Context-Based Occlusion Detection for Robust Visual Tracking

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Motivation:

➢ **The discrimination of occlusion from object appearance variation.**

- In cases of occlusion, the target template should be keep unchanged such that unwanted occlusion information may be excluded from the template and will not affect subsequent tracking.

- In cases of target appearance variation, such as object deformation and illumination variation, the target template should be timely updated to learn the target variation.

Contribution:

➢ **A new definition of occlusion.** If some background points in previous frames move into the target region in current frame and block parts of target, the target is regarded as being occluded.
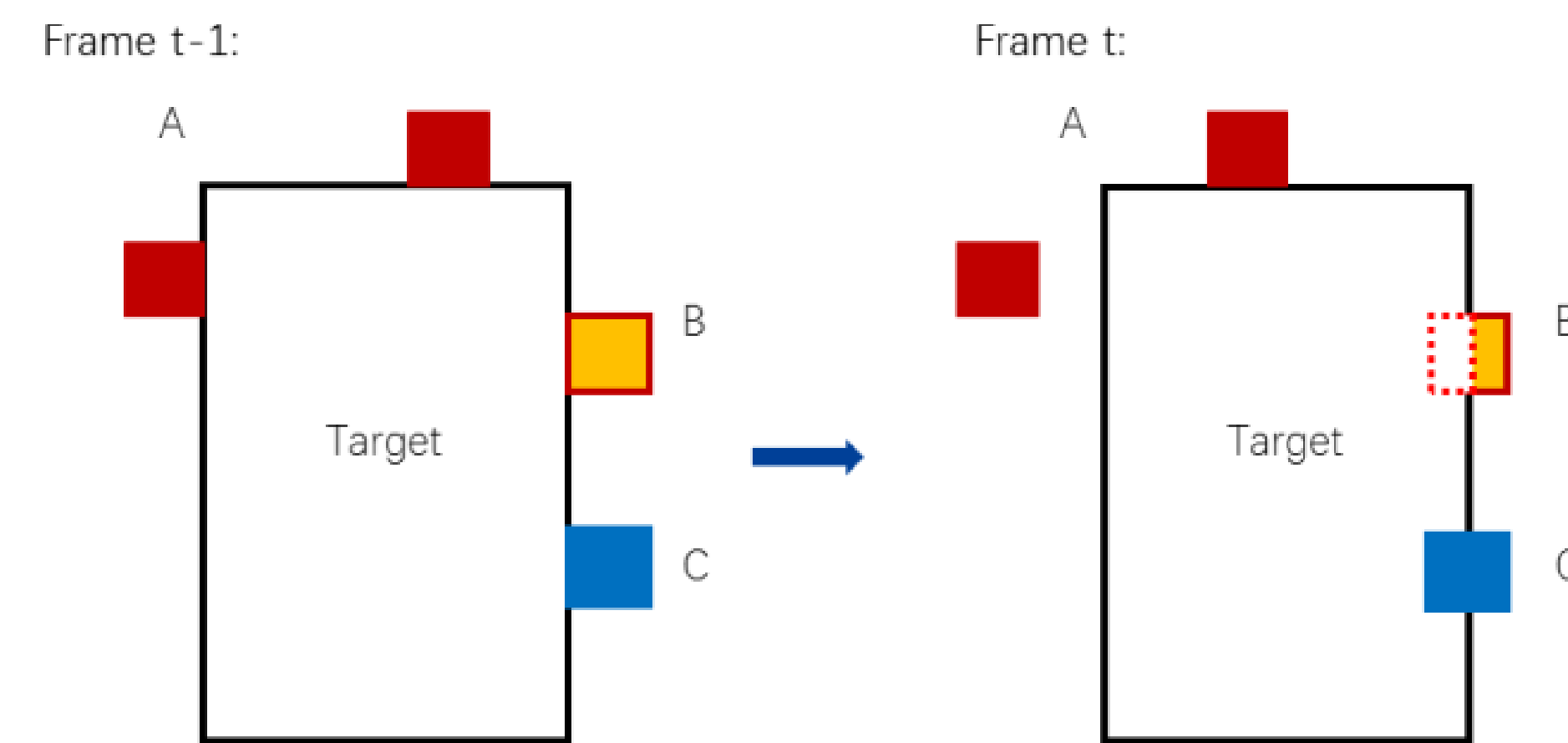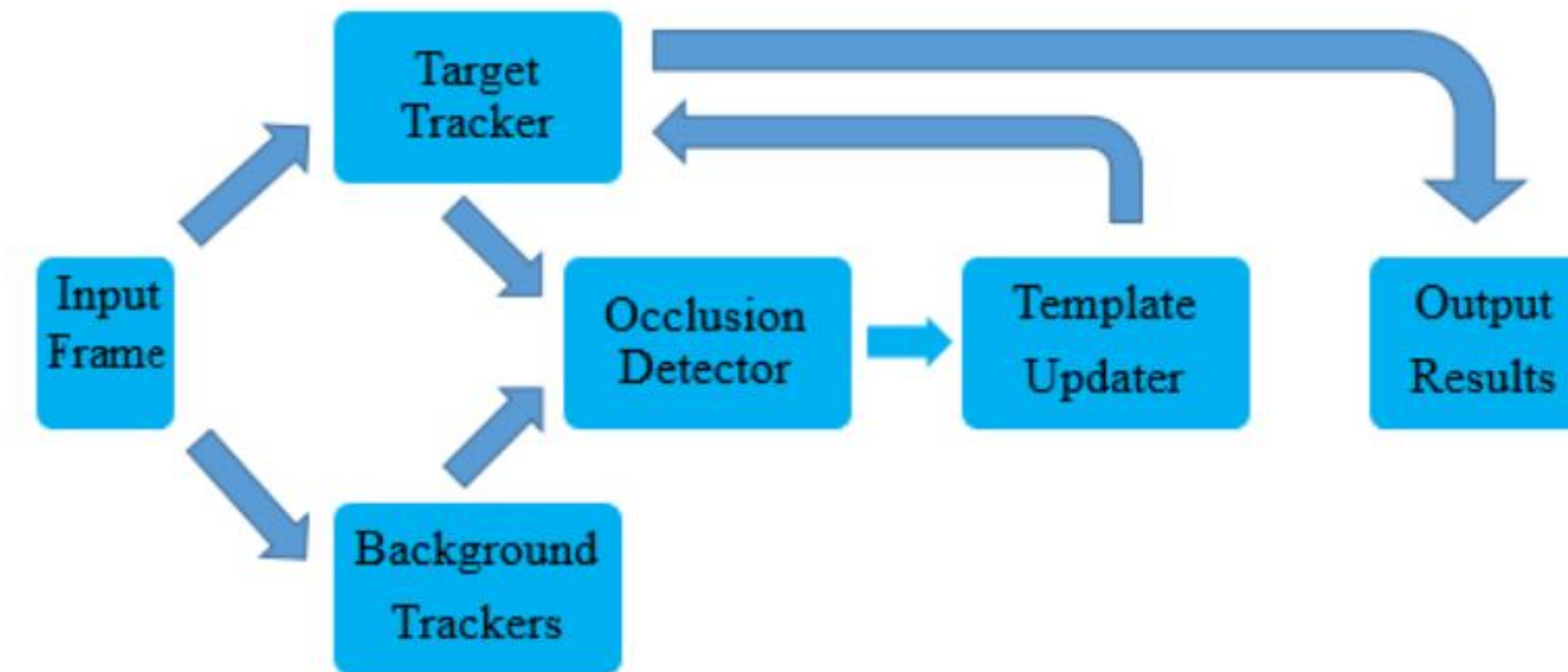
➢ **The classification of background points.**

Fig. 1. Three different kinds of background patches. Class #A (red): patches that are left behind; Class #B (orange): patches that are covered by target; Class #C (blue): patches that overlap the target. The number of patches belonging to Class #C indicates whether there is occlusion.

➢ **The new framework of object tracking** which explicitly detects the occlusion and decides when to update the template of target.

Algorithm:

➢ **The flowchart**:

➢ The target tracker: Gaussian-Kernelized Correlation Filter tracker with scale estimation.

➢ The background around the target is divided into many small patches, each equipped with a linear-Kernelized Correlation Filter tracker.

➢ The occlusion detector classifies the background patches into 3 classes with the classification criterion as follows:

- 1. If a patch does not overlap the target bounding box, then it belongs to Class #A.

- 2. If a patch overlaps the target bounding box with low tracking confidence, it belongs to Class #B.

- 3. If a patch overlaps the target bounding box with high tracking confidence, it belongs to Class #C.

➢ The updating strategy is as follows:

- 1. If the number of occluding background candidates is greater than a predefined threshold, the occlusion happens and the target template stops updating.

- 2. Otherwise, the occlusion is not observed and the target template will update in usual interpolation way.

Experiments: