



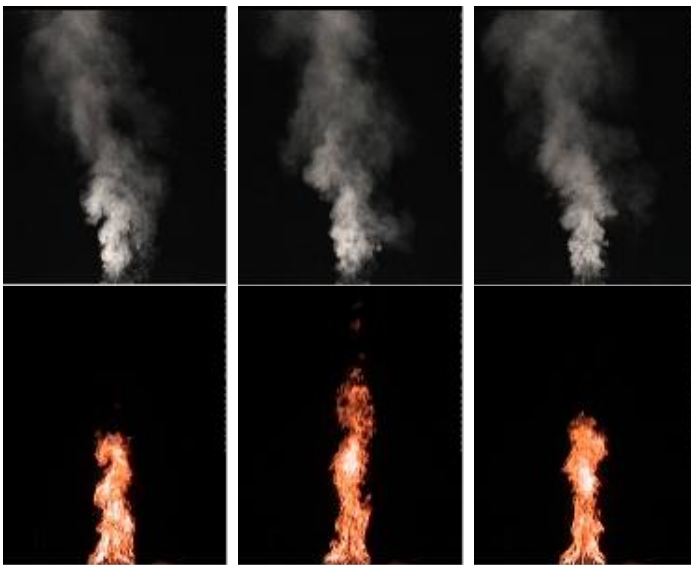
Synthesizing and Mixture of Dynamic Textures for the Test of Video Fire Detectors

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Synthesizing of Test Fire TF2 and TF5

Motivation: Synthesizing test fires is aimed to obtain the response threshold of video fire detectors to simplify test procedures.

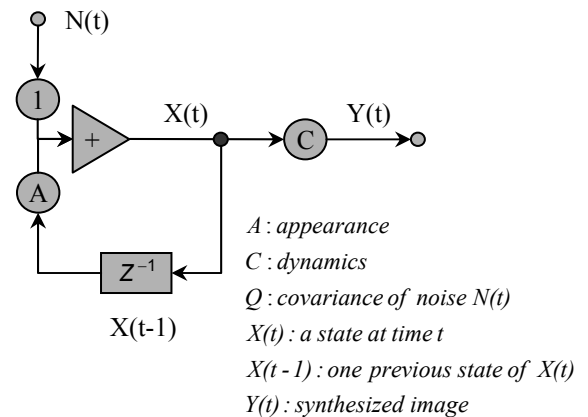


Video sequence of the test fire is characterized by a model of linear dynamic system (LDS):

$$X(t) = A \cdot X(t-1) + N(t) \quad N(t) \sim N(0, Q)$$

$$Y(t) = C \cdot X(t)$$

Parameter A , C , Q are learned from the original video sequences by means of a closed-form sub-optimal solution, as the block diagram shows:



Mixtures of Two Synthesized Test Fires

A mixture is realized through a linear combination of the components U , S , V of singular vector decomposition (SVD) from TF2 and TF5 respectively and the mean values from the original video sequences.

Applying the SVD is

- to reduce the dimension of matrix
- capture the dynamics of the TF

Parameter X defines the percentage of the corresponding U , S , V and its mean value. The experiment represents an onset for a flexible mixture of different test fire video sequences.

