TP-3

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Work done individually

Présentez vos implémentations en discutant des forces et des faiblesses de ces approches.

The submission contains three files namely *'gait.m'* , *'correlation.m'* and *'activity_recognition.m' which gives the N*gait*, Correlation and Buffer output respectively.*

<u>*gait.m & correlation.m*</u>

If you want just the Ngait then comment out the *filename* in line 6(gait.m). This is a very simple gait recognition algorithm as dicussed in class, where we are utilizing the fact that the during the full stride(two legs are fartherst apart) the area is more and hence more pixels than during the recovery(two legs are nearest or overlapping). From this data a graph is drawn and Ngait is calculated.

If you want the correlation keep the line 6(gait.m) commented and give the file names of videos that you want to use to find correlation. In this we are taking *k and l* as decribed in paper as the frames with the first minimum in the graphs.

<u>Strengths:</u>

- It is computationally very less intensive , so very fast
- The graph obtained is not smooth and hence will have many local minimums and maximums so used an Savitzky-Golay to smooth it.

<u>Weakness:</u>

- I haven't taken just the lower part for calculating the number of pixes ,as I was getting some bad results. This can be improved with better proccing of video before calculating the graph
- We could improve on the bounding box detection in correlation.m and also the regionprops() gives the connected components. I have considered the largest comonents, there could be other method to improve results
- Using gait as the tool to recognise individual humans is difficult because it depends on various factors like view angle, change in walking surfaces and inturn the gait i.e the same human can have different gait depending on which surface they are walking

activity_recognition.m

This is a very simple implementation of the idea discussed in *“Beyond Tracking: Modelling and Understanding Activity Behaviour”* . Here during a scene we are tring to see if there are any Short, Medium or Long term changes. According to the assignment we are only computing the PCH(pixel change history) buffer. The part contains different parameters like accumulation, decay which can be modified. So for the given dataset we are trying to see if the person is stopping during his gait. When you are seeing the output, and if you observe that some parts of buffer are accumulating but decaying slower than the surrounding though some time has passed, then it implies that there is medium term activity.

The videos are very short , so to detect and remember the decay is kept a larger value which in turn makes decaying slower and also the accumulation is also gradual due to its large value. Large value of both decay and accumulation implies that the buffer is changing gradually, small values imply the change is not gradual.

Strength:

- Computationally very less intensive as we are just finding the buffer
- The memory required for running the program is also less

Weakness:

- The accumulation and decay can be optimized for better results on dataset.
- The thresholding can also be done better.

Décrivez une façon d'améliorer les résultats de la première partie (Gait analysis) en utilisant l'approche de la deuxième partie (PCH).

From the second part we can observe changes if the human is walking unusually like stopping , taking a few steps and stopping or alternate stopping and moving. These do not constitute the normal gait of the human, so we can use this data the find the gait appropriately, by subtracting the frames of stopping.

Our gait algorithm is considering only the total number of white pixels, there can be cases like the person walks some distance and the leaves the briefcase or some object and this causes wrong results. Using the PCH long term changes can be detected and this scenario can be overcomed.

Finalement, proposez une modification pour chaque algorithme qui pourrait, selon vous, améliorer leur résultat respectif.

<u>gait.m & correlation.m</u>

- Optimizing the Savitzky-Golay which reduces the local mimimums and maximums
- Getting better bounding boxes for human
- Having some parameter about the surface and camera view which could be modified dependind on video and this could significantly increase the results

<u>activity_recognition.m</u>

- The updating function for the buffer can be made better
- The accumulation and decay factors can be improved
- The threshold can be optimized

References and Sources:

- Matlab documentation
- Wikipedia
- Lecture notes
- The HumanID Gait Challenge Problem:. Data Sets, Performance and Analysis
- Beyond Tracking: Modelling and Understanding Activity Behaviour