7.4.1 Event-based video summary

The following tables show shot summaries generated automatically by the proposed system.

'hall_cif' Shot Summary based on Objects and Events; StartPic 1/EndPic 300

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
23	Appearing completed	1	8	Move	(68 ,114)/(88 ,147)	(2 ,1)	3878 /3878
84	Appearing completed	5	8	Move	(234,111)/(224,130)	(-1 ,1)	750 /750
146	is Deposit by ObjID 1	6	8	Stop	(117,162)/(117,163)	(0 ,0)	298 /298
226	Occlusion	6	88	Stop	(117,162)/(117,163)	(0 ,0)	292 /290
226	Occlusion ObjID 6	1	211	Move	(68 ,114)/(149,129)	(-1 ,0)	6602 /1507
251	Disappear	1	235	Disappear	(68 ,114)/(125,128)	(-1 ,1)	6602 /95

'road1_cif' Shot Summary based on Objects and Events; StartPic 1/EndPic 300

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
8	Appearing completed	1	8	Move	(306,216)/(272,167)	(-5 ,-5)	1407 /1407
11	Entering completed	2	8	Move	(344,205)/(340,199)	(-1 ,-1)	543 /543
45	Appearing completed	3	8	Stop	(148,39)/(148,39)	(0 ,0)	148 /148
158	Appearing completed	4	8	Move	(142,69)/(138,74)	(-1 ,1)	157 /157
182	Disappear	1	181	Disappear	(306,216)/(173,41)	(0 ,0)	809 /34
200	Appearing completed	5	8	Move	(336,266)/(295,191)	(-8 ,-8)	1838 /1838
201	Move Fast	5	9	Move	(336,266)/(288,181)	(-8 ,-8)	1588 /1588
204	Exit	4	53	Exit	(142,69)/(8 ,273)	(-9 ,14)	191 /471
204	Occlusion	5	12	Move	(336,266)/(271,157)	(-5 ,-8)	1103 /1103
204	Occlusion by ObjID 5	2	201	Stop	(344,205)/(289,129)	(0 ,0)	822 /555
269	Exit	3	231	Exit	(148,39)/(3 ,230)	(-6 ,7)	156 /391
279	Abnormal	2	276	Stop	(344,205)/(291,129)	(0 ,0)	822 /563

'floor' Shot Summary based on Objects and Events; StartPic 1/EndPic 826

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
36	Appearing completed	1	8	Move	(126,140)/(123,135)	(0 ,-1)	320 /320
268	is Deposit by ObjID 1	3	8	Stop	(121,140)/(121,140)	(0 ,0)	539 /539
405	Occlusion	3	145	Stop	(121,140)/(120,141)	(0 ,0)	541 /555
405	Occlusion ObjID 3	1	377	Move	(126,140)/(83 ,109)	(1 ,0)	840 /2422
411	Removal by ObjID 1	3	150	Removal	(121,140)/(104,132)	(0 ,0)	541 /1451
787	Appearing completed	18	8	Move	(105,68)/(108,86)	(0 ,0)	91 /91
825	Exit	1	796	Exit	(126,140)/(9 ,230)	(-10,7)	840 /247

'floort' Shot Summary based on Objects and Events; StartPic 1/EndPic 636

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
8	Entering completed	1	8	Stop	(32 ,136)/(32 ,136)	(0 ,0)	270 /270
16	Appearing completed	2	8	Move	(55 ,65)/(57 ,78)	(1 ,0)	814 /814
185	Occlusion	1	185	Move	(32 ,136)/(32 ,131)	(0 ,-1)	269 /352
185	Occlusion ObjID 1	2	177	Move	(55 ,65)/(59 ,102)	(-1 ,1)	1267 /2108
202	Removal by ObjID 2	1	201	Removal	(32 ,136)/(33 ,116)	(0 ,-1)	269 /374
636	Exit	2	627	Exit	(55 ,65)/(277,235)	(9 ,2)	1267 /252

'floorp' Shot Summary based on Objects and Events; StartPic 1/EndPic 655

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
13	Entering completed	1	8	Move	(85 ,234)/(74 ,215)	(2 ,-5)	3671 /3671
460	is Deposit by ObjID 1	2	8	Stop	(32 ,135)/(32 ,135)	(0 ,0)	266 /266
654	Disappear	1	648	Disappear	(85 ,234)/(51 ,108)	(0 ,1)	3327 /85

'urbicande_cif' Shot Summary based on Objects and Events; StartPic 1/EndPic 300

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
8	Appearing completed	1	8	Move	(246,160)/(249,152)	(0 ,-1)	185 /185
30	Entering completed	4	8	Move	(331,158)/(322,160)	(0 ,0)	65 /65
31	Entering completed	5	8	Stop	(337,157)/(337,157)	(0 ,0)	47 /47
48	Appearing completed	6	8	Move	(235,95)/(240,107)	(1 ,1)	197 /197
52	Occlusion by ObjID 6	1	52	Stop	(246,160)/(260,129)	(0 ,0)	180 /148
52	Occlusion	6	12	Move	(235,95)/(243,118)	(1 ,3)	277 /277
104	Appearing completed	7	8	Move	(120,13)/(138,48)	(1 ,5)	621 /621
145	Occlusion by ObjID 7	1	145	Stop	(246,160)/(249,117)	(0 ,0)	180 /158
145	Occlusion	7	49	Move	(120,13)/(245,106)	(1 ,1)	441 /240
158	Exit	4	135	Exit	(331,158)/(30 ,194)	(-6 ,2)	61 /28
182	Entering completed	8	8	Stop	(337,157)/(337,157)	(0 ,0)	49 /49
200	Exit	6	159	Exit	(235,95)/(334,172)	(0 ,0)	122 /34
215	Occlusion by ObjID 7	5	192	Stop	(337,157)/(302,152)	(0 ,0)	47 /92
229	Entering completed	9	8	Stop	(337,157)/(337,157)	(0 ,0)	49 /49
253	Abnormal	1	253	Move	(246,160)/(183,92)	(-1 ,-1)	180 /311
261	Occlusion	9	40	Move	(337,157)/(341,158)	(1 ,0)	49 /98
261	Occlusion by ObjID 9	7	165	Stop	(120,13)/(331,150)	(0 ,0)	441 /67
276	Abnormal	5	253	Move	(337,157)/(226,143)	(-1 ,0)	47 /259
290	Entering completed	10	8	Stop	(307,193)/(307,193)	(0 ,0)	550 /550

'survey_d' Shot Summary based on Objects and Events;; StartPic 1/EndPic 979

Pic	Event	ObjID	Age	Status	Position	Motion	Size
					start/present	present	start/present
8	Entering completed	2	8	Move	(31 ,161)/(34 ,173)	(1 ,5)	7115 /7115
8	Entering completed	1	8	Move	(200,29)/(196,31)	(1 ,0)	2156 /2156
17	Entering completed	3	8	Move	(15 ,173)/(7 ,177)	(-1 ,1)	1103 /1103
25	Entering completed	4	8	Move	(81 ,195)/(82 ,190)	(1 ,-3)	1967 /1967
70	Occlusion ObjID 1	2	70	Move	(31 ,161)/(129,154)	(1 ,0)	3593 /4605
70	Occlusion	1	70	Move	(200,29)/(162,48)	(-1 ,1)	2219 /3523
81	Entering completed	5	8	Move	(283,146)/(275,164)	(0 ,1)	3038 /3038
91	Occlusion	5	18	Move	(283,146)/(211,163)	(-5 ,0)	2886 /3124
91	Occlusion ObjID 5	2	91	Move	(31 ,161)/(153,143)	(1 ,0)	3593 /4189
107	Occlusion by ObjID 1	5	34	Move	(283,146)/(121,164)	(-5 ,0)	2886 /2643
107	Occlusion ObjID 5	1	107	Move	(200,29)/(124,66)	(-1 ,1)	2219 /5138
122	Exit	5	48	Exit	(283,146)/(5 ,165)	(-3 ,3)	2886 /340
197	Exit	1	196	Exit	(200,29)/(3 ,118)	(-2 ,5)	2219 /123
228	Exit	2	227	Exit	(31 ,161)/(309,12)	(0 ,-2)	3593 /153
242	Entering completed	7	8	Move	(210,27)/(200,29)	(-1 ,1)	1137 /1137
287	Entering completed	8	8	Move	(242,24)/(235,26)	(-1 ,1)	1431 /1431
355	Exit	7	120	Exit	(210,27)/(4 ,103)	(-1 ,3)	1424 /166
432	Entering completed	9	8	Move	(245,26)/(241,27)	(-1 ,3)	1304 /1304
449	Exit	8	169	Exit	(242,24)/(4 ,167)	(-2 ,3)	1708 /192
594	Entering completed	12	8	Move	(261,28)/(255,30)	(-1 ,1)	1453 /1453
606	Exit	9	181	Exit	(245,26)/(13 ,171)	(-1 ,1)	601 /2320
741	Exit	12	154	Exit	(261,28)/(8 ,186)	(-3 ,3)	1436 /1109
836	Entering completed	13	8	Move	(233,26)/(226,30)	(0 ,2)	1202 /1202
975	Exit	13	146	Exit	(233,26)/(3 ,123)	(-3 ,1)	1444 /254

'stair_wide_cif' Shot Summary based on Objects and Events;; StartPic 1/EndPic 1475

Pic	Event	ObjID	Age	Status	Position start/present	Motion present	Size start/present
172	Entering completed	2	8	Move	(312,248)/(308,230)	(-2 ,-2)	5746 /5746
216	Entering completed	3	8	Move	(184,186)/(167,169)	(-2 ,-2)	7587 /7587
234	Exit	2	69	Exit	(312,248)/(337,282)	(3 ,16)	11803 /180
479	Appearing completed	4	8	Stop	(128,104)/(127,100)	(0 ,0)	211 /211
547	Disappear	3	338	Disappear	(184,186)/(114,67)	(0 ,-1)	6374 /137
608	Entering completed	7	8	Move	(120,88)/(125,79)	(1 ,1)	2536 /2536
678	Entering completed	8	8	Move	(138,85)/(131,85)	(-1 ,0)	5308 /5308
803	Exit	7	202	Exit	(120,88)/(337,282)	(3 ,20)	3432 /199
812	Disappear	8	141	Disappear	(138,85)/(121,92)	(0 ,0)	4334 /73
916	Entering completed	9	8	Move	(11 ,151)/(23 ,159)	(3 ,0)	2866 /2866
1179	Exit	9	270	Exit	(11 ,151)/(127,72)	(0 ,0)	4955 /1388
1290	Entering completed	16	8	Stop	(123,72)/(128,77)	(0 ,0)	2737 /2737
1363	Exit	16	80	Exit	(123,72)/(83 ,154)	(-5 ,1)	3844 /15910

7.4.2 Key-image based video representation

In a surveillance environment, important events may occur after a long time has passed. During this time, the attention of human operators decreases and significant events may be missed. The proposed system for event detection identifies events of interest as they occur and human operators can focus their attention on moving objects and their related events.

This section presents automatic extracted key-images from video shots. Key-images are the subset of images which best represent the content of a video sequence in an abstract manner. Key-image video abstraction transforms an entire video shot into a small number of representative images. This way important content is maintained while redundancies are removed. Key-images based on events are appropriate when the system must report on specific events as soon as they happen.

Figures 7.6–7.14 show key-images extracted automatically from video shots. Each image is annotated on its upper left and right corners with the image number, object ID, age, and events. Only objects performing the events are annotated in this application. Note that in the figures no key-images for the event *Exit* or *Disappear* are shown because of space constraint. In Fig. 7.13, no *appear*, *enter*, *exit*, and *disappear*