

Background Subtraction - Adaptive SVD revealing Moving Objects

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One important task when processing sensor data is to distinguish relevant data from irrelevant one. Image and video data is no exception. With static cameras, e.g. in video surveillance, the background, e.g. houses or trees, largely stays constant over a series of frames, whereas the foreground, consisting of objects of interest, e.g. cars or humans, causes differences in image sequences. Background subtraction aims to create a model of the background based on previous image sequences and subtracts it from newly incoming images resulting in the moving objects contained in the foreground. This work describes how a newly developed method for an iterative and adaptive calculation of a singular value decomposition (SVD) can be used to maintain a model of the background via singular vectors spanning a subspace of the image space. The method provides a way to determine, in a computationally efficient manner, the amount of new information of an image regarding the singular vectors spanning the background space and provides the ability to perform block-wise updates. Both properties contribute to a fast and robust algorithm. The effects of these two properties and the success of the overall method to perform a state of the art background subtraction are shown in qualitative and numerical evaluations.