Interpolation Continued

Consider an arbitrary signal. I originally take 8 samples ($\vec{x}$), and the sampling time is $T_s = 1\text{s}$. If I want 16 samples ($\vec{y}$) over the same duration, then $T_s = 0.5\text{s}$.

Recall: the $j^{th}$ DFT basis element corresponds to a physical frequency of $\frac{j}{nT_s}$.

Recipe for Interpolation:

(1) Take samples to get $\vec{x}$.

(2) Compute DFT: $\vec{X} = U_n^* \vec{x}$.

(3) Add in zeros to get $\vec{X}_{\text{new}}$ that has length $b_n$ (“zero padding”).

(4) Multiply by $\sqrt{b}$ where $b$ is the factor of increase in resolution.

(5) Compute inverse DFT: $\vec{x}_{\text{new}} = U_{b_n} \vec{X}_{\text{new}}^\dagger$. 

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