# LABORATORY #5: REPORT
# A.A. 2015-2016

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|---|---|
| Subject: | Image and Video Analysis |
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## 1 Algorithm developed

```
close all;
clear all;
addpath('lib');
global method
global MAX_FRAMES
global T1
global alpha
global T3
global R
global sigma
global T4
MAX_FRAMES  = 50;
T1 = 1/255;
alpha = 0.7;
T3 = 7/255;
R = 5;
sigma = 0.2;
T4 = 0.4;

%[movRGB, f_rate] = read_video('../video/lab2016_1.mp4');
%save('movRGB.mat','movRGB', 'f_rate');
load('movRGB.mat');
methods = {'Fixed Threshold','Background modeling','Probabilistic Approach'};
instant = 25;
for i=1:3
    method = i;
    disp(strcat('Method: ',methods(method)));
    motion = motion_detection(movRGB);
    %implay(mov/255, f_rate);
    results(:,:,method) = motion(:,:,instant);
end
```

```
32 implay(motion, f_rate);
33
34 for i=1:3
35     figure(i);
36     imshow(results(:,:,i));
37 end
38 figure(4);
39 imshow(movRGB(:,:,:,instant)/255);
```

Where the function 'motion_detection' has the following code:

```
1  function motion = motion_detection(movRGB)
2  %% SOME USEFUL GLOBAL VARIABLES
3  global method
4  global T1
5  global alpha
6  global T3
7  global R
8  global sigma
9  global T4
10
11 %% CONVERTING RGB IMAGE TO GREYSCALE IMAGE
12 [h, w, ~, t] = size(movRGB);
13 motion = zeros(h,w,t-1);
14 mov = zeros(h,w,t);
15 for k=1:t
16     mov(:,:,k)=rgb2gray(movRGB(:,:,:,k)/255);
17 end
18
19 %% FIXED THRESHOLD METHOD
20 if (method==1)
21     for k=2:t
22         rho = mov(:,:,k)-mov(:,:,k-1);
23         motion(:,:,k-1) = rho.^2 > T1;
24     end
25 end
26
27 %% BACKGROUND MODELING METHOD
28 if (method==2)
29     B = zeros(h,w,t-1);
30     B(:,:,1) = mov(:,:,1);
31     for k=2:t
32         B(:,:,k) = alpha * mov(:,:,k-1) + (1-alpha)*B(:,:,k-1);
33         rho = mov(:,:,k)-B(:,:,k);
34         motion(:,:,k-1) = rho.^2>T3;
35     end
36 end
37
38 %% PROBABILISTIC APPROACH
39 if (method==3)
40     Pbgr = zeros(h,w,t-1);
41     for k = 2:R
42         for i=1:k-1
43             Pbgr(:,:,k-1) = Pbgr(:,:,k-1) + ...
44                 exp(-1/(2*sigma^2)*(mov(:,:,k)-mov(:,:,k-i)).^2)/(k-1);
```

```
45          end
46          motion(:,:,k-1) = Pbgr(:,:,k-1) <= T4;
47      end
48      for k = R+1:t
49          for i=1:R
50              Pbgr(:,:,k-1) = Pbgr(:,:,k-1) + ...
51                  exp(-1/(2*sigma^2)*(mov(:,:,k)-mov(:,:,k-i)).^2)/R;
52          end
53          motion(:,:,k-1) = Pbgr(:,:,k-1) <= T4;
54      end
55  end
```

## 2 Results

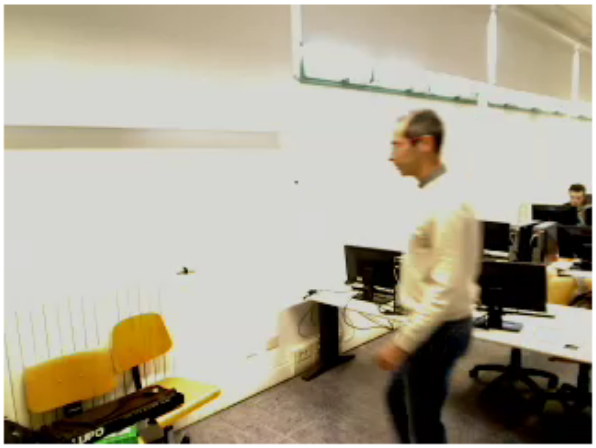

Figure 1: Input video at a certain instant

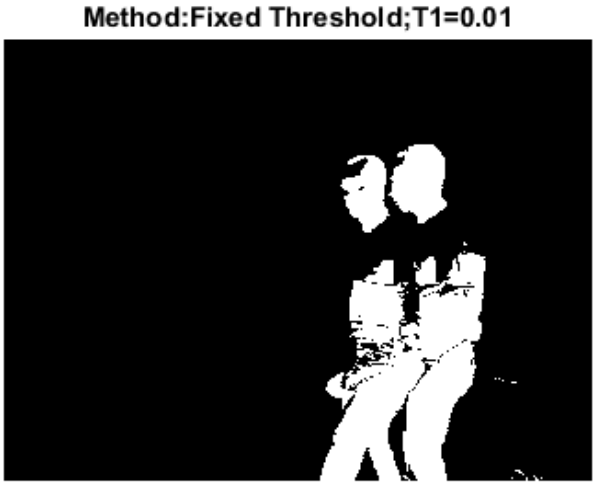


Figure 2: Output video at a certain instant with method 1

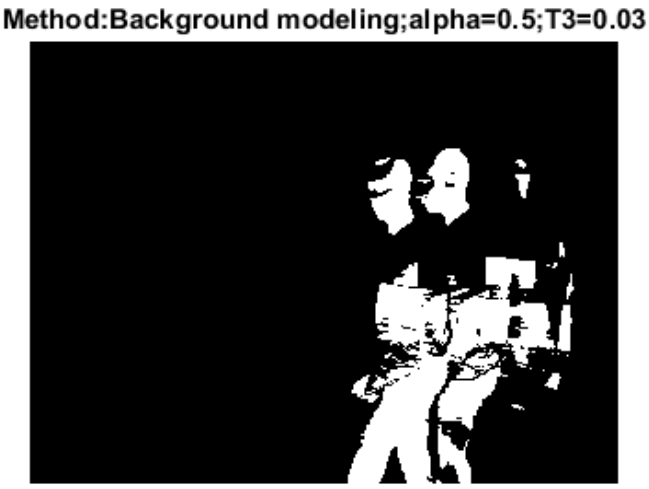


Figure 3: Output video at a certain instant with method 2

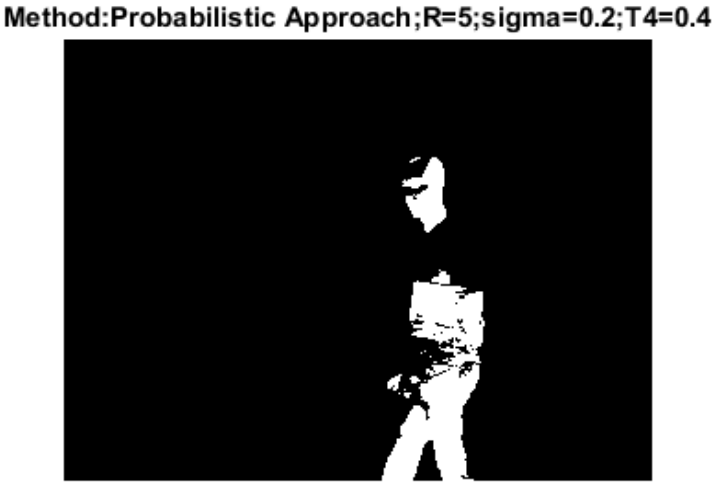


Figure 4: Output video at a certain instant with method 3