difference

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This system employs real time video processing to detect and measure motion. It accomplishes this by a delayed frame that is subtracted from the present which shows what has changed.

[the past is subtracted from the present]

The feedback created from movement is representative of a brief history of motion occuring in the past. While the linear 1pixel wide line than pans left to right will record motion in increments of grayscale. White to record the most movement and varying shades of grey for time with varying levels of motion. Audio is similarly made to respond to motion in the varying levels of its pitch.

A representation of what is before the camera only takes place with motion. A stillness before the camera results in a black, seemingly empty, response. Motion incites the system to respond with representation. However, there exists a tension with that 1 pixel line representation of the past erasing the real time representation.

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The first process through which we put the video was a simple time difference. Figure 1 shows the schematic of this process. The equation for this process is

D(t) = X(t) - X(t-d0)

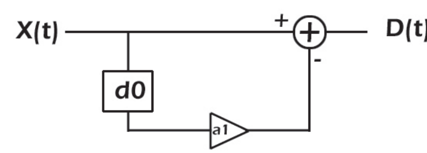

figure 1

where d is the delay, specified either in time or frames. What D(t) gives us is a measure of what has changed in the past d1 span of time and of what magnitude the change was. Each frame of D is averaged and this mean value, Dmean(t), controls both the sound frequency and the video overlay magnitude.

The second process we used on the video was a moving average (MA) process. Figure 2 shows the schematic of the MA process for three delays. The equation for the MA process is:

Y(t) = D(t) + a1*D(t-d1) + a2*D(t-d1-d2) + a3*D(t-d1-d2-d3)

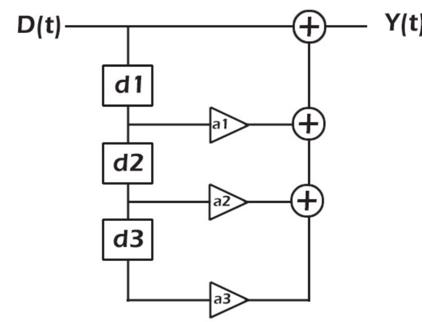

figure 2

where a1, a2, and a3 are the weighting coefficients and d1, d2, and d3 are time delays. The values coefficients a1, a2, and a3 typically depend on the application as well as the desired output. One experiment set these values with a random number generator which yielded an effect which varied over time.

The moving average, Y(t), provides information about times further into the past than D(t), as input values as far back as X(t-d0-d1-d2-d3) are present.

Another process which was explored was the autoregressive (AR) process. This process, pictured in Figure 3, has the equation

Y(t) = D(t) + a1*Y(t-1) + a2*Y(t-d1-d2) + a3*Y(t-d1-d2-d3)

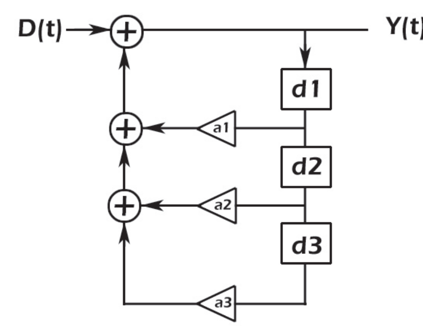

figure 3

The coefficients, a1, a2, and a3 are typically chosen to have a magnitude less than one to provide stability. The AR process actually feeds back (or regresses) onto itself. As such, the output is affected by both past values of D(t) as well as past values of Y(t).