CV - Homework 4 - Locate Abandoned and Removed Objects

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Problem

Given a video find the frame in which abandoned object appears. Next, find the frame in which the object was removed.

Algorithm

- Read video filenames from the test file
- For each video process it
- Subtract background using BackgroundSubtractorMOG model
- Perform erosion to eliminate noise
- Perform dilation to unite separated parts of one object into one object
- Find contours
- Find bounding rectangle for each objects

At this stage we need to distinguish between stable (abandoned) objects and moving objects (e.g. man). Let's assume that object is abandoned if it's bounding rectangle remains almost the same in at least MIN FRAMES subsequent frames. Almost the same means that coordinates of corresponding vertices coordinates di ers no more than for MAX SIMILAR DISTANCE pixels. That's why we accumulate bounding rectangles once appeared until they are disappeared. We store the rst appearance frame, count of frames in which the object has appeared, the last appearance frame and its bounding rectangle.

- for each bounding rectangle in the current scene compare it with each accumulated rectangle;
- if it's almost the same as one which is accumulated - iterate count of frames in which the object has appeared;
- if not - it's new object - add into the accumulator.

Next we need to clear accumulator by removing already disappeared or moving objects:

- for each accumulated but not updated at the current step object;
- delete it from accumulator;
- if it has appeared in more than MIN_FRAMES frames - this is our object of interest.

Program Output

```
ObjectAbandonmentAndRemoval1.avi:
      rectangle: (339, 194, 54, 51) - timespan: (207, 486)
ObjectAbandonmentAndRemoval2.avi:
      rectangle: (266, 245, 104, 95) - timespan: (224, 510)
```

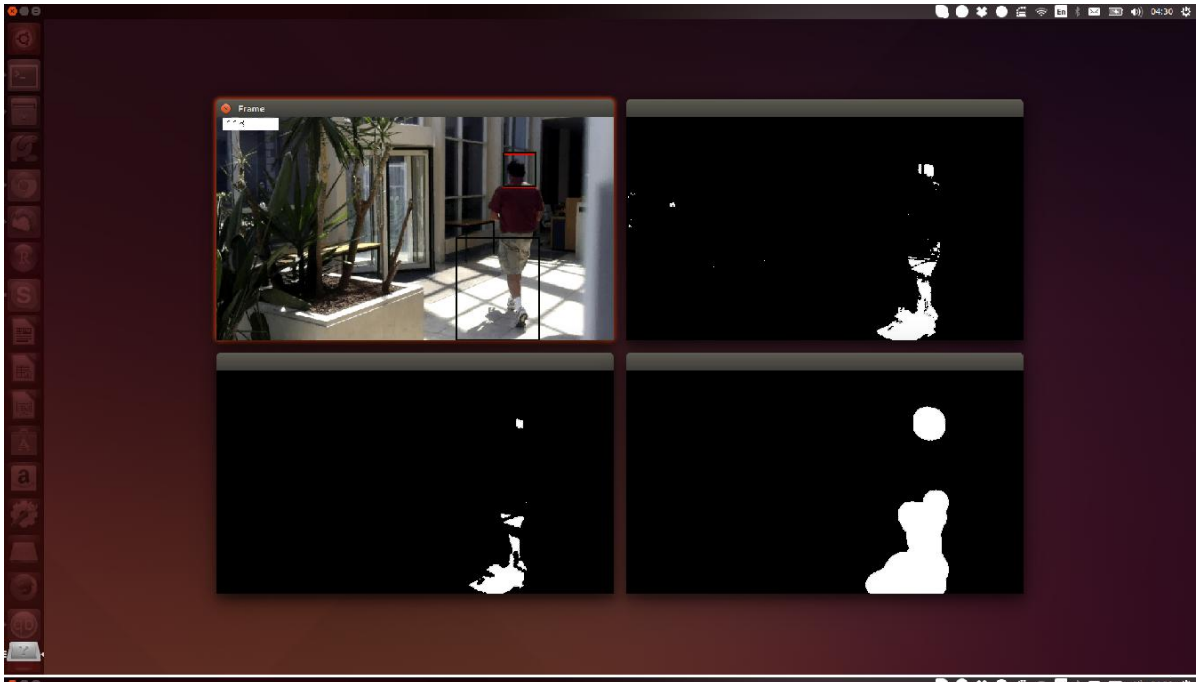
Illustrations

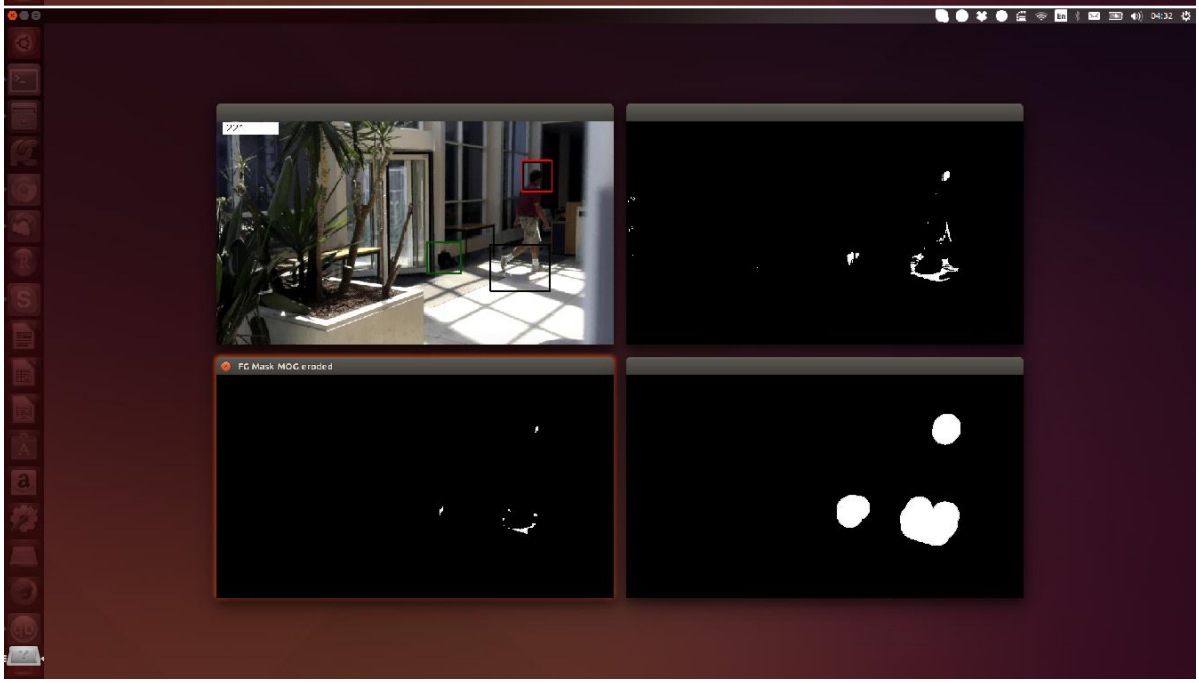
On the all illustrations:

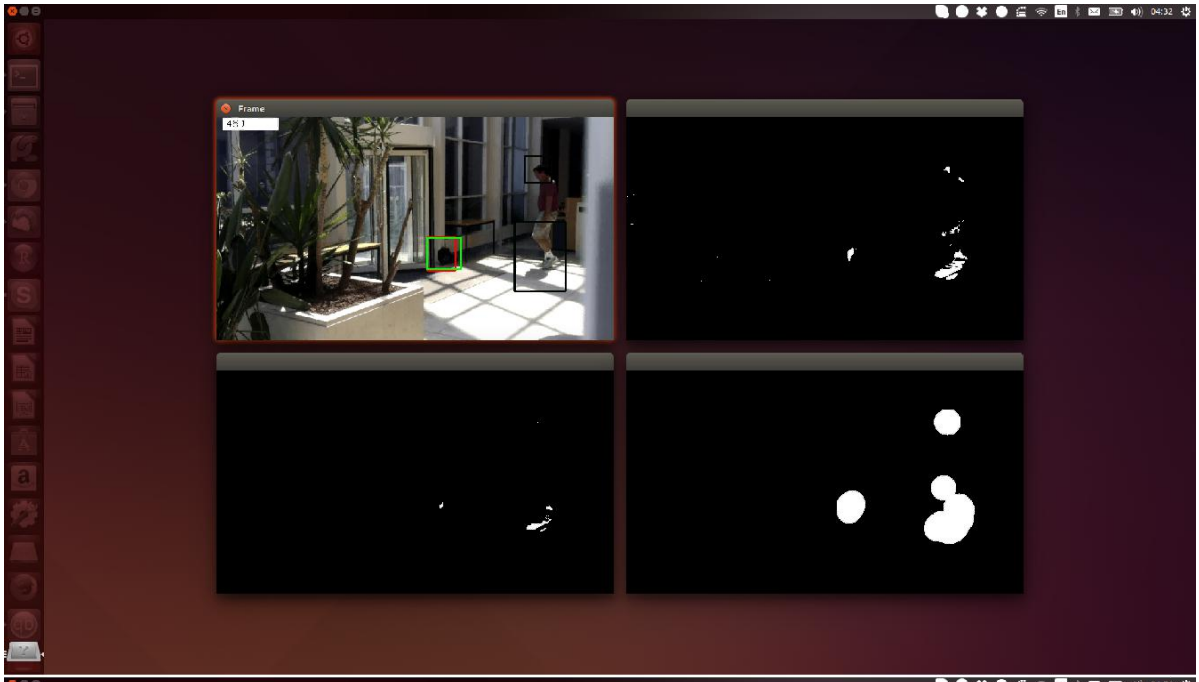
- the original frames are in the top left corner;
- foreground extracted by MOG algorithm is in the top right corner;
- eroded foreground in the bottom left corner;
- dilated foreground in the bottom right corner;

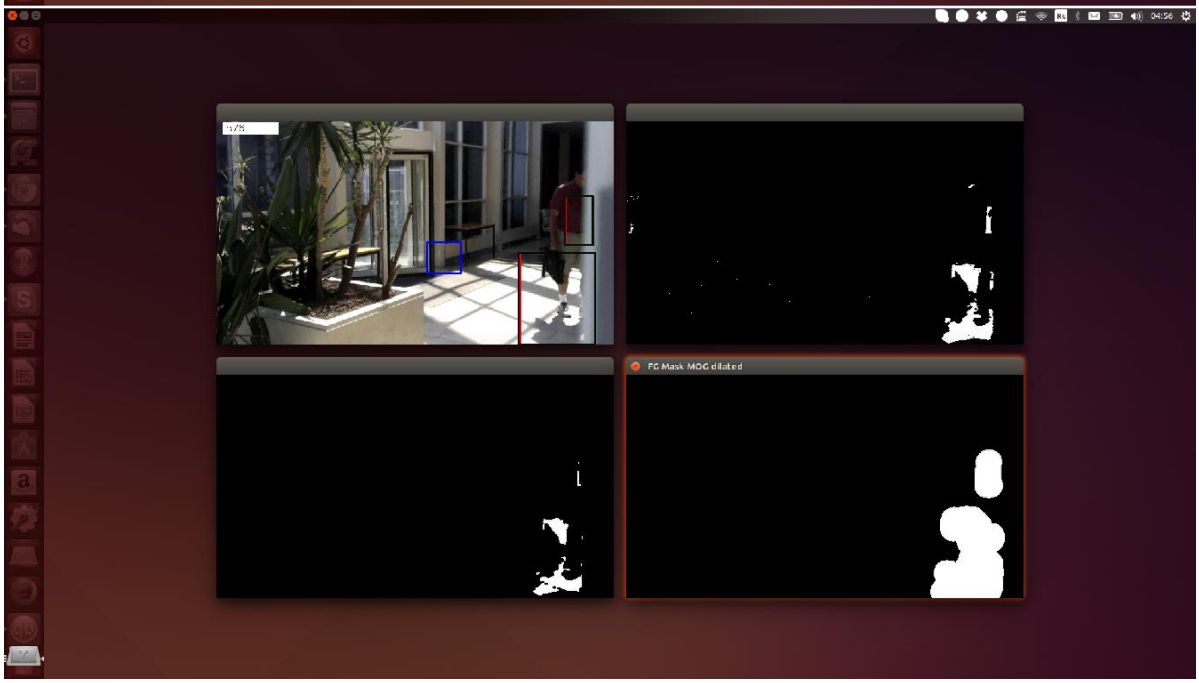
Moreover on the original frame di erent color of rectangles means:

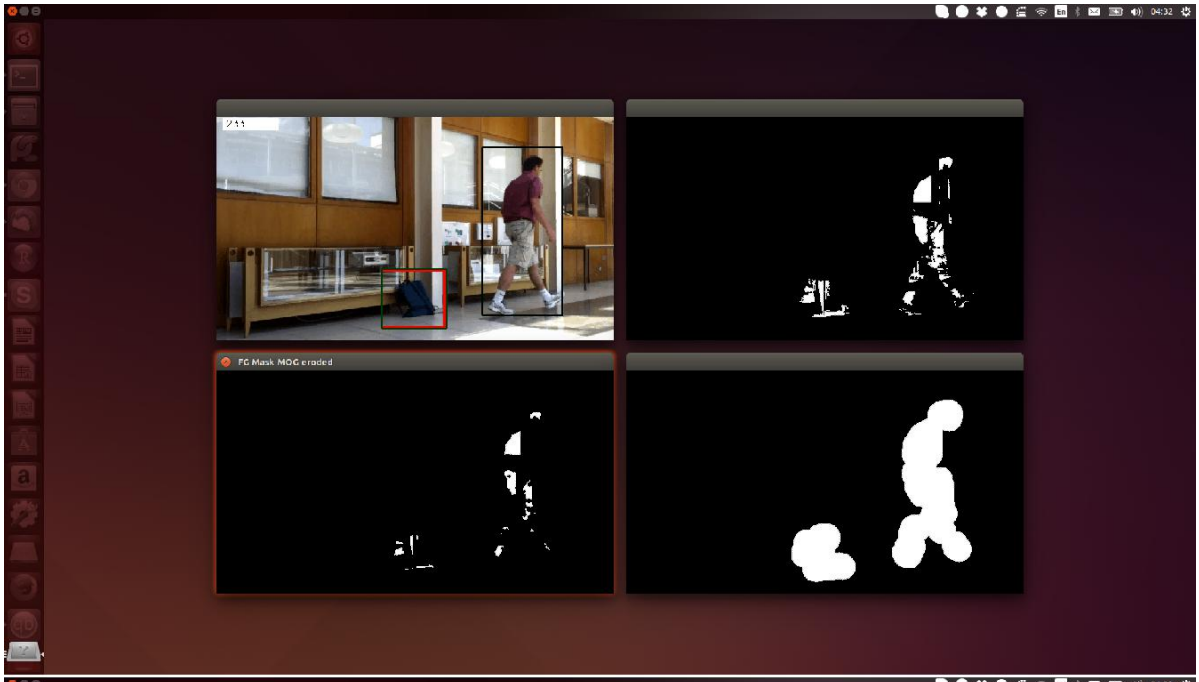
- red - all bounding rectangles found at the current frame;
- different gradations of green - currently accumulated rectangles. More bright green means that object has appeared for a longer time;
- blue - all objects which have been already found;

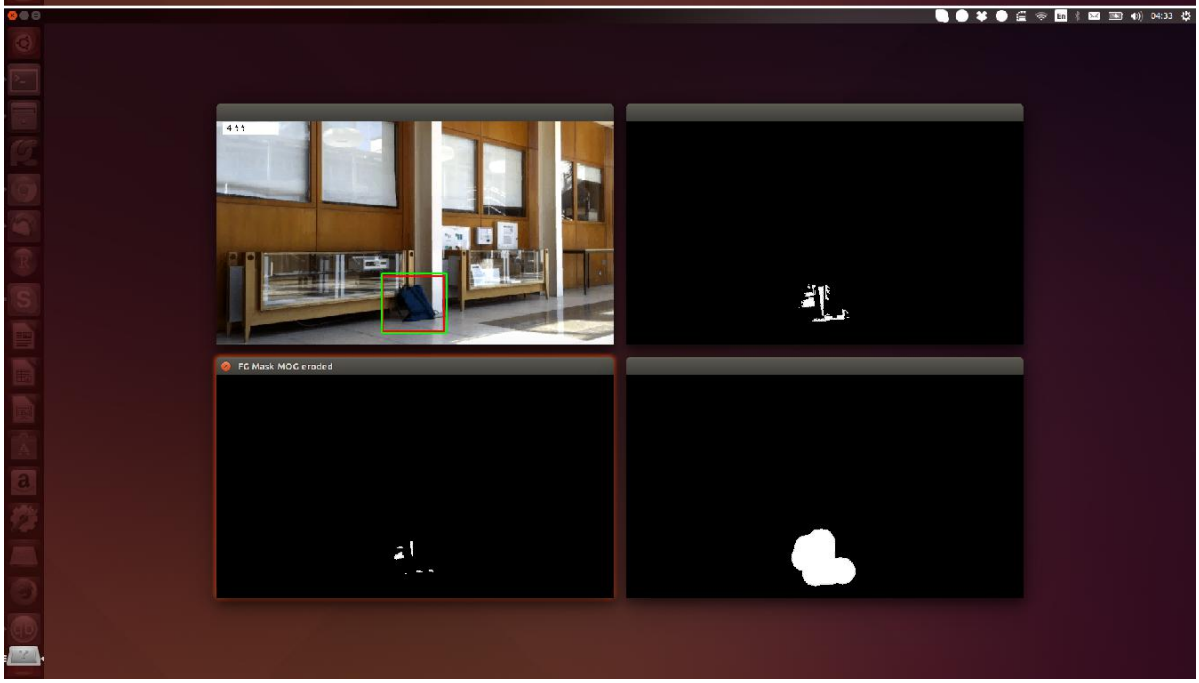

Frame

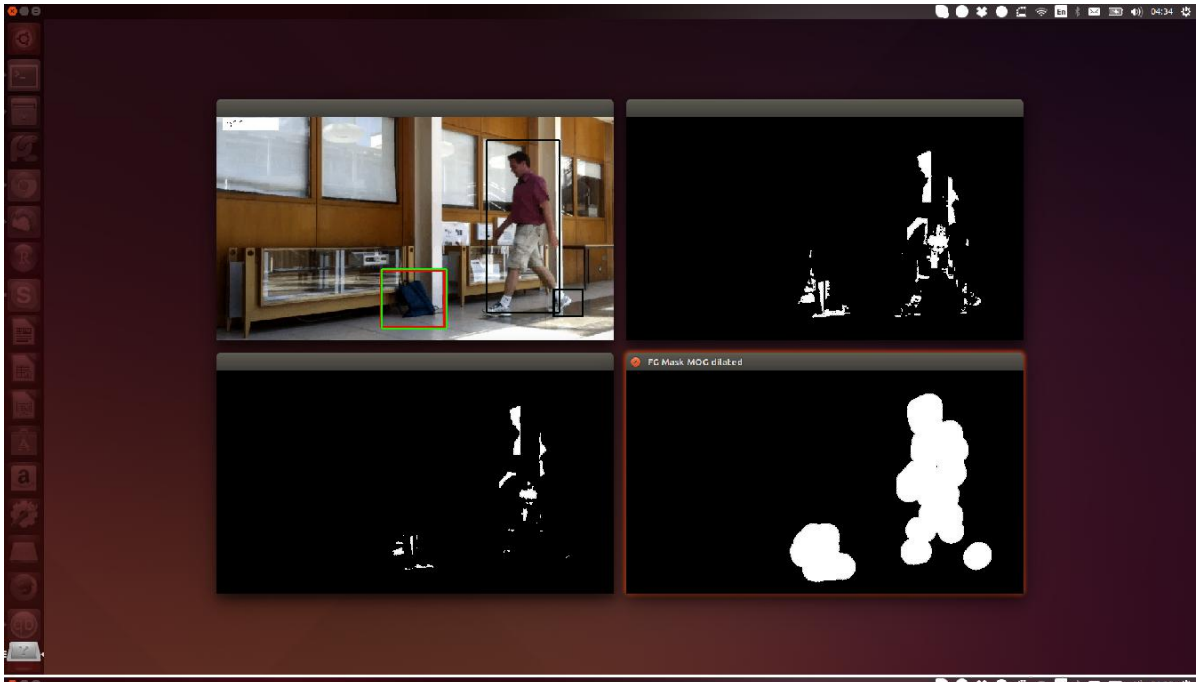

FG Mask MOG eraded

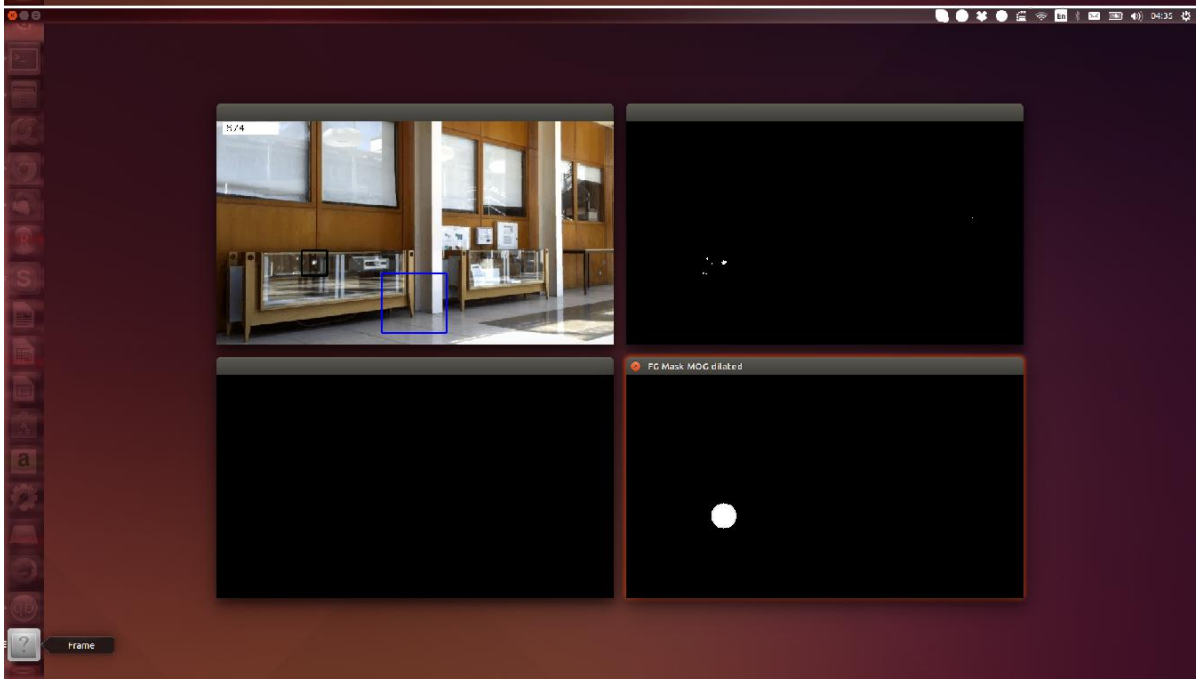

Frame


FG Mask MOG dilated


FG Mask MOG eroded


FG Mask MOG eroded


FG Mask MOG dilated


574
FG Mask MOG dilated
frame