Resampling:

\[ f \left( \frac{2}{4} \right) = \sum_{x} K \left( \frac{\frac{3}{4}}{4} - x \right) f(x) \]

Convolution - just only evaluated where we need it could

Why?

Reconstruct signal then sample it

Lazy - so only reconstruct at samples

\[ 1 1 1 1 1 \] sampled signal is spike chain

Spike chain = high frequencies + signal

Low pass filter of spike chain = reconstruction

Convolve w/ LPF

(tent is an approx LPF)
Resampling \((2)\)

\[
\begin{array}{c}
1 & 0 & 1 & 0 & 1 & 0 \\
\xmark & \xmark & \xmark & \xmark & \xmark & \xmark \\
\end{array}
\]

What went wrong?
- aliasing
- need to pre-filter

\[
\begin{array}{c}
\downarrow \\
\end{array} \Rightarrow \begin{array}{c}
\text{signal convolution filter pre-filter sampling}
\end{array}
\]

Resampling:
\[
\text{signal} \ast \text{reconst filter} \ast \text{pre-filter} \ast \text{sampling}
\]

(associative)

Combine filters - do 1 convolution
Resampling Kernels

in Freq domain

or once a frequency is cut, no need to cut it again

Lower Frequency = Wider, Lower bump Cut-off
RESAMPLING (Again)

S = Scale (e.g. \( \frac{1}{2} \) as many samples)

Recoll kernel 1 source sample wide

prefilter 1 dest sample wide

= \( \frac{1}{5} \) source samples wide

pick bigger one

\( \frac{1}{2} \)

\( 0 \quad 1 \quad 2 \)

\( \text{in source samples} \)

\[ 1 \quad 0 \quad 1 \quad 0 \quad 1 \quad 0 \quad 1 \quad 0 \]

\[ \times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times \]

\( \@2 \)

\[ -2 \quad -1 \quad 0 \quad 1 \quad 2 \]

\[ 0 \quad \frac{1}{2} \quad 1 \quad \frac{1}{2} \quad 0 \]

Look Up

note that it adds to 1