Interpolation and Inpainting

The following describes linear interpolation and a simple inpainting technique to upsample the chroma planes in DV video.

Let u_i and v_i where $i = 0, \ldots, 179$ correspond to one line of the color plane in the DV source and U_j and V_j where $j = 0, \ldots, 719$ be the upsampled color plane. Linear interpolation is given by

$$U_{4i+k} = \big((4 - k)u_i + ku_{i+1}\big)/4$$
$$V_{4i+k} = \big((4 - k)v_i + kv_{i+1}\big)/4$$

where $k = 0, \ldots, 3$ and $i = 0, \ldots, 179$.

Let Y_j where $j = 0, \ldots, 719$ correspond to one line of the luma plane. Inpainting is given by

$$U_{4i+k} = \big((n_{i,4} - n_{i,k})u_i + n_{i,k}u_{i+1}\big)/n_{i,4}$$
$$V_{4i+k} = \big((n_{i,4} - n_{i,k})v_i + n_{i,k}v_{i+1}\big)/n_{i,4}$$

where

$$n_{i,k} = \sum_{m=0}^{k} \big|Y_{4i+m} - Y_{4i+m+1}\big|$$

and $k = 0, \ldots, 3$ and $i = 0, \ldots, 179$.