

Testing with different scenarios

The testing consisted of the following:

A distance test to validate that people are being detected correctly and also if the distance between them is small to notify. So, the expected results (number of people and if an alert needs to be sent are compared for each image), we can also see an overall improvement in time using the parallel approach.

1. Distance test

Initial configuration

Please enter the horizontal distance of the room in meters

3

Please enter the social distance of the room in meters (recommended 1 meter)

0.5

Initial image:



images/DistanceTests/Test_4(Sequence_with_people)/1.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 1

Starts in pixels: 546

Ends in pixels:

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 14.0 milliseconds

Total time taken to reduce noise on parallel 35.0 milliseconds

Total time taken to detect people on parallel 7.0 milliseconds

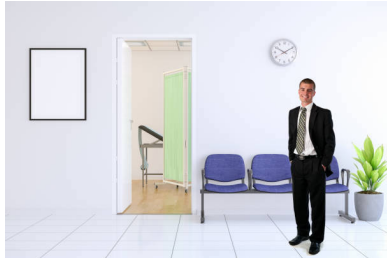
Expected results:

Number of people: 1

Alert: No

Conclusion (Expected vs obtained results): Correct

images/DistanceTests/Test_4(Sequence_with_people)/2.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 1

Starts in pixels: 444

Ends in pixels: 519

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 6.0 milliseconds

Total time taken to reduce noise on parallel 5.0 milliseconds

Total time taken to detect people on parallel 2.0 milliseconds

Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 1

Alert: No

images/DistanceTests/Test_4(Sequence_with_people)/3.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 1

Starts in pixels: 277

Ends in pixels: 351

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 1.0 milliseconds

Total time taken to reduce noise on parallel 20.0 milliseconds

Total time taken to detect people on parallel 4.0 milliseconds

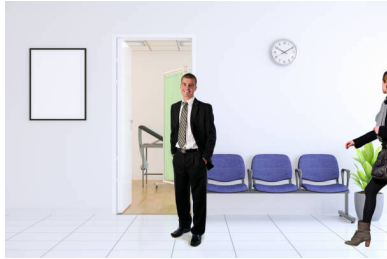
Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 1

Alert: No

images/DistanceTests/Test_4(Sequence_with_people)/4.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 2

Starts in pixels: 259 533

Ends in pixels: 332

Distances between them in pixels:
201

Distances between them in meters:

0.99 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 0.0 milliseconds

Total time taken to reduce noise on parallel 7.0 milliseconds

Total time taken to detect people on parallel 5.0 milliseconds

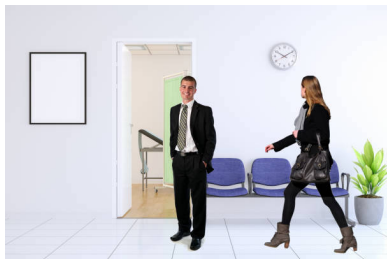
Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 2

Alert: No

images/DistanceTests/Test_4(Sequence_with_people)/5.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 2

Starts in pixels: 258 407

Ends in pixels: 332 553

Distances between them in pixels:
75

Distances between them in meters:

0.37 = ALERT! Not respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 1.0 milliseconds

Total time taken to reduce noise on parallel 5.0 milliseconds

Expected results:

Number of people: 2

Alert: Yes

Total time taken to detect people on parallel 0.0 milliseconds

Conclusion (Expected vs obtained results): Correct

images/DistanceTests/Test_4(Sequence_with_people)/6.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 2

Starts in pixels: 0 266

Ends in pixels: 55 335

Distances between them in pixels:
211

Distances between them in meters:

1.03 = Respecting social distance

PROCESSING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 1.0 milliseconds

Total time taken to reduce noise on parallel 5.0 milliseconds

Total time taken to detect people on parallel 1.0 milliseconds

Conclusion (Expected vs obtained results): Correct

2. Distance and performance tests:

a. Theater scenario

Initial configuration

Please enter the horizontal distance of the room in meters

5

Please enter the social distance of the room in meters (recommended 1 meter)

0.5

Initial image:



images/Scene1Theater/1.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 1

Starts in pixels: 46

Ends in pixels: 468

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 40.0 milliseconds

Total time taken to detect changes and binarize on sequential: 42.0 milliseconds

Total time taken to reduce noise on parallel 152.0 milliseconds

Total time taken to reduce noise on sequential: 198.0 milliseconds

Total time taken to detect people on parallel 40.0 milliseconds

Total time taken to detect people on sequential: 55.0 milliseconds

Addition of times parallel: 232.0

Addition of times sequential: 295.0

Saved time: 63.0

Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 1

Alert: No

images/Scene1Theater/2.jpg

Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 2

Starts in pixels: 0 873

Ends in pixels: 226 1274

Distances between them in pixels:
647

Distances between them in meters:

1.08 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 24.0 milliseconds

Total time taken to detect changes and binarize on sequential: 25.0 milliseconds

Total time taken to reduce noise on parallel 65.0 milliseconds

Total time taken to reduce noise on sequential: 187.0 milliseconds

Total time taken to detect people on parallel 34.0 milliseconds

Total time taken to detect people on sequential: 45.0 milliseconds

Addition of times parallel: 123.0

Addition of times sequential: 257.0

Saved time: 134.0

Conclusion (Expected vs obtained results): Correct



Expected results:

Number of people: 2

Alert: No

images/Scene1Theater/3.jpg



Expected results:

Number of people: 2

Alert: No

Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 2

Starts in pixels: 372 1352

Ends in pixels: 634 1776

Distances between them in pixels:
718

Distances between them in meters:

1.20 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 10.0 milliseconds

Total time taken to detect changes and binarize on sequential: 19.0 milliseconds

Total time taken to reduce noise on parallel 135.0 milliseconds

Total time taken to reduce noise on sequential: 186.0 milliseconds

Total time taken to detect people on parallel 23.0 milliseconds

Total time taken to detect people on sequential: 42.0 milliseconds

Addition of times parallel: 168.0

Addition of times sequential: 247.0

Saved time: 79.0

Conclusion (Expected vs obtained results): Correct

images/Scene1Theater/4.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 194 1100 1969

Ends in pixels: 587 1362 2393

Distances between them in pixels:
513 607

Distances between them in meters:

0.86 = Respecting social distance

1.01 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 10.0 milliseconds

Total time taken to detect changes and binarize on sequential: 18.0 milliseconds

Total time taken to reduce noise on parallel 132.0 milliseconds

Total time taken to reduce noise on sequential: 278.0 milliseconds

Total time taken to detect people on parallel 25.0 milliseconds

Total time taken to detect people on sequential: 41.0 milliseconds

Addition of times parallel: 167.0

Addition of times sequential: 337.0

Saved time: 170.0

Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 3

Alert: No

images/Scene1Theater/5.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 4

Starts in pixels: 37 940 1819 2567

Ends in pixels: 472 1334 2081 2991

Distances between them in pixels:

468 485 486

Distances between them in meters:

0.78 = Respecting social distance

0.81 = Respecting social distance

0.81 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 10.0 milliseconds

Total time taken to detect changes and binarize on sequential: 18.0 milliseconds

Total time taken to reduce noise on parallel 61.0 milliseconds

Total time taken to reduce noise on sequential: 279.0 milliseconds

Total time taken to detect people on parallel 19.0 milliseconds

Total time taken to detect people on sequential: 33.0 milliseconds

Addition of times parallel: 90.0

Addition of times sequential: 330.0

Saved time: 240.0

Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 4

Alert: No

b. Hospital scenario

Initial configuration

Please enter the horizontal distance of the room in meters

8

Please enter the social distance of the room in meters (recommended 1 meter)

1

Initial image:



images/Scene2Hospital/1.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 1

Starts in pixels: 1127

Ends in pixels: 1559

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 86.0 milliseconds

Total time taken to detect changes and binarize on sequential: 106.0 milliseconds

Total time taken to reduce noise on parallel 625.0 milliseconds

Total time taken to reduce noise on sequential: 782.0 milliseconds

Total time taken to detect people on parallel 168.0 milliseconds

Total time taken to detect people on sequential: 298.0 milliseconds

Addition of times parallel: 879.0

Addition of times sequential: 1186.0

Saved time: 307.0

Expected results:

Number of people: 1

Alert: No

Conclusion (Expected vs obtained results): Correct

images/Scene2Hospital/2.jpg



Expected results:

Number of people: 2

Alert: No

Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 2

Starts in pixels: 513 2553

Ends in pixels: 1064 2987

Distances between them in pixels:
1489

Distances between them in meters:

1.75 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 57.0 milliseconds

Total time taken to detect changes and binarize on sequential: 103.0 milliseconds

Total time taken to reduce noise on parallel 653.0 milliseconds

Total time taken to reduce noise on sequential: 951.0 milliseconds

Total time taken to detect people on parallel 158.0 milliseconds

Total time taken to detect people on sequential: 281.0 milliseconds

Addition of times parallel: 868.0

Addition of times sequential: 1335.0

Saved time: 467.0

Conclusion (Expected vs obtained results): Correct

images/Scene2Hospital/3.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 176 2039 4092

Ends in pixels: 681 2590 4526

Distances between them in pixels:
1358 1502

Distances between them in meters:

1.60 = Respecting social distance

1.77 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 247.0 milliseconds

Total time taken to detect changes and binarize on sequential: 83.0 milliseconds

Total time taken to reduce noise on parallel 527.0 milliseconds

Total time taken to reduce noise on sequential: 984.0 milliseconds

Total time taken to detect people on parallel 135.0 milliseconds

Total time taken to detect people on sequential: 276.0 milliseconds

Addition of times parallel: 909.0

Addition of times sequential: 1343.0

Saved time: 434.0

Expected results:

Number of people: 3

Alert: No

Conclusion (Expected vs obtained results): Correct

images/Scene2Hospital/4.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 2686 4626 5328

Ends in pixels: 3192 5142 5762

Distances between them in pixels:
1434 186

Distances between them in meters:

1.69 = Respecting social distance

0.22 = ALERT! Not respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 57.0 milliseconds

Total time taken to detect changes and binarize on sequential: 79.0 milliseconds

Total time taken to reduce noise on parallel 480.0 milliseconds

Total time taken to reduce noise on sequential: 981.0 milliseconds

Total time taken to detect people on parallel 139.0 milliseconds

Total time taken to detect people on sequential: 263.0 milliseconds

Addition of times parallel: 676.0

Addition of times sequential: 1323.0

Saved time: 647.0

Expected results:

Number of people: 3

Alert: Yes

Conclusion (Expected vs obtained results): Correct

images/Scene2Hospital/5.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 5

Starts in pixels: 431 2191 3900 4632 5328

Ends in pixels: 1023 2811 4406 5148 5762

Distances between them in pixels:

1168 1089 226 180

Distances between them in meters:

1.38 = Respecting social distance

1.28 = Respecting social distance

0.27 = ALERT! Not respecting social distance

0.21 = ALERT! Not respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 58.0 milliseconds

Total time taken to detect changes and binarize on sequential: 82.0 milliseconds

Total time taken to reduce noise on parallel 565.0 milliseconds

Total time taken to reduce noise on sequential: 957.0 milliseconds

Total time taken to detect people on parallel 140.0 milliseconds

Total time taken to detect people on sequential: 255.0 milliseconds

Addition of times parallel: 763.0

Addition of times sequential: 1294.0

Saved time: 531.0

Expected results:

Number of people: 5

Alert: Yes

Conclusion (Expected vs obtained results): Correct

c. Elevator scenario

Initial configuration

Please enter the horizontal distance of the room in meters

3

Please enter the social distance of the room in meters (recommended 1 meter)

0.35

Initial image:



images/Scene3Elevator/1.jpg



Expected results:

Number of people: 3

Alert: No

Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 392 1690 3022

Ends in pixels: 1109 2451 3740

Distances between them in pixels:

581 571

Distances between them in meters:

0.40 = Respecting social distance

0.40 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 87.0 milliseconds

Total time taken to detect changes and binarize on sequential: 104.0 milliseconds

Total time taken to reduce noise on parallel 519.0 milliseconds

Total time taken to reduce noise on sequential: 747.0 milliseconds

Total time taken to detect people on parallel 88.0 milliseconds

Total time taken to detect people on sequential: 160.0 milliseconds

Addition of times parallel: 694.0

Addition of times sequential: 1011.0

Saved time: 317.0

Conclusion (Expected vs obtained results): Correct

images/Scene3Elevator/2.jpg



Expected results:

Number of people: 3

Alert: Yes

Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 392 1690 2616

Ends in pixels: 1109 2451 3334

Distances between them in pixels:

581 165

Distances between them in meters:

0.40 = Respecting social distance

0.11 = ALERT! Not respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 73.0 milliseconds

Total time taken to detect changes and binarize on sequential: 93.0 milliseconds

Total time taken to reduce noise on parallel 351.0 milliseconds

Total time taken to reduce noise on sequential: 621.0 milliseconds

Total time taken to detect people on parallel 81.0 milliseconds

Total time taken to detect people on sequential: 161.0 milliseconds

Addition of times parallel: 505.0

Addition of times sequential: 875.0

Saved time: 370.0

Conclusion (Expected vs obtained results): Correct

images/Scene3Elevator/3.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 392 1690 2616

Ends in pixels: 1109 2451 3334

Distances between them in pixels:

581 165

Distances between them in meters:

0.40 = Respecting social distance

0.11 = ALERT! Not respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 64.0 milliseconds

Total time taken to detect changes and binarize on sequential: 82.0 milliseconds

Total time taken to reduce noise on parallel 367.0 milliseconds

Total time taken to reduce noise on sequential: 793.0 milliseconds

Total time taken to detect people on parallel 78.0 milliseconds

Total time taken to detect people on sequential: 158.0 milliseconds

Addition of times parallel: 509.0

Addition of times sequential: 1033.0

Saved time: 524.0

Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 3

Alert: Yes

images/Scene3Elevator/4.jpg



Expected results:

Number of people: 3

Alert: Yes

Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 903 1690 3073

Ends in pixels: 1621 2451 3791

Distances between them in pixels:

69 622

Distances between them in meters:

0.05 = ALERT! Not respecting social distance

0.43 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 74.0 milliseconds

Total time taken to detect changes and binarize on sequential: 91.0 milliseconds

Total time taken to reduce noise on parallel 509.0 milliseconds

Total time taken to reduce noise on sequential: 811.0 milliseconds

Total time taken to detect people on parallel 81.0 milliseconds

Total time taken to detect people on sequential: 161.0 milliseconds

Addition of times parallel: 664.0

Addition of times sequential: 1063.0

Saved time: 399.0

Conclusion (Expected vs obtained results): Correct

images/Scene3Elevator/5.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 903 1690 3073

Ends in pixels: 1621 2451 3791

Distances between them in pixels:

69 622

Distances between them in meters:

0.05 = ALERT! Not respecting social distance

0.43 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 69.0 milliseconds

Total time taken to detect changes and binarize on sequential: 89.0 milliseconds

Total time taken to reduce noise on parallel 236.0 milliseconds

Total time taken to reduce noise on sequential: 829.0 milliseconds

Total time taken to detect people on parallel 92.0 milliseconds

Total time taken to detect people on sequential: 180.0 milliseconds

Addition of times parallel: 397.0

Addition of times sequential: 1098.0

Saved time: 701.0

Conclusion (Expected vs obtained results): Correct

Expected results:

Number of people: 3

Alert: Yes

images/Scene3Elevator/6.jpg



Obtained results:

OBTAINED INFORMATION:

* Number of people in the room: 3

Starts in pixels: 392 1690 3022
Ends in pixels: 1109 2451 3740
Distances between them in pixels:
581 571

Distances between them in meters:

0.40 = Respecting social distance

0.40 = Respecting social distance

PROCESING TIME INFORMATION:

Total time taken to detect changes and binarize on parallel 66.0 milliseconds
Total time taken to detect changes and binarize on sequential: 84.0 milliseconds

Total time taken to reduce noise on parallel 467.0 milliseconds
Total time taken to reduce noise on sequential: 791.0 milliseconds

Total time taken to detect people on parallel 82.0 milliseconds
Total time taken to detect people on sequential: 165.0 milliseconds

Addition of times parallel: 615.0

Addition of times sequential: 1040.0

Saved time: 425.0

Expected results:

Number of people: 3

Alert: No

Conclusion (Expected vs obtained results): Correct