1

Anomaly Detection

Abstract—se days the surveillance systems are very attended for se days the surveillance systems are very attended forse days the surveillance systems are v

Index Terms—Abnormal event detection, rare event detection, outlier detection, novelty detection, one-class classification, visual surveillance systems, crowd analysis

1 Introduction

Tese days the surveillance systems are very attended I for se days the surveillance systems are very attended forse days the surveillance systems are very attended for events. In respect to what is the definition of anomaly, there are several approaches to finding them. Totally, it can be categorized as follow:

- se days the surveillance systems are very attended forse days the surveillance systems are very attended for [].
- se days the surveillance systems are very attended forse days the surveillance systems are very attended for [].
- se days the surveillance systems are very attended for [].

se days the surveillance systems are very attended forse days the surveillance systems are very attended

forse days the surveillance systems are very attended forse days the surveillance systems are very attended forse days the surveillance systems are very attended forse days the surveillance systems are very attended for Based on above definition,

2 ENCOURAGED FOR COMPUTER

2.1 journals). Most IEEE

This is the 3th section

2.2 tended forse daysthe surveillance systems are v

This is the 4th section

2.3 Dn and Multi-Instance Learning (TR

This is the 5th section

2.4 n and Multi-Instance Learning (TR

This is the 6th section

2.5 n and Multi-Instance Learning (TR

This is the 7th section

3 N AND MULTI-INSTANCE LEARNING (TR

- 4 DATAS
- 5 EVALUATING MEASURE

Modeling Frameworks	References
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]
TRAjectory Segmentation and Multi-Instance Learning (TRASMIL)	[73]

TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	
TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	
TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	
TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	
TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	
TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	
TRAjectory Segmentation and Multi-Instance	[73]
Learning (TRASMIL)	

Dataset	A	AUC	EER	Reference
	[?]			[1]
UCSD Ped1				[7]
				[9]
				[13]
				[15]
				[16]
				[23]
				[29]
				[30]
				[32]
				[33]
				[35]
				[37]
				[38]
				[39]
				[40]
				[40]
	[?]			[1]
UCSD				[11]
Ped2				[15]
				[19]
				[23]
				[28]
				[29]
				[30]
				[32]
				[35]
				[37]
				[38]
				[39]
				[40]
				[10]
UMN				[2]
				[6]
				[7]
				[10]
				[18]
				[19]
				[20]
				[28]
				[29]
				[32]
				[39]
				[e.1
				[2]
PETS				[4]
				[6]
		I	1	1

II.		
		[10]
		[20]
		. ,
		[7]
		[7]
Avenue		[13]
		[16]
		[33] [37]
		[27]
		[3/]
		[7]
Subway	7	[13]
Jubway		[1/1]
		[14] [23]
		[23]
		[3]
QMUL		r- J
QIVIOL		
		[18]
CUHK		[30]
COTIK		[50]
		[21]
Hockey		[36]
Tiockey		
Fight		
		[7]
LICE		[,]
UCF		

6 EXPERIMENTAL RESULT

7 SUMMARY, DISCUSSIONS AND CONCLUSIONS

This paper presents.

REFERENCES

- [1] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [2] H. Kopka and P. W. Daly, A Guide to ETeX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [3] H. Kopka and P. W. Daly, A Guide to ET_EX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [4] H. Kopka and P. W. Daly, A Guide to ETeX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [5] H. Kopka and P. W. Daly, A Guide to ET_EX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [6] H. Kopka and P. W. Daly, A Guide to ETeX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [7] H. Kopka and P. W. Daly, A Guide to LT_EX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [8] H. Kopka and P. W. Daly, A Guide to ETeX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [9] H. Kopka and P. W. Daly, A Guide to ET_EX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [10] H. Kopka and P. W. Daly, A Guide to ETEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [11] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [12] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [13] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [14] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [15] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [16] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [17] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [18] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [19] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [20] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
 [21] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [22] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [23] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [24] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [25] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [26] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [27] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [28] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [29] H. Kopka and P. W. Daly, A Guide to LaTeX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [30] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [31] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [32] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [33] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [34] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.

- [35] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [36] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [37] H. Kopka and P. W. Daly, A Guide to ET_EX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [38] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [39] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [40] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [41] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [42] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [43] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [44] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [45] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [46] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [47] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [48] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [49] H. Kopka and P. W. Daly, A Guide to ETEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [50] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [51] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [52] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [53] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [54] H. Kopka and P. W. Daly, A Guide to LTFX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [55] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [56] H. Kopka and P. W. Daly, A Guide to LTFX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [57] H. Kopka and P. W. Daly, A Guide to ETFX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [58] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [59] H. Kopka and P. W. Daly, A Guide to ET_FX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [60] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [61] H. Kopka and P. W. Daly, A Guide to ETEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [62] H. Kopka and P. W. Daly, A Guide to UTFX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [63] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [64] H. Kopka and P. W. Daly, *A Guide to LaTeX*, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [65] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [66] H. Kopka and P. W. Daly, A Guide to UTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [67] H. Kopka and P. W. Daly, A Guide to LTFX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [68] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [69] H. Kopka and P. W. Daly, A Guide to ETEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [70] H. Kopka and P. W. Daly, A Guide to LTFX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999. [71] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. Harlow,
- England: Addison-Wesley, 1999.
 [72] H. Kopka and P. W. Daly, *A Guide to LITEX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.

[73] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [74] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [75] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [76] H. Kopka and P. W. Daly, A Guide to LTFX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999.	
[77] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[78] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[79] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [80] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [81] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999.	
[82] H. Kopka and P. W. Daly, A Guide to LaTeX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[83] H. Kopka and P. W. Daly, A Guide to ET _E X, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[84] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[85] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [86] H. Kopka and P. W. Daly, A Guide to ETFX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [87] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999.	
[88] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[89] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[90] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[91] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [92] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [93] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999.	
[94] H. Kopka and P. W. Daly, A Guide to LaTeX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[95] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[96] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[97] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [98] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999. [99] H. Kopka and P. W. Daly, A Guide to ETFX, 3rd ed.	Harlow,
England: Addison-Wesley, 1999.	,
[100] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
[101] H. Kopka and P. W. Daly, A Guide to LTEX, 3rd ed. England: Addison-Wesley, 1999.	Harlow,
- G	