

Chapter III-7 — Analysis

Replace Missing Data Using the Interpolate2 Operation

By using the same number of points for the destination as you have source points, you can replace NaNs without modifying the other data.

If you have waveform data, simply duplicate your data and perform linear interpolation using the same number of points as your data. For example, assuming 100 data points:

```
Duplicate data1,data1a  
Interpolate/T=1/N=100/Y=data1a data1
```

If you have XY data, the Interpolate2 operation has the ability to include the input x values in the output X wave. For example:

```
Duplicate data1, yData1, xData1  
xData1 = x  
Display yData1 vs xData1  
Interpolate2/T=1/N=100/I/Y=yData1a/X=xData1a xData1,yData1
```

If, after performing an operation on your data, you wish to put the modified data back in the source wave while maintaining the original missing values you can use a wave assignment similar to this:

```
yData1 = (numtype(yData1) == 0) ? yData1 : yData1a
```

This technique can also be applied using interpolated results generated by the **Smooth** operation (page V-878) or the **Loess** operation (page V-515).

Replace Missing Data Using Median Smoothing

You can use the Smooth dialog to replace each NaN with the median of surrounding values.

Select the Median smoothing algorithm, select "NaNs" from the Replace popup, and choose "Median" for the "with:" radio button. Enter the number of surrounding points used to compute the median (an odd number is best).

You can choose to overwrite the NaNs or create a new waveform with the result. The Smooth dialog produces commands like this:

```
Duplicate/O data1,data1_smth;DelayUpdate  
Smooth/M=(NaN) 5, data1_smth
```

Interpolation

Igor Pro has a number of interpolation tools that are designed for different applications. We summarize these in the table below.

Data	Operation/Function	Interpolation Method
1D waves	wave assignment, e.g., val=wave(x)	Linear
1D waves	Smooth	Running median, average, binomial, Savitsky-Golay
1D XY waves	interp()	Linear
1D single or XY waves	The Interpolate2 Operation	Linear, cubic spline, smoothing spline
1D or 2D single or XY	Loess	Locally-weighted regression
Triplet XYZ waves	ImageInterpolate	Voronoi
1D X, Y, Z waves	Data→Packages→XYZ to Matrix	Voronoi
1D X, Y, Z waves	Loess	Locally-weighted regression
2D waves	ImageInterpolate	Bilinear, splines, Kriging, Voronoi