

LabView - Post processing

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1 For loop

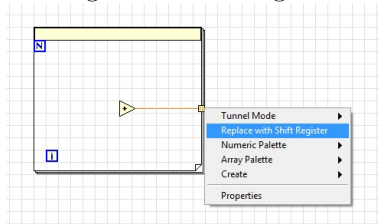
Create a new VI

Create a for loop (controllable counts "n") that adds a random number for each loop. And display the end result.

You will need to use: For loop, "create random number" (In the numerical pallet) and "Shift Register"

The Shift Register sends value(s) back into the next loop iteration

Figure 1: Shift Register



Create a new loop incorporating the one you made, again with controllable loop counts "Samples". Pull out the values and display them on a chart (Waveform chart, can be found on the front panel, not the block diagram).

Create a histogram of the values. The VI can be found in the Mathematics/Prob & Stats - panel (create the histogram from the block diagram, "intervals" can be set to 20).

Try the following settings: $n=1$, samples=1000; What does the histogram tell you?

Describe the visual difference between the histograms with $n=2$ and $n=1000$. Can you explain this?

2 Waveform generation - dummy signal and Spectrum

Create a new VI.

LabView uses waveforms for data acquisition. We will therefore use this now.

1. Create a sample sinusoidal wave signal. Panel: Signal Processing/Wfm Generation (creates 1000 samples). Make the frequency and amplitude adjustable (control). Display it on a waveform chart.

On the front panel, select the x-axis and change the format to "relative time, display seconds as well (2 digits precision)"

2. Create a second sinusoidal wave signal, add it to the first (numerical addition works here). Change the frequencies to $f_1=50$, $f_2=2$, amplitudes of 1. Have a look at the results.

3. Add Gaussian noise to the signal (same pallet as the wave signals), standard deviation should be controllable.

4. Add a power spectrum VI (Quick search -i ctrl+space -i "FFT - Power spectrum and PSD"), display the results in a Graph.

Can you identify the signal frequencies? Do you see the effects of the noise?

Tweak the frequencies and the noise to see how the noise can overshadow the main frequencies.

3 Filtering

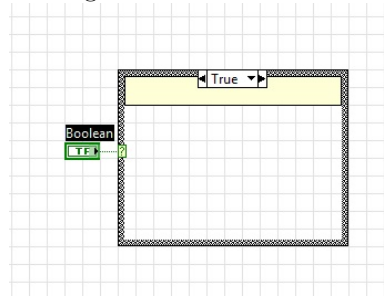
Create a new VI.

1. Have the VI generate a sample array of $n=1000$ samples (Gaussian distribution) by using the VI "Gaussian White Noise" in the pallet: Signal processing/Sig Generation/. Standard deviation (σ) should be controllable.

2. Display the results on a waveform chart.

3. Create a case structure (controllable). Run the signal into the case struc-

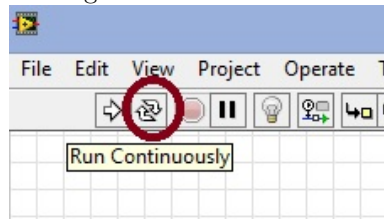
Figure 2: Case structure



ture, and through a Savitzki-Golay filter (equivalent to the one used in the wavelab). Remember to link the unfiltered values in the "FALSE" case of the structure.

4. Use the "run continuously" function and do a visual inspection of the signal with and without the filter activated

Figure 3: Case structure



5. Remove the case structure (right click on it and select remove case structure, DONT delete it). Display the filtered and the unfiltered values on the chart. (Use a "Build array" function in the array pallet, the output needs to be transposed).
6. Tweak the parameters of the filter. Using continuous run. How could you program the equivalent of the "continuous run" function? Try it.