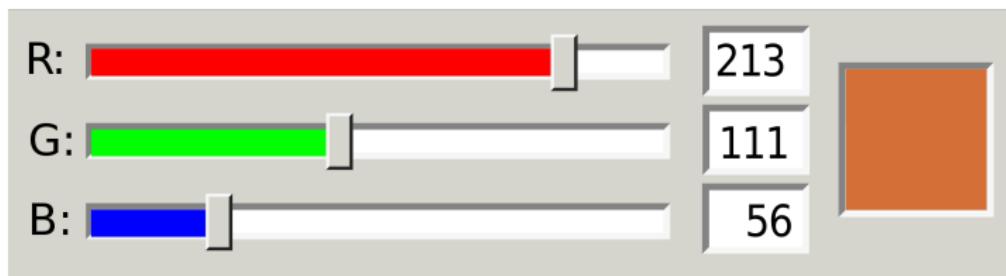


Methods for Background Subtraction in Video

Rhian Davies

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Analysing video in Matlab



Video test

(Loading Video...)

Frame Difference

- ▶ Assume that the first frame is the background.
- ▶ Accept pixel i as foreground if

$$|X_t[i] - X_{t-1}[i]| > \tau.$$

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- ▶ Advantage: Computationally light, adaptive.
- ▶ Disadvantage: Stationary objects can vanish
- ▶ Disadvantage: Interior pixels for uniformly distributed
- ▶ Choice of τ

Approximate Median

If $X_t[i] > B[i]$ then $B[i] = B[i] + 1$
If $X_t[i] < B[i]$ then $B[i] = B[i] - 1$

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- ▶ Advantage: Separates as a whole
- ▶ Advantage: Still fairly efficient
- ▶ Disadvantage: Background adapts more slowly.
- ▶ Disadvantage: Lots of ghost trails (τ dependent)

Challenging real world problems require something more adaptive.

Ghosts

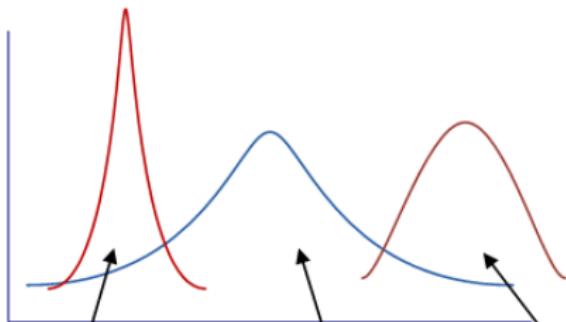


Ghost: A set of connected points detected as motion but not corresponding to any real moving object.

Mixture of Gaussian

- ▶ Parametric background model based on visual history.
- ▶ Each pixel represented by a mixture of Gaussian functions.
- ▶ μ : educated guess of the $X_{t+1}[i]$
- ▶ σ : Our confidence
- ▶ 3-5 Gaussian components and weight them

$$\omega_1 * N(\mu_1, \sigma_1) + \omega_2 * N(\mu_2, \sigma_2) + \omega_3 * N(\mu_3, \sigma_3)$$



- ▶ Advantage: Slow illumination changes
- ▶ Self corrective (parked cars)
- ▶ Disadvantage: Shadows
- ▶ Disadvantage: Physical background changes are slow.
- ▶ Disadvantage: Computationally heavy.

Review

- ▶ Frame difference
- ▶ Approximate Median
- ▶ Mixture of Gaussian

