Adventures with Slit Scan

Slit scan is a photographic technique for distorting images. A slide is placed on a light table with a camera on a movable mount. A mask with a narrow slit is placed between the camera and slide. The camera shutter is opened, and a time lapse photo is taken as the mask is moved across the slide and the camera is moved sideways.
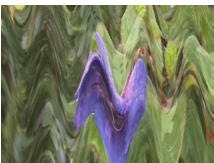
 If everything is adjusted perfectly, you would just get a copy of the image, but that's not the point. Here's where it gets interesting.
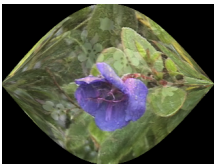
 If the slide moves with the mask, you get streaks of color from the part of the image that is revealed.

 If the slide moves, but does not keep up with the mask, the image is stretched, a la the Enterprise zipping into hyperspace.

 If the slide moves at a right angle to the mask motion, the image develops bends and kinks.

 If the camera moves up and down (or zooms in and out) you get swells and constrictions.

 If the mask is somewhat above the image you get stretch and blurring in the direction of movement.

 If the mask is inside the camera just behind the shutter, you can do all of this by pointing at subjects on the street.

Many variants of this technique have been used, including cameras that pull long strips of film past an internal slit and elaborate animation setups. The famous traveling scenes from 2001: A Space Odyssey are an example. We can imitate a lot of this in a digital system, but it's not quite the same. Photography is an analog process, and the motion of the camera produces a continuously blended image. Digital images are prone to pixilation, especially if movies are used to imitate actual motion.

Slitscan is an inherently slow process, best suited to generating still images or animation frames. It's a relatively simple process that uses common objects.
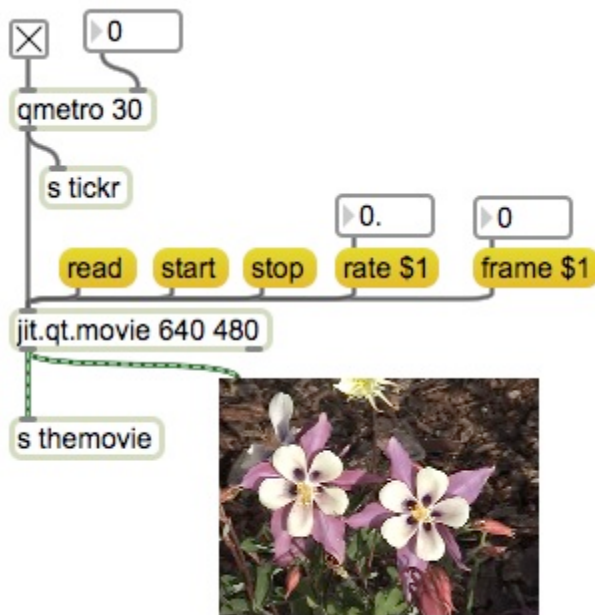

Figure 1.

Figure 1 shows how to bring the source material to the patch. This will allow the use of stills or movies, and cueing or speed changed playback of the latter. Figure 2 shows the basic form of the process. The matrix named "film" is set up to use source dimensions and destination dimensions, copying only part of the input image at a time. The source dimension is the equivalent of the slit over the image.
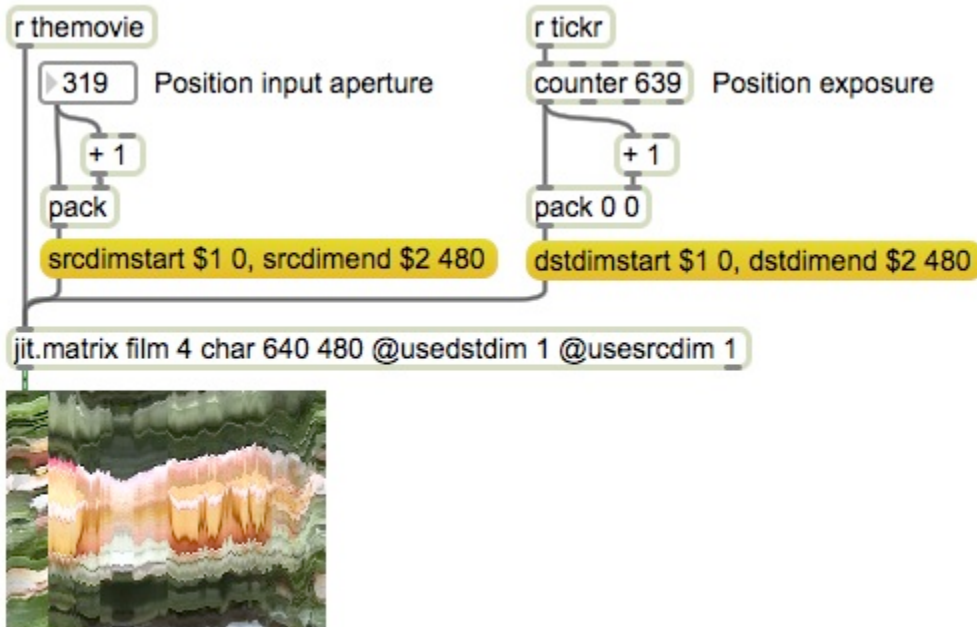
Figure 2.

In figure 2, the srcdimstart and srcdimend messages establish the column of pixels to be transferred. Note that the y coordinates are fixed to top and bottom. They need not be. Figure 3 shows a vertical scan:
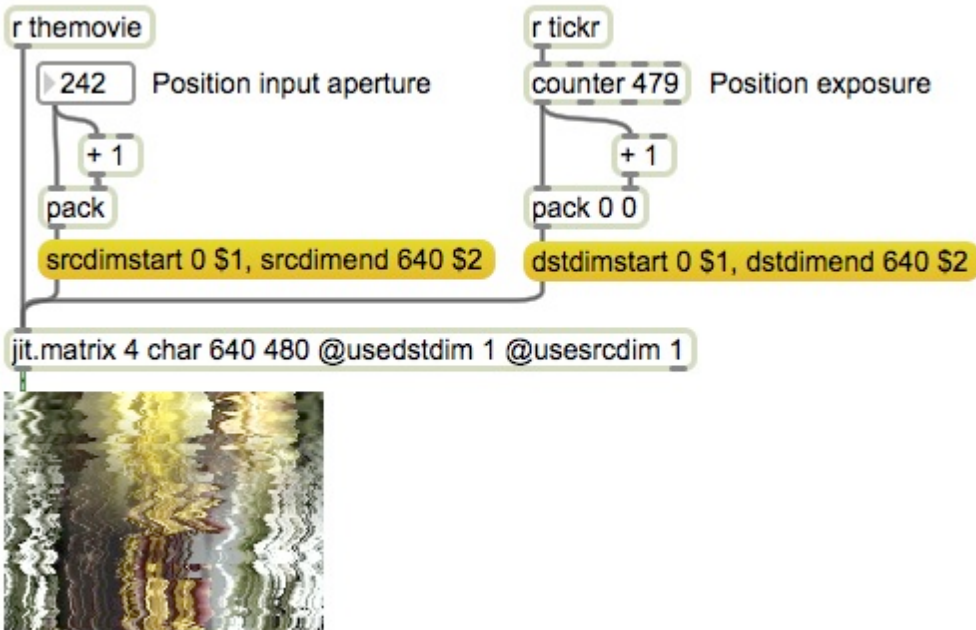

Figure 3.

Scanning vertically is no more complicated than mainipulating the y coordinate instead of the x. Figure 4 shows how to scan an arbitrary area. I've added a preview window to display the source area of the original. (This uses a jit.lcd and framerect command, as shown in several other tutorials.)
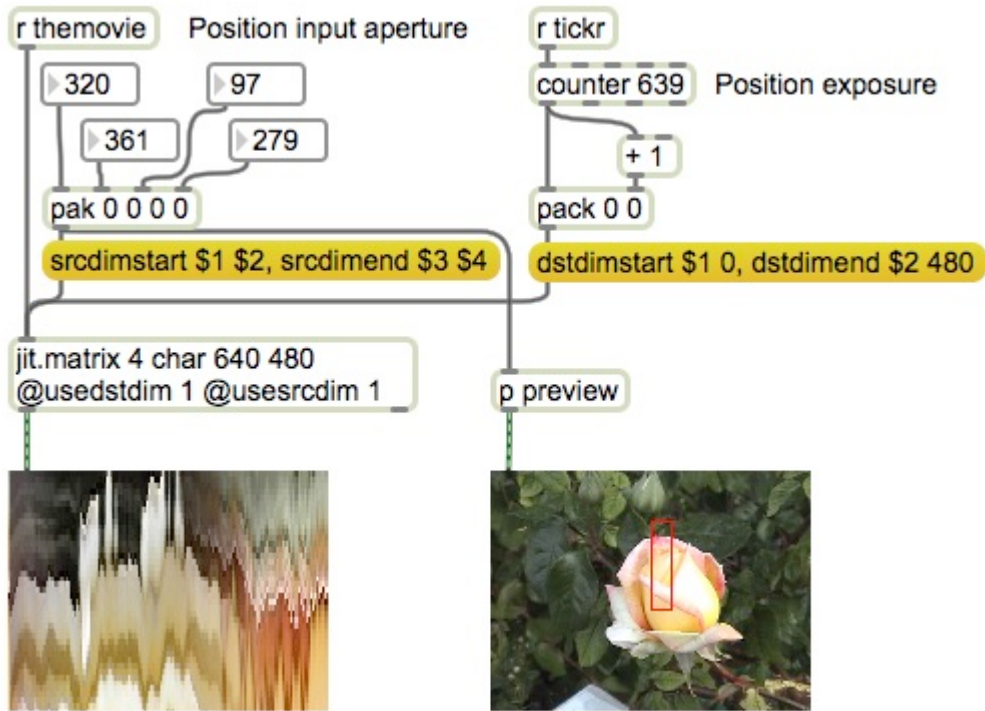
Figure 4.

In figure 5, the image is manipulated before scanning. The effect of this depends on the nature of the source image. The best effects come from a source with a lot of motion
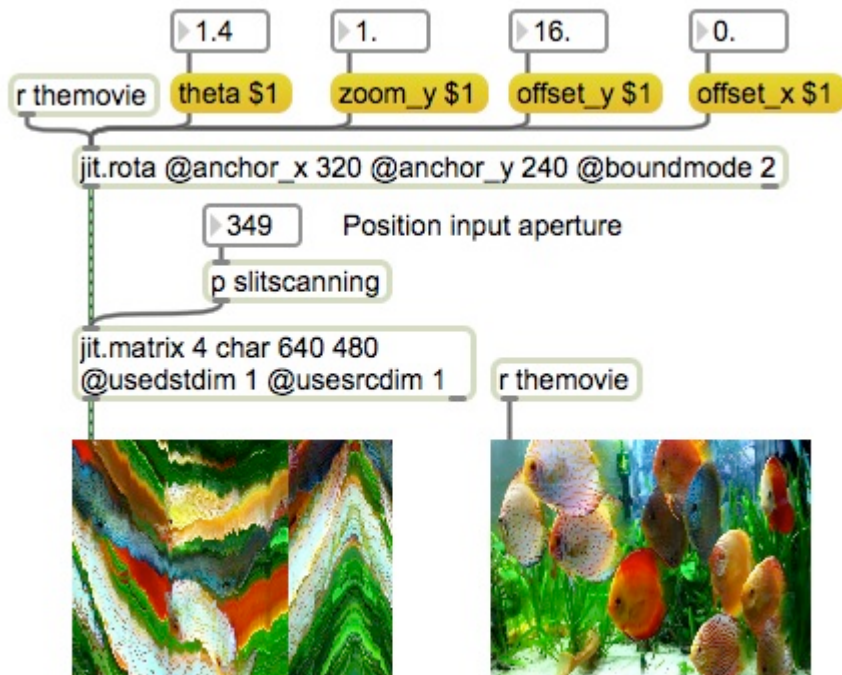

Figure 5.

Still images can be interesting if we automate the processing. In figure 6 a still image is rotated slightly for each frame.
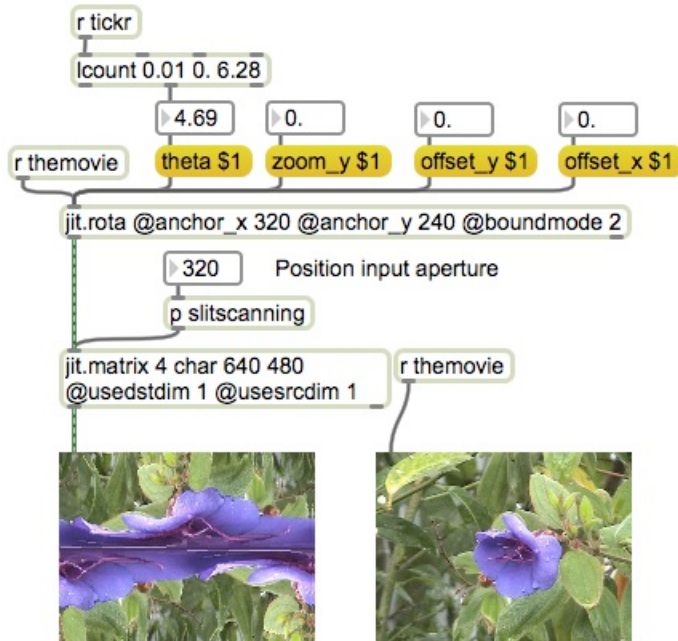

Figure 6.
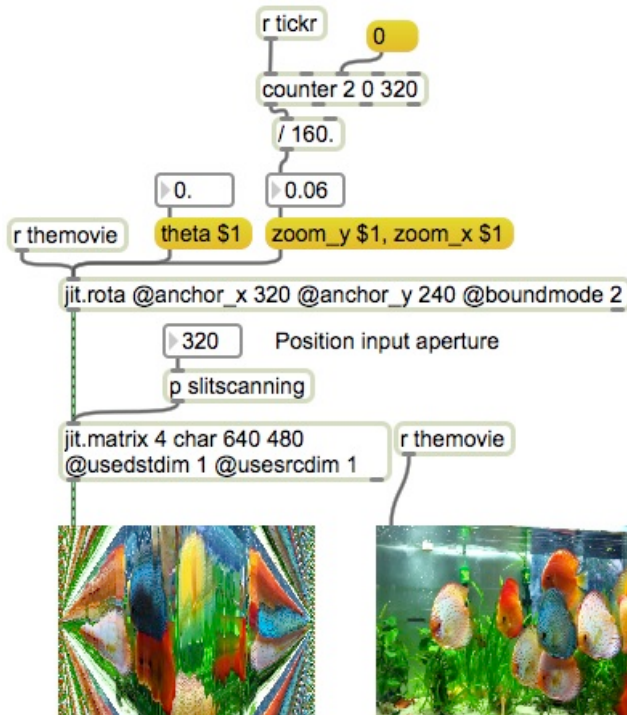In figure 7, the zoom is manipulated up and down.

Figure 7.

The destination need not slide left to right. We can create symmetry in the image by alternating the motion on odd and even frames. This is easily done with an if object that contains the string "if $i1 % 2 then $i1 else out2 $i1". The remainder 2 (% 2) operation is 0 for all even numbers, and the if statement treats anything that evaluates to 0 as false. Even numbers will be sent from the right outlet for reversal. This is shown in figure 8.
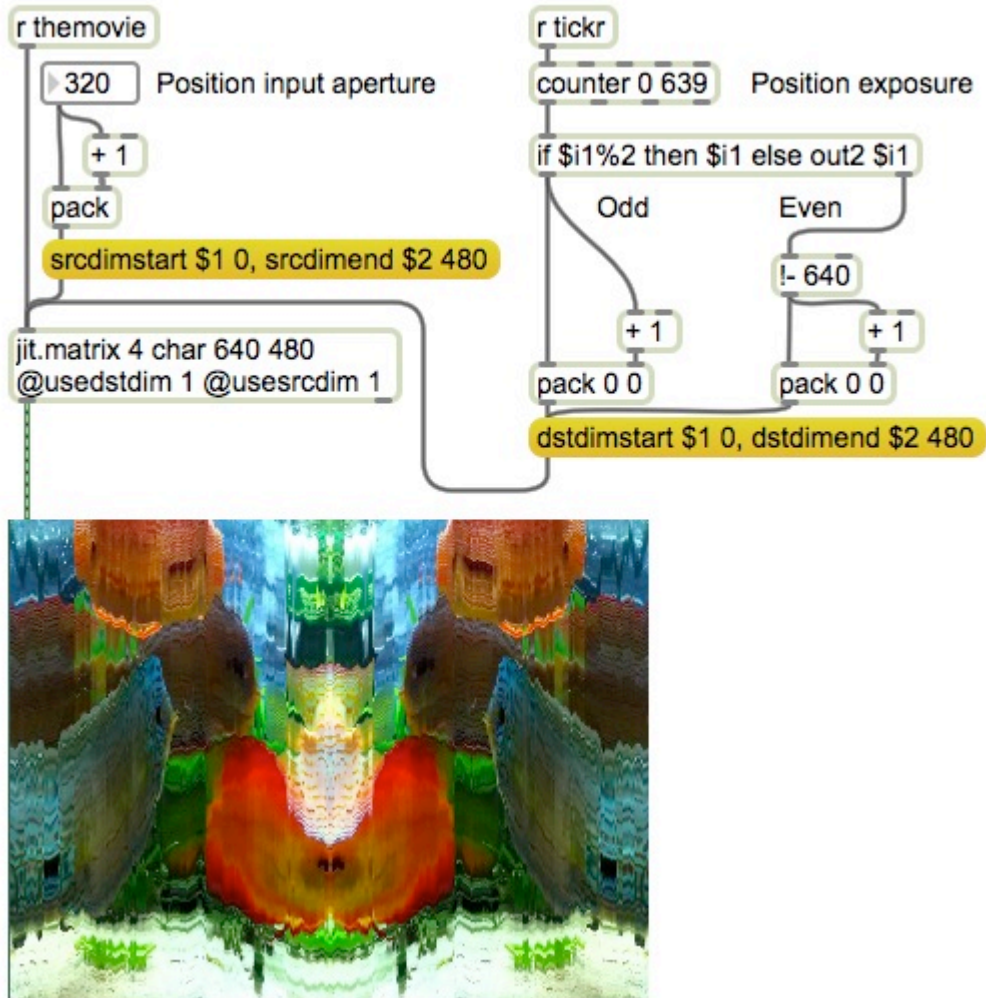

Figure 8.