People counting using video as a source data

Luka Kušić

Problem

In certain cases, counting the number of people who've entered or exited an area can only be done manually, for example entering or exiting the faculty, government, or hospital building. In such cases, software that recognises and counts people comes in as highly useful.

Dataset

I have been assigned 10 videos of people entering and exiting a faculty building. After counting people manually, data is prepared for comparison with results of the software. Expected accuracy is 60%.

V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
4	24	17	23	17	27	29	22	10	23

Source example

Models

Background Subtraction:

As the name suggests, BS calculates the foreground mask performing a subtraction between the current frame and a background model, containing the static part of the scene or, more in general, everything that can be considered as background given the characteristics of the observed scene.

Morphological operations:

Erosion:

The basic idea of erosion is just like soil erosion only, it erodes away the boundaries of foreground object.

Dilation:

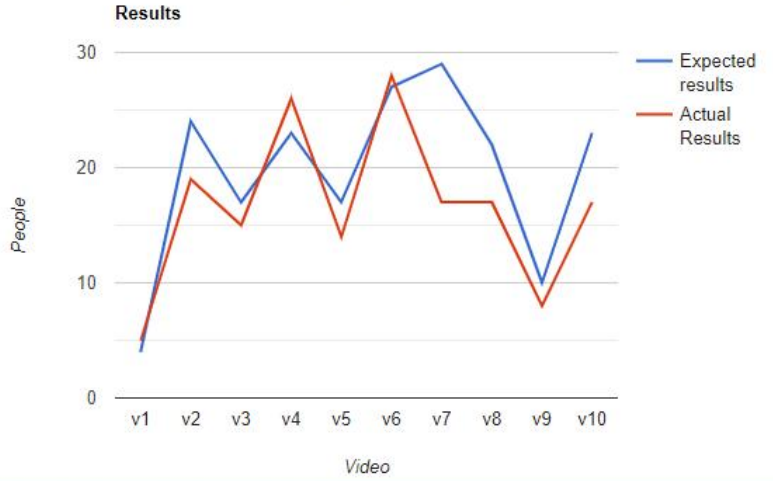
It is just opposite of erosion. Because, erosion removes white noises, but it also shrinks our object. So we dilate it. Since noise is gone, they won't come back, but our object area increases.

Tracking:

I've created methods designed to track a person once they enter a certain zone. From there, they will be counted as they cross the counter line.

Results & Analysis

Both on individual and overall level, software provides satisfactory results. Overall accuracy is **84.69%**. Analysis of results shows an issue with tracking multiple people grouped together, which is due to video quality. Second issue is not tracking people who appear within the boundaries as the video analysis starts, an issue which would fade into insignificant deviation as video lengths increased.



Future Works

There is still some room for improvement for the wider purpose use. As is, software is, in certain cases, recognising multiple people as one. Refining the factors of what makes a person is the next step. First frame people count could be implemented after, to achieve next to perfect accuracy.

References

[1] Dimitri van Heesch, Doxygen, OpenCV library

[2] Ivan Peric, Primer predefinisanog projekta

[3] Federico Mejia Barajas, People counter with OpenCV guide