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VISUAL OBJECT TRACKING : Final Report

Version 1 : Simple Multi Object Tracker

FPS Benchmark

FPS	Average	Lower	Higher
Value	38	31	43

TrackEval Benchmark

Metrics	HOTA	MOTA	IDF1	ID Switch	Frag
Value	16.83	2.7	18.9	1444	311

The metrics are not very good. In our logic, while computing the Jaccard matrix, we pair tracks with a detection only if that detection is the highest for the given track and its value exceeds 0.5.

Version 2 : Multi Object Tracker using Hungarian Algorithm to match the tracks

FPS Benchmark

FPS	Average	Lower	Higher
Value	36	23	42

TrackEval Benchmark

Metrics	HOTA	MOTA	IDF1	ID Switch	Frag
Value	17.043	11.2	20.033	893	273

We can see small improvements in some metrics, this version is clearly better than the first one. It also cost very little FPS.

Version 3 : Version 2 + Kalman Filter Update (Visual change only)

FPS Benchmark

FPS	Average	Lower	Higher
Value	34	18	40

TrackEval Benchmark

Metrics	HOTA	MOTA	IDF1	ID Switch	Frag
Value	17.043	11.2	20.033	893	273

This version is solely visual, so the metrics will remain unchanged. The application of the Kalman filter does not significantly increase the processing time; we observed an average loss of only 2 FPS compared to version 2.

Version 4 : Multi Object Tracker using deep learning features to better match the tracks + Kalman Filter

FPS Benchmark

FPS	Average	Lower	Higher
Value	2	1	5

TrackEval Benchmark

Metrics	HOTA	MOTA	IDF1	ID Switch	Frag
Value	17.722	11.939	20.2	747	278

Extracting the features and the histogram from each detection is really time consuming so the FPS are very low compared to the others version.
The model used is a pretrained ResNet18 (around 11 millions parameters).
The performance is not much better than in the other version.

Version 5 : Version 1 + Optimizing the way we compute the jaccard matrix by not calculating anything if the two bounding box are too different.

FPS Benchmark

FPS	Average	Lower	Higher
Value	38	31	64

TrackEval Benchmark

Metrics	HOTA	MOTA	IDF1	ID Switch	Frag
Value	16.83	2.7	18.9	1444	311

We can see some gains in FPS especially in the higher bound. We can explain that by the fact that some particular frames have some detection boxes that are not overlapping on the tracks boxes so we do not compute anything which leads to an FPS spike.