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Literature Review:

Parallel Algorithm implementation for multi-object tracking and surveillance

The objective of this paper is to propose a parallel implementation of dictionary learning based multi-person tracking on single camera. After its success of face recognition, dictionary learning is recently adapted to multi-person tracking and achieves very promising results [2]. However, by recognizing that the computational complexity of dictionary learning is a big factor preventing tracking algorithm to operate in real-time, especially when the size of dictionary increases over time, this paper proposes parallel algorithms, implemented on GPU, to try speed up the system.

There are two things are processed in parallel in this paper. First is processing detected targets at the same time. Second is the first step of finding largest inner product (the best matching column in dictionary) in orthogonal matching pursuit (OMP) algorithm. These are done by leveraging SIMD multithreaded many core of GPUs.

The framework for multi-person tracking is the same with [2] except for some minor changes including number of appearance features, and different way of constructing location of targets and also extracting features within human region, resulted from background subtraction approach.

The GPU used in this work is GeForce GT 630M with maximum number of threads per block is 1024. The performance evaluation is conducted on PETS'09 dataset. It shows the comparisons with [2] in terms of different configuration: size of dictionary, number of objects. For example, when dictionary size is 1000 and number of targets are 10, the GPU version achieve 92,90x faster than CPU.

Although the paper shows an impressive performance and speed-up. We believe that there is better way to maximize the parallelism level of dictionary learning, which we will further investigate in future.

References:

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[2] Lu, Weizhi, et al. "Multi-object tracking using sparse representation." 2013 IEEE International Conference on Acoustics, Speech and Signal Processing. IEEE, 2013.