secondly, train a separate autoencoder model for each folder of cuboids, which aids in detecting anomalies more effectively.
- Thirdly, employ a threshold-based approach to detect anomalies, which assists in reducing false positives and improving detection accuracy.
- Lastly, our modular approach allows for better adaptability to different types of videos and scenarios, making it more versatile and applicable in various real-world situations.

BASE PAPER DETAILS

TITLE: **Video anomaly detection with spatio-temporal dissociation**
PUBLISHED YEAR: 2022
JOURNAL NAME: **Elseveir (Pattern Recognition)**

This presents a novel approach for detecting anomalies in videos by dissociating spatial and temporal information. This method aims to improve anomaly detection accuracy by separating spatial and temporal features, enhancing the system's ability to identify unusual events or behaviors in video data.

LITERATURE SURVEY

TITLE & AUTHOR	JOURNAL & YEAR	DATASET	APPROACH	OUTCOME	LIMITATIONS
Proposed System for Criminal Detection and Recognition on CCTV Data Using Cloud and Machine Learning, Pratiksha Shetgaonkar.	IEEE, 2019	Available CCTV dataset	Mainly CNN & SVM	Efficient and effective criminal detection and recognition on CCTV data.	Privacy concerns, data quality dependencies, and biases in machine learning models.
Anomaly Detection using Convolutional Spatiotemporal Autoencoder, Hemant Dhole	IEEE, 2019	Avenue and UCSD	Spatio-temporal Autoencoders, CNN	Effectively identified anomalies in video data with high accuracy and low false positive rates, showcased robustness across various datasets.	Scalability and generalization to diverse scenarios.
Video anomaly detection with spatio-temporal dissociation, Yunpeng Changa.	ELSEVEIR, 2022	Avenue Benchmark Dataset	Spatio-temporal dissociation, CNN	Achieved a higher true positive rate and a lower false positive rate, indicating high effectiveness.	Complexity and computational demands due to dissociating spatial and temporal information.

THANK YOU!!