Analysis

2018CS10333 and 2019CS50430

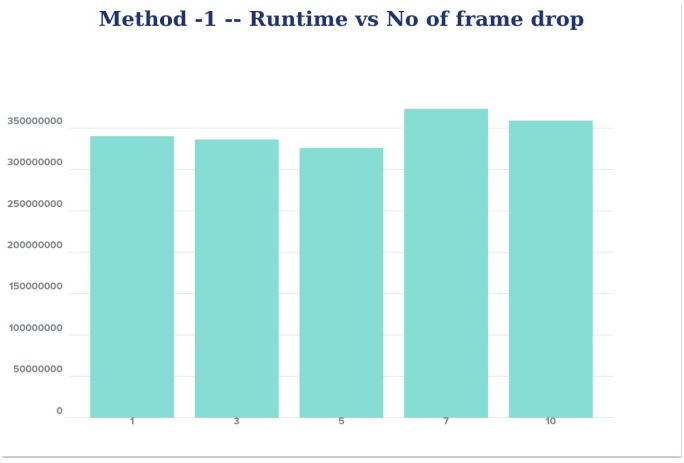
April 1, 2021

1 Metrics

Here,we use metrics as time and CPU usage. Run time is simply obtained by std:: chrono by noting difference in start and end times.
CPU usage we get by running mpstat in a separate terminal process.
To calculate the utility we employed the following methodology:
Using the obtained results and expected results (results from sub task 2), we find the RMS error.
Define utility as e^{-error} .
The accuracy is thus compared.

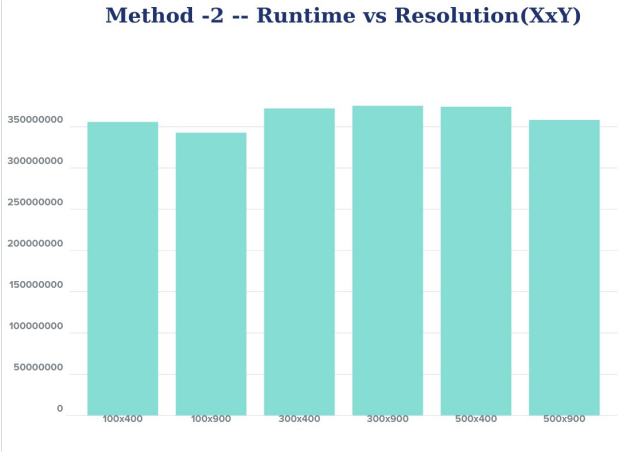
2 Methods

2.1 Method 1



Here, we use as parameter the number of frames dropped. Between graph of baseline and the rest, lower the error more is accuracy as defined by our utility function. When we process less frames, the accuracy is greater. Such as when in split in the video in smaller parts.

2.2 Method 2



Here, we use as parameter the size to which we want our video to be analysed in . When the sizes are either too big or too small (resize/resolution ratio is far from 1), we observe that it becomes difficult for opencv to perform utilitarian object detection.

2.3 Method 3

Here, we use as parameter the number of threads. In this method, we process every frame and distribute the work among so that we can obtain more efficiency. We multithread the work of background subtraction function rather than the main function. We employ modified background subtraction here: instead of subtracting from empty frame, we subtract from previous frame.

2.4 Method 4

Here, we use as parameter the number of threads. In this method, there is the obvious obstacle of thread synchronization due to which the video cropped and corrected doesn't seem legible. Best results are thus, when number of threads is lesser such as in 2.

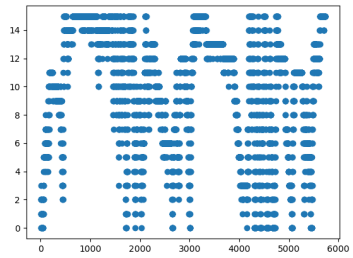
3 Trade off analysis

3.1 Method 1

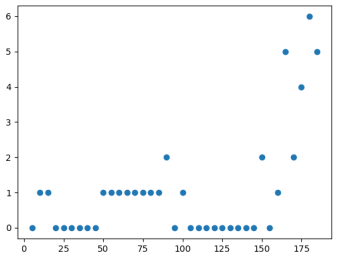
3.2 Method 2

3.3 Method 3

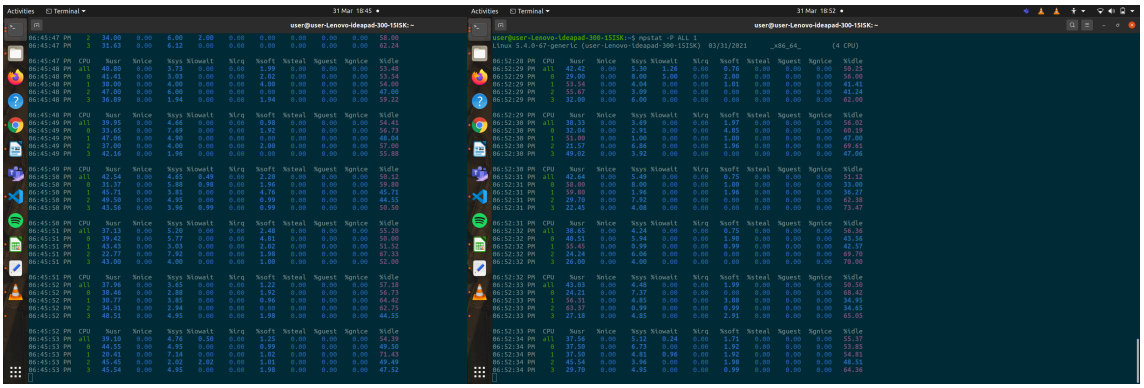
3.4 Method 4



(a) static queue density vs frame count

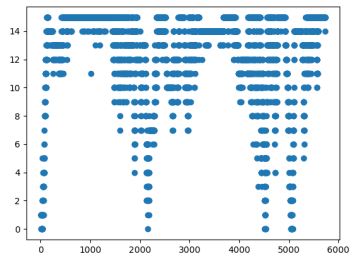


(b) static queue density vs frame count

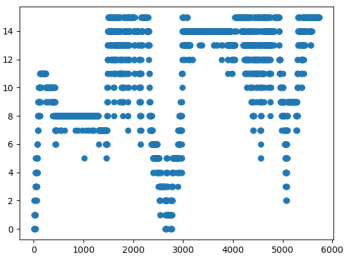


(a) cpu usage when each frame is analysed is around 30percent

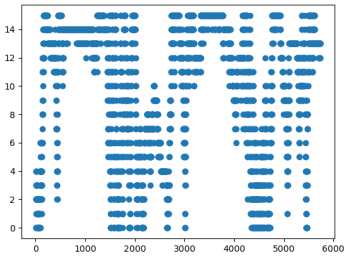
(b) cpu usage when each 5th frame is analysed is around 55percent



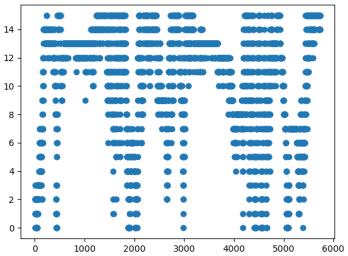
(a) Size 100 x 400



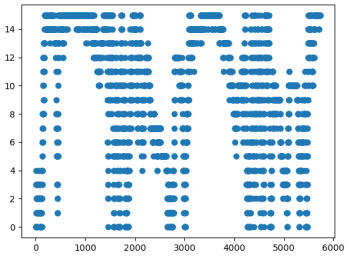
(b) Size 100 x 900



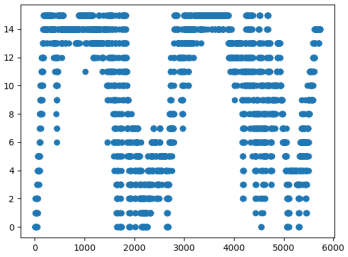
(a) Size 300 x 400



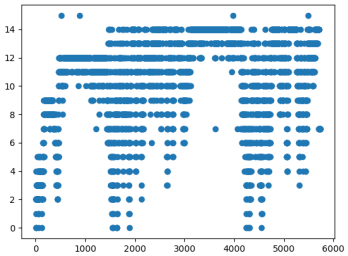
(b) Size 300 x 900



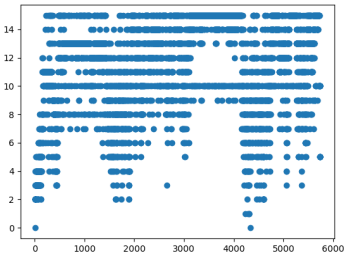
(a) Size 500 x 400



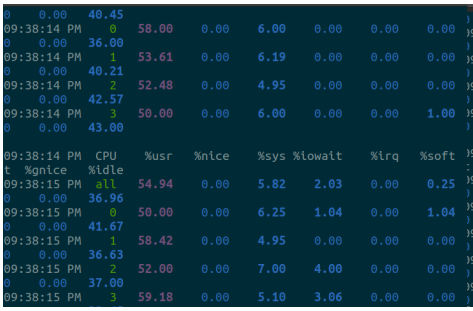
(b) Size 500 x 900



(a) 2 threads



(b) 3 threads

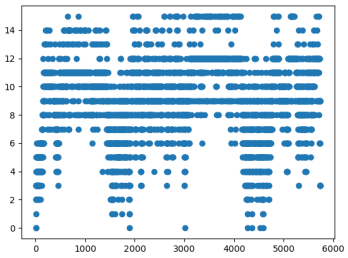


```
0     0.00   40.45
09:38:14 PM    0   58.00    0.00    6.00    0.00    0.00    0.00
0     0.00   36.00
09:38:14 PM    1   53.61    0.00    6.19    0.00    0.00    0.00
0     0.00   40.21
09:38:14 PM    2   52.48    0.00    4.95    0.00    0.00    0.00
0     0.00   42.57
09:38:14 PM    3   50.00    0.00    6.00    0.00    0.00    1.00
0     0.00   43.00

09:38:14 PM  CPU    %usr   %nice    %sys %iowait    %irq   %soft
t  %gnice   %idle
09:38:15 PM  all   54.94    0.00    5.82    2.03    0.00    0.25
0     0.00   36.96
09:38:15 PM    0   50.00    0.00    6.25    1.04    0.00    1.04
0     0.00   41.67
09:38:15 PM    1   58.42    0.00    4.95    0.00    0.00    0.00
0     0.00   36.63
09:38:15 PM    2   52.00    0.00    7.00    4.00    0.00    0.00
0     0.00   37.00
09:38:15 PM    3   59.18    0.00    5.10    3.06    0.00    0.00
```

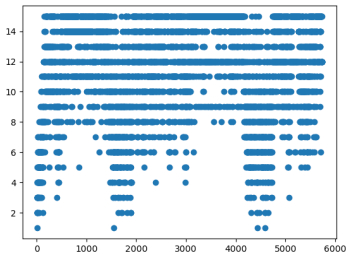
(a) cpu usage of 2 threads

```
0     0.00   35.73
09:40:34 PM    0   56.00    0.00    6.00    1.00    0.00    1.00    0.00    0.0
0     0.00   36.00
09:40:34 PM    1   58.10    0.00    2.86    0.00    0.00    2.86    0.00    0.0
0     0.00   36.19
09:40:34 PM    2   55.10    0.00    7.14    2.04    0.00    0.00    0.00    0.0
0     0.00   35.71
09:40:34 PM    3   51.00    0.00   10.00    4.00    0.00    0.00    0.00    0.0
0     0.00   35.00

09:40:34 PM  CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %gues
:  %gnice   %idle
09:40:35 PM  all   62.09    0.00    3.56    0.76    0.00    0.00    0.00    0.0
0     0.00   33.59
09:40:35 PM    0   56.57    0.00    6.06    2.02    0.00    0.00    0.00    0.0
0     0.00   35.35
09:40:35 PM    1   63.27    0.00    2.04    1.02    0.00    0.00    0.00    0.0
0     0.00   33.67
09:40:35 PM    2   65.66    0.00    3.03    0.00    0.00    0.00    0.00    0.0
0     0.00   31.31
09:40:35 PM    3   62.89    0.00    3.09    0.00    0.00    0.00    0.00    0.0
0     0.00   34.02
```

(b) cpu usage of 3 threads

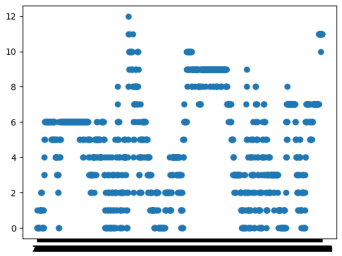


(a) 4 threads

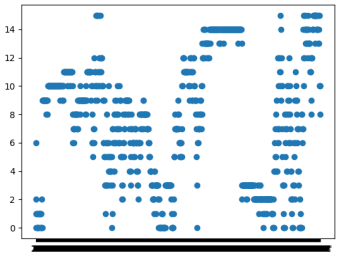


(b) 5 threads

(a) 2 threads



(b) 3 threads



(a) 4 threads