



An Approach to Automatic Creation of Cinemagraphs

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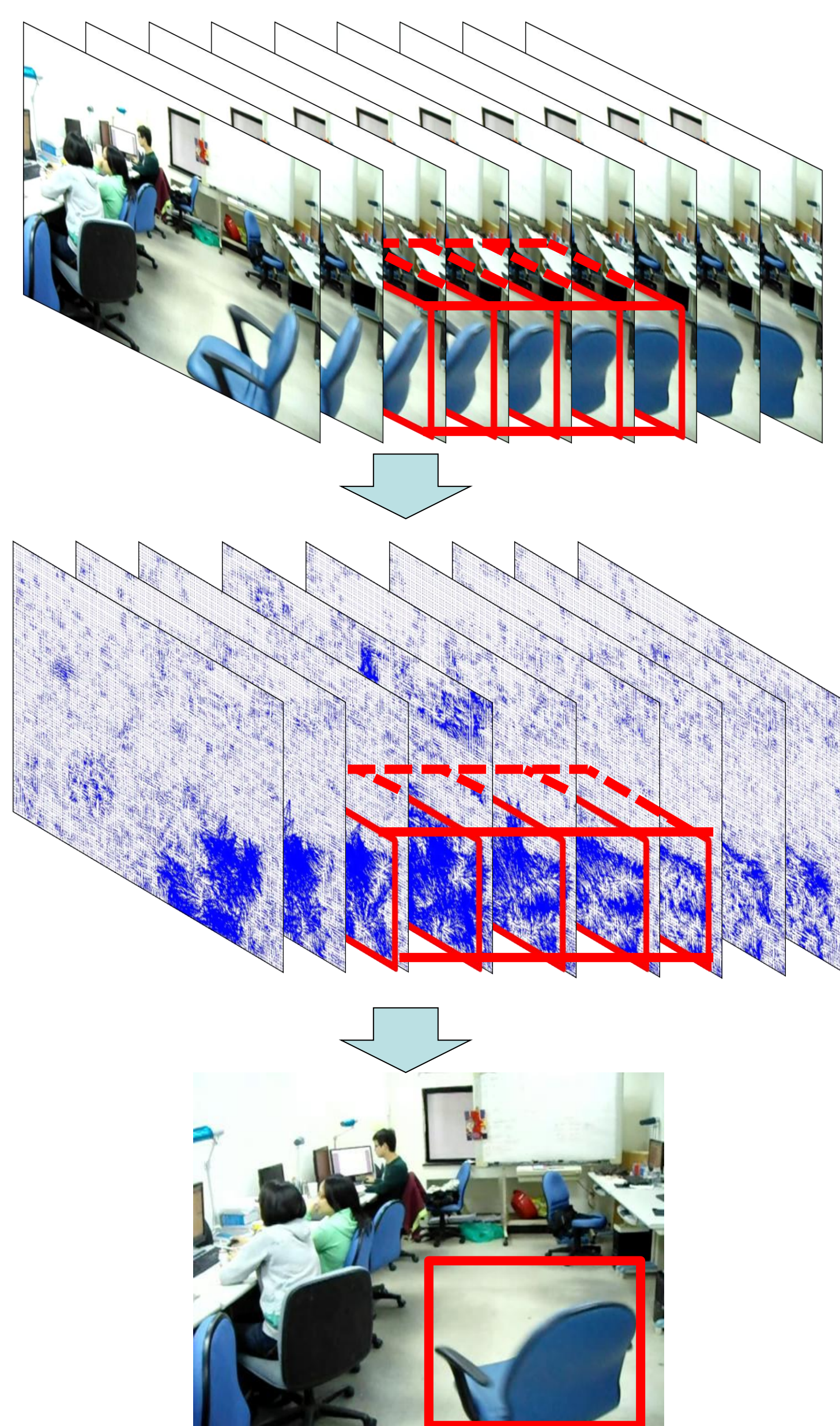
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A cinemagraph is a new type of medium that infuses a static image with the dynamics of one or a few dynamic regions. It is in many ways intermediate between a photograph and a video.

In this paper, we present a **fully automatic** approach that creates cinemagraphs from video sequences.



APPROACH



Problem formulation

Given a video sequence $[I_1, I_2, \dots, I_N]$, we aim to identify both where (the spatial location) and when (the temporal location) the interesting dynamic behavior of an object appears in a video.

Six parameters $\{t^*, b^*, l^*, r^*, s^*, e^*\}$ need to be determined.

We view the task as an optimization problem that seeks a sub-volume in video with the maximum cumulative flow fields.

$$V^* = \arg \max_{V \in \Lambda} f(V) = \arg \max_{V \in \Lambda} \sum_{p \in V} s(p)$$

Constraints:

$$d(R_{s^*}, R_{e^*}) \leq \varepsilon$$

$$|s^* - e^*| \geq T$$

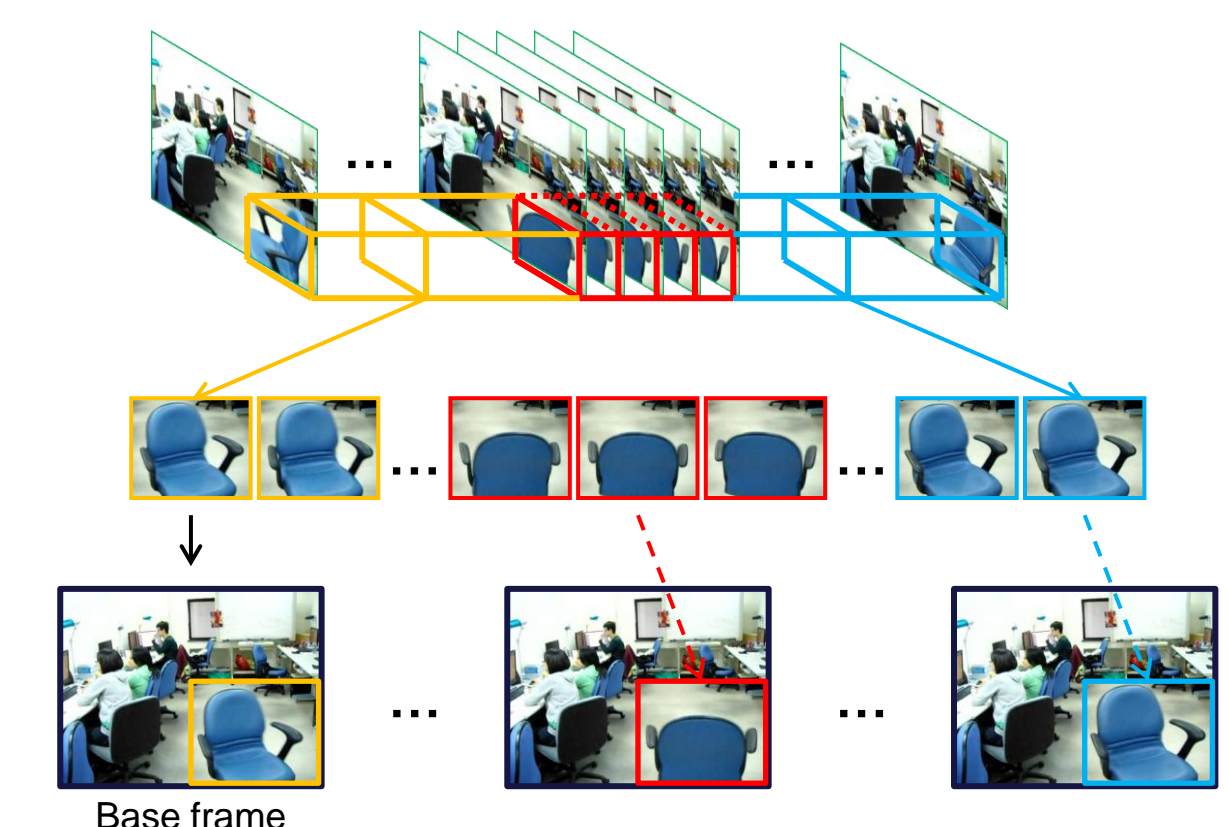
Efficient sub-volume search

- A branch-and-bound scheme
- A simplified implementation of Yuan's method that decomposes the 6D parameter space into a 4D spatial and a 2D temporal parameter space.

*J. Yuan, Z. Liu, and Y. Wu, "Discriminative subvolume search for efficient action detection," *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, 2009.

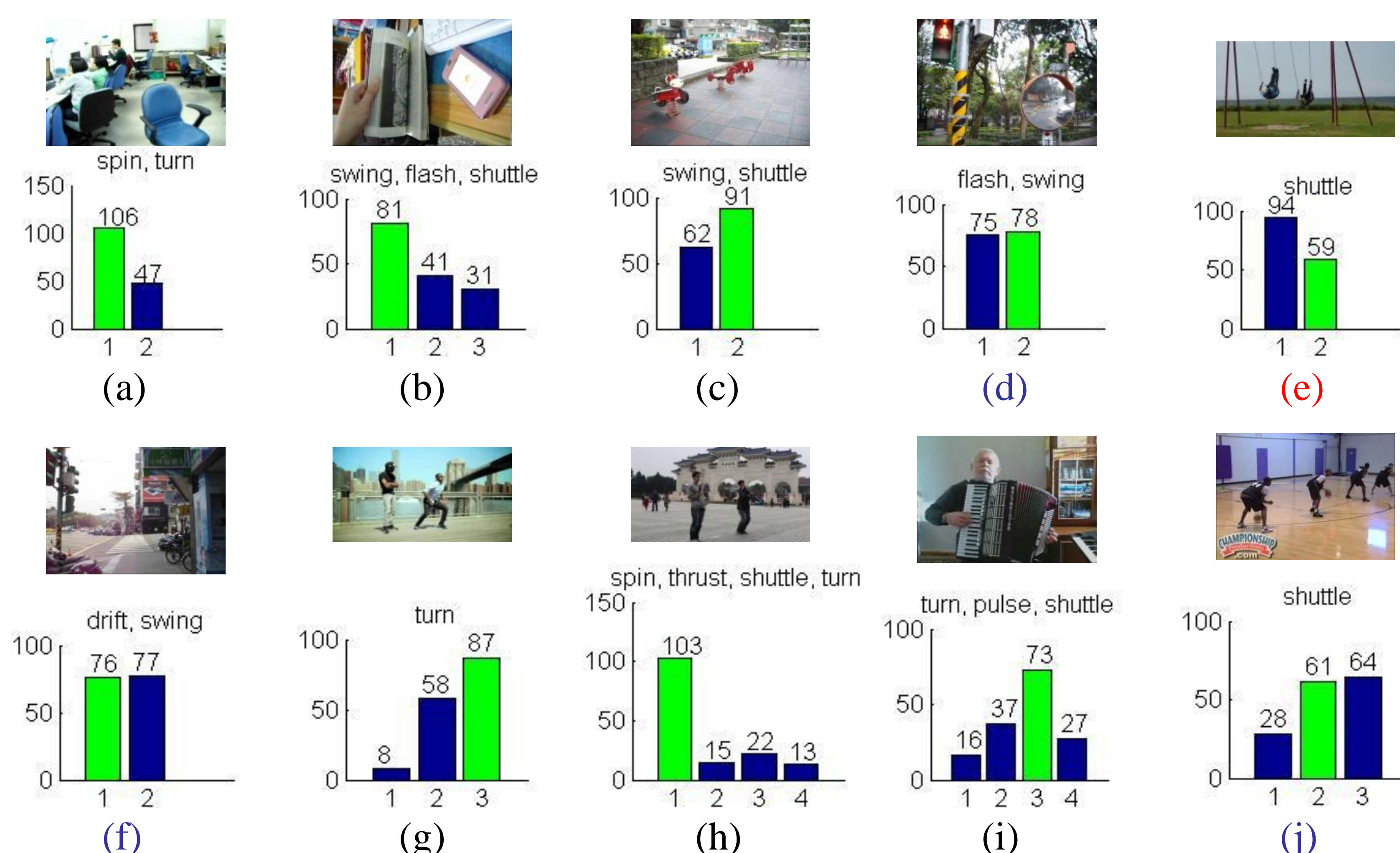
Post processing

A small SSD is required to obtain a seamless video loop.



SUBJECTIVE TEST

- 10 video clips were used in the experiment, including various motion patterns*—they may result from appearance variations, or the perceived path of an object.
- The user study involves 153 participants. For each video, we manually created a cinemagraph for each observed motion pattern, together with the automatically created cinemagraph. Each evaluator is asked to select the most enjoyable one from the options.



- **Users do not prefer a particular motion pattern; they tend to select the one with a relatively large motion when the observed motion patterns differ in magnitude.**
- **It is not clear how users favor a cinemagraph when motion patterns are alike in terms of their types or magnitudes.**
- **Semantic analysis techniques for better understanding the scene/event are required.**

*E. Pogalin, A.W.M. Smeulders, and A.H.C. Thean, "Visual quasi-periodicity," *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, 2008.

CONTACT

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