

Dual-mode iterative denoiser: Tackling the weak label for anomaly detection

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Introduction

• In the secure field, anomaly detection aims to detect abnormal events under surveillance.









Challenge

- Crowd anomaly detection suffers from limited training data under weak supervision.
- The normal video contains no anomalies. The abnormal video contains anomaly but its temporal position in the video is unknown. Only video-level label is available.)
- Direct end-to-end training is unpractical.





Proposed method

• Dual-mode iterative denoiser.





Proposed method

- Set the video-level label as the noised label for the clip-level label.
- Clean the noise in the clip-level label to conduct the end-toend training.





Proposed method





Proposed method-Predenoiser

- Social MIL is used to denoise the label on the coarse-grained segment's level.
- Clip-level course label is obtained.





Proposed method-Cluster Denoiser

- According to the clip-level labels, using the anomaly set and normality set to train two CAEs.
- Then we utilize the two CAEs to modify the ambiguous set.





Proposed method-GCN Denoiser

• GCN is used to correct the noised label through temporal correction and feature similarity.





Experimental Results

QUANTITATIVE COMPARISON ON UCF-crime		
Method	AUC(%)	
Hasan et al. [10]	50.66	
Lu et al. [3]	65.51	
Sultani et al. [6]	74.89	
Lin <i>et al.</i> [7]	78.28	
Zhong et al. [22]	79.25	
Our method	83.31	

TABLE I

TABLE II			
THE ABLATION STUDIES ON	UCF-crime		

	Pre-D.	Cluster L.D.	GCN L.D.	AUC(%)
1	\checkmark	\checkmark	\checkmark	83.31
2	\checkmark	\checkmark		83.07
3	\checkmark		\checkmark	81.13
4		\checkmark	\checkmark	80.86
5		\checkmark		77.04
6			\checkmark	79.98

TABLE III			
QUANTITATIVE COMPARISON ON Shanghai	Tech new	split.	

Method	AUC(%)
Sultani et al. [6]	73.51
Lin <i>et al.</i> [7]	74.83
Zhong et al. [22]	82.09
Our method	85.12

TABLE IV				
THE ABLATION	STUDIES	ON Shanghai	Tech new	split.

	Pre-D.	Cluster L.D.	GCN L.D.	AUC(%)
1	\checkmark	\checkmark	\checkmark	85.12
2	\checkmark	\checkmark		82.47
3	\checkmark		\checkmark	83.39
4		\checkmark	\checkmark	82.94
5		\checkmark		75.14
6			\checkmark	82.32



Thank you!