People Counter

- Problem statement:
  This project aims to count number of people crossing a line at a time in viewframe of camera. Input to system will be live feed from the camera and output is count of people who have crossed the line. I will be calculating number of people who have crossed line in either direction. This way I can have counter for people going inside and outside the room.
- Approach:
  - Background Image Calculation by taking median of individual pixels of last 5 images.
  - Background Subtraction - Frame Difference between background calculated in above step and current frame.
  - Segment the image obtained in above step to get binary image.
  - Erosion followed by Dilation to fill holes.
  - Threshold image based on area of blobs to discard noises.
  - Count number of connected components in image.
  - Keep track of connected components with a label on each blob in next captured images. If merged blobs is splitted then algorithm should take care of this. Algorithms should handle splitting of blobs and merging of different blobs and accordingly increment IN/OUT counters.
  - Count of people will be incremented when the blob just crosses the monitored line in successive frames.
- Experiments and results:
  - I will try to capture overhead images from camera. I will be optimising my algorithm for this viewpoint only though my approach will be valid for other viewpoints as well.
  - I will use opencv apis to do background subtraction, erosion and dilation. Rest of code I am planning to implement myself.
  - I am planning to collect data myself. I will try to optimize the algorithm for overhead images captured.
  - I am planning to give more efficient implementation of people counting. I will try to properly tag binary blobs and segment image to count number of people in the image. Tracking blobs is one of the most important aspect of this algorithm. A merged blob could split in future or blobs could merge. I will try to optimise my algorithm to effectively differentiate b/w these two scenarios.
  - Sometimes it will be difficult to count people if more than two people are entering room together. Though this isn't likely case.
  - I am expecting this experiment to reveal a more simplistic and accurate model to count number of people. There are numerous use case of this and getting a simplistic working model will have varied application at different fields.

Note: My Approach to count number of people is still not completely finalized. Some minor changes are possible in future. I will update you with changes as soon as possible.

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Siddharth Bhal