Noisy Signal Predictor

with machine learning

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6 March, 2020

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Objective

- The objective of is to predict filter out the noise from a sinusoidal signal
- This is similar to filtering the incoming signal using a conventional low-pass filter
- The predictor should be able to de-noise the sinusoidal signal with high degree of accuracy

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IntroductionUse of Machine learning algorithm to filter out noise from a signals

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Methodology and Results

The steps involved in this procedure are systematic. They are:

- generation of a sine wave with a uniform amplitude and single frequency
- adding random noise to the sinusoidal signal
- convert the noisy signal to a dataset
- select an appropriate model

Regression algorithm will be used
Providing the X value as the feature, the corresponding Y values(Amplitudes) can be predicted.
To train the system, we must first provide it with many examples of data points, including both the predictors (in our case, the X values) and their labels (in our case, the corresponding Y values or amplitudes).

Performance measure

- A typical performance measure for regression problems is the Root Mean Square Error (RMSE), as shown in Equation **??**
- It gives an idea of how much error the system typically makes in its predictions
- Higher value of RMSE means the error is large

$$RMSE\left(\mathbf{X}, h\right) = \sqrt{\frac{1}{m}\sum_{i=1}^{m}\left(h\left(\mathbf{x}^{(i)}\right) - y^{(i)}\right)^2} \tag{1}$$