

EE5490: Image Signal Processing

Lab-13

Super-resolution

Apr. 21 (Batch-A) and Apr. 25 (Batch-B)

Let $x(t) = \sin(2\pi f_0 t) + \sin(2\pi f_1 t)$, where $f_0 = 4\text{Hz}$, $\Delta f = 0.3\text{Hz}$ and $f_1 = f_0 + \Delta f$. Obtain $x[n] = x(nT_s)$ containing N samples, such that: $\frac{1}{NT_s} < \Delta f$ and $T_s = 0.1$ sec.

Generate the following two sequences:

$$y_1 = DW_1 x$$

$$y_2 = DW_2 x$$

where, W_1 is an identity matrix, W_2 is the warping matrix corresponding to a shift of $\Delta x = 0.3$ and D performs downsampling by 2. Now, check whether you can recover the original signal $x[n]$ from the signals y_1 and y_2 .

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