Topics to be covered

- Introduction to IIR Filter.
- Steps for designing IIR filters.
- Low Pass IIR filter.
- High Pass IIR filter.
- Band Pass IIR filter.

Infinite Impulse Response Filter

In contrast to FIR filter, Infinite Impulse Response (IIR) filters have impulse response which does not converge to zero over infinite length of time. Thus they are unstable filters.

The Recursion Equation

$$y[n] = a_0x(n)+a_1x(n-1)+a_2x(n-2)+a_3x(n-3)+....$$
$$+b_1y(n-1)+b_2y(n-2)+b_3y(n-3)+....$$

Steps for designing IIR Filter

1. Describe the Filter parameters such as cuttoff and order of the filter.
2. Generate filter / filter coefficients using Butterworth method.
3. Find the impulse response of the filter.
4. Transform the impulse response of the filter into frequency domain by taking FFT of the impulse response and evaluate the filter.
5. Filter the given signal with the evaluated filter

OR

Apply the filter to the given signal.

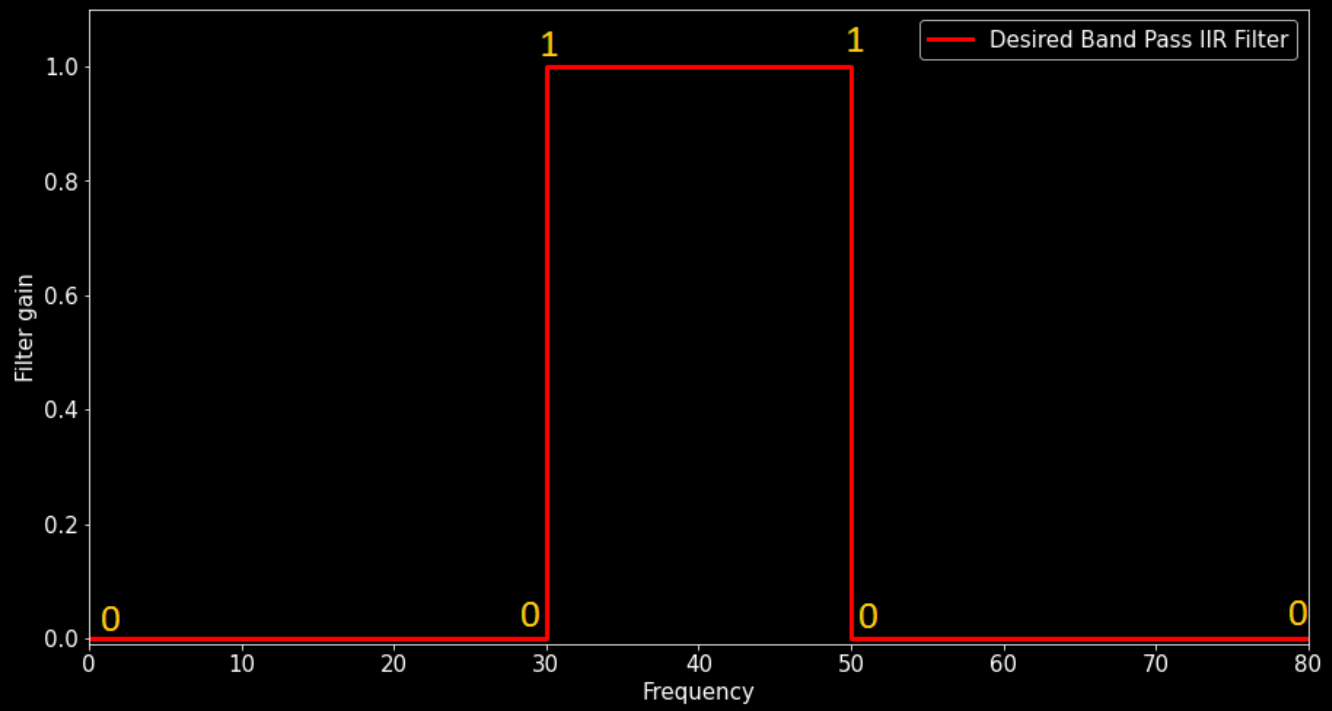
Band Pass IIR Filter

srate = 1024 Hz
cutt off = [30 50]
order = 5

desired shape = [0 0 1 1 0 0]

frequencies = [0 cuttoff [0] cuttoff [0] cuttoff [1] cuttoff [1] Nyqusit]

frequencies = [0 30 30 50 50 512]



Comparison Between FIR and IIR Filters

FIR Filters	IIR Filters
Short Impulse Respone	Long Impulse Response
Slow due to large order	Fast due to small order
Inherently Stable	Stability depend upon the data
High performance due to flexibility in designing	Low performance and less flexibility
Non Recursive Filters	Recursive Filters

Task for Students

- Design Band stop IIR filter using Butterworth method.