

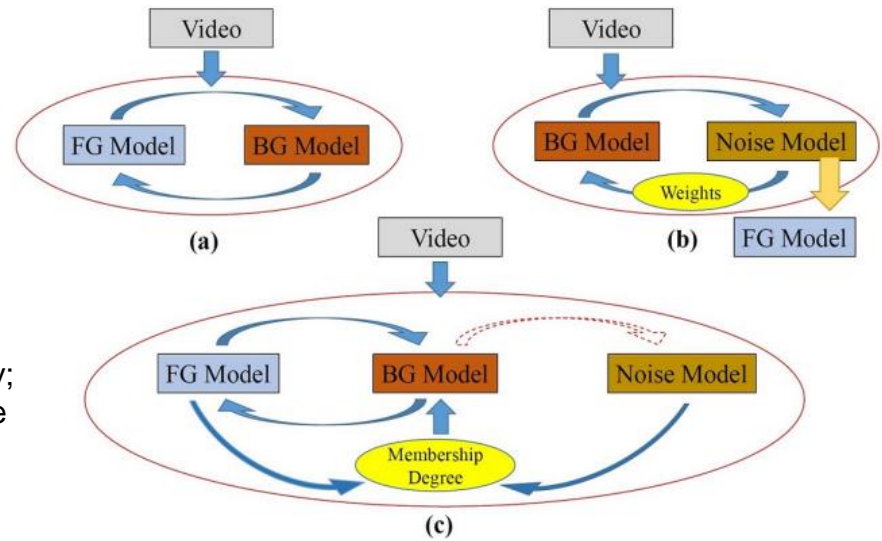
Fuzzy Background and Adaptive Foreground Model for Moving Target Detection

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Frontiers of Computer Science, DOI: [10.1007/s11704-022-2099-0](https://doi.org/10.1007/s11704-022-2099-0)

Problems & Ideas

- The problem of moving target detection method based on Matrix Decomposition (MD)/factorization(MF) :
 - MD-based models enjoying the accuracy of detecting moving objects have limited capability in handling complex background such as dynamic - e.g., slight changes in background may be labelled as foreground objects.
 - MF-based models focus on the optimization of the underlying low-rank structure for BG only, overlooking the rich constraints of foreground component.
- Ideas: A moving target detection model combining MF and MD optimization ways can refine background and foreground estimation.



Comparison of the proposed combined methodology and two conventional frameworks. (a) Matrix Decomposition (MD) way; (b) Matrix Factorization (MF) way; (c) the proposed J MDF: we simultaneously take FG model, BG model, and noise model into account by extending the fuzzy membership degree.

Main Contributions

- Contributions:
 - A moving target detection model combining MF and MD optimization ways can refine background and foreground estimation;
 - A fuzzy membership degree represents the soft association between each pixel and background. It is designed based on noise analysis and foreground information, which can complement foreground to a certain extent;
 - An adaptive generalized group sparsity constraint promotes the spatio-temporal continuity of moving objects in the foreground.

Table 1 COMPARISON OF FOREGROUND DETECTION RESULTS (F-MEASURE) ON I2R DATASET.

Video	PCP [9]	DECOLOR [15]	E-LSD [43]	ROUTE [12]	OMoGMF+TV [6]	GSTO [63]	JMDF01	JMDF02	JMDF03
Bootstrap	0.639	0.581	0.685	0.641	0.669	0.711	0.673	0.690	0.693
Campus	0.444	0.767	0.784	0.409	0.813	0.810	0.763	0.826	0.828
Curtain	0.692	0.781	0.832	0.785	0.836	0.812	0.883	0.892	0.914
Escalator	0.572	0.724	0.715	0.588	0.651	0.733	0.660	0.691	0.734
Fountain	0.683	0.833	0.831	0.727	0.825	0.855	0.871	0.881	0.884
Hall	0.520	0.643	0.671	0.615	0.652	0.673	0.671	0.683	0.690
ShopMall	0.692	0.671	0.744	0.707	0.701	0.747	0.742	0.741	0.748
WaterSurface	0.781	0.836	0.887	0.853	0.902	0.901	0.929	0.938	0.940
Lobby	0.652	0.607	0.742	0.711	0.787	0.813	0.835	0.844	0.834
Average	0.631	0.716	0.766	0.671	0.760	0.784	0.781	0.798	0.807