ENPM 809T: Autonomous Robotics - HW 1

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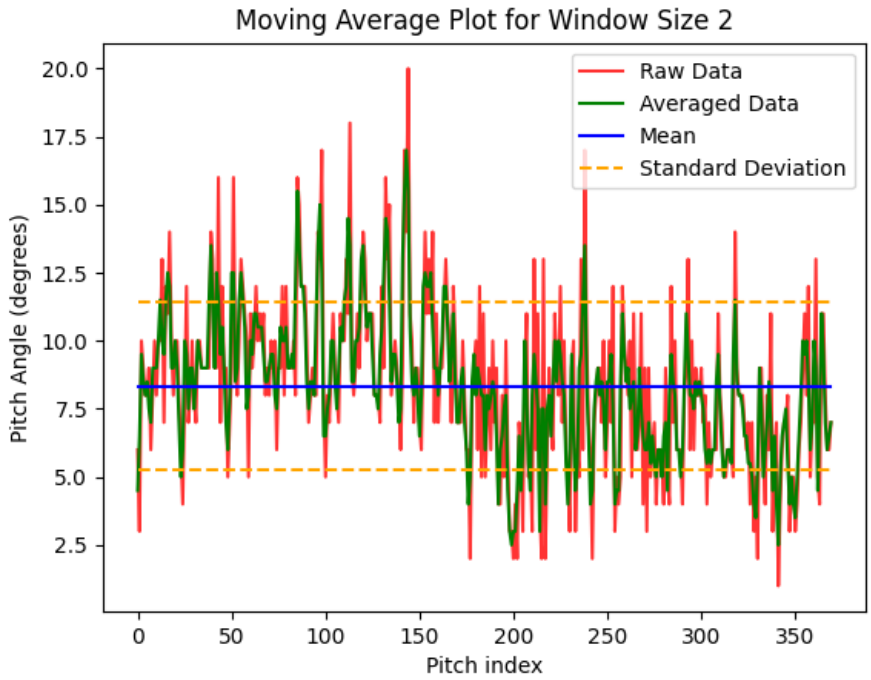
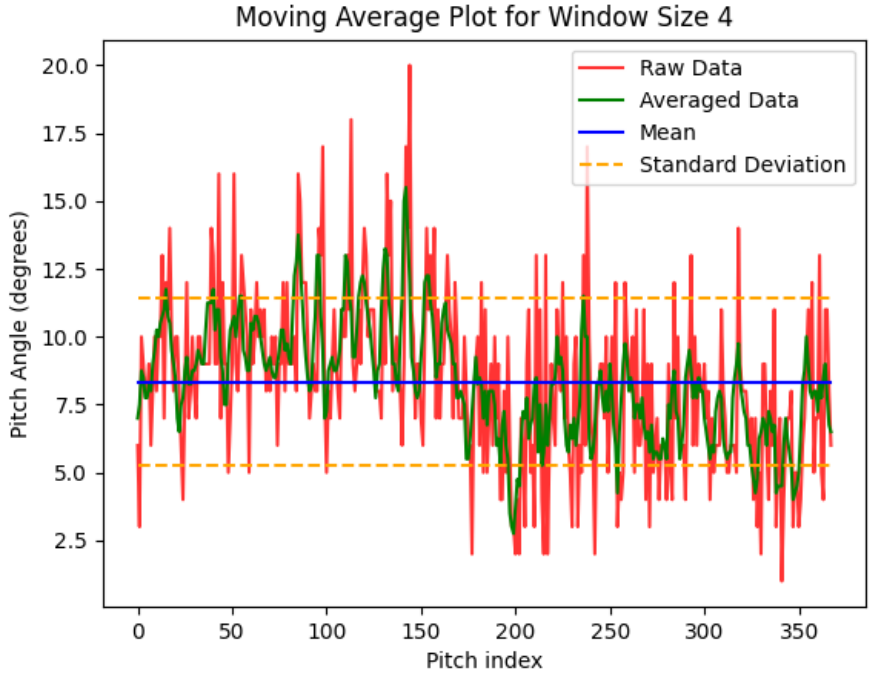
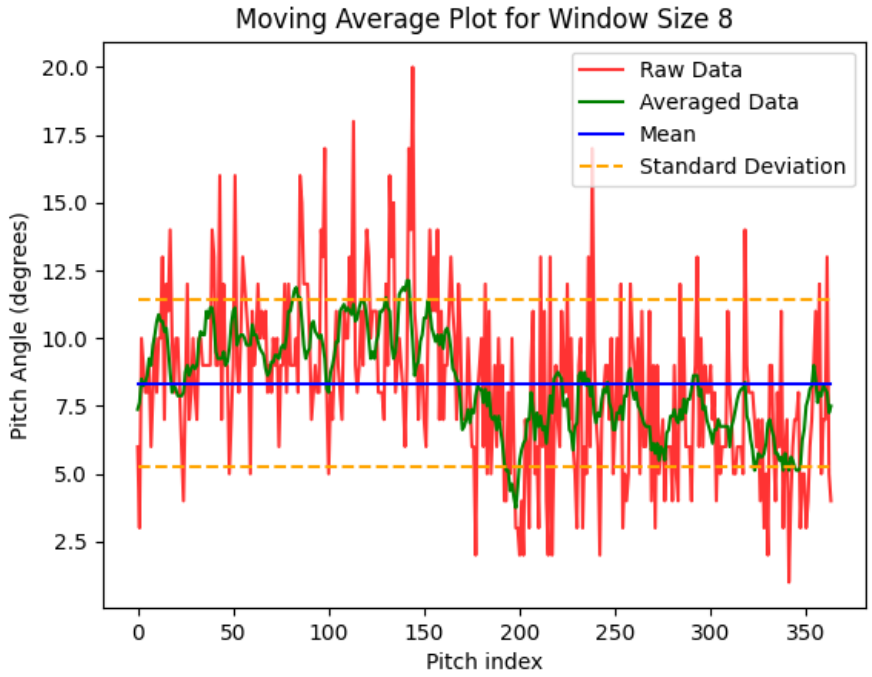
I have successfully parsed the raw sensor data and produced the required results. The results are:



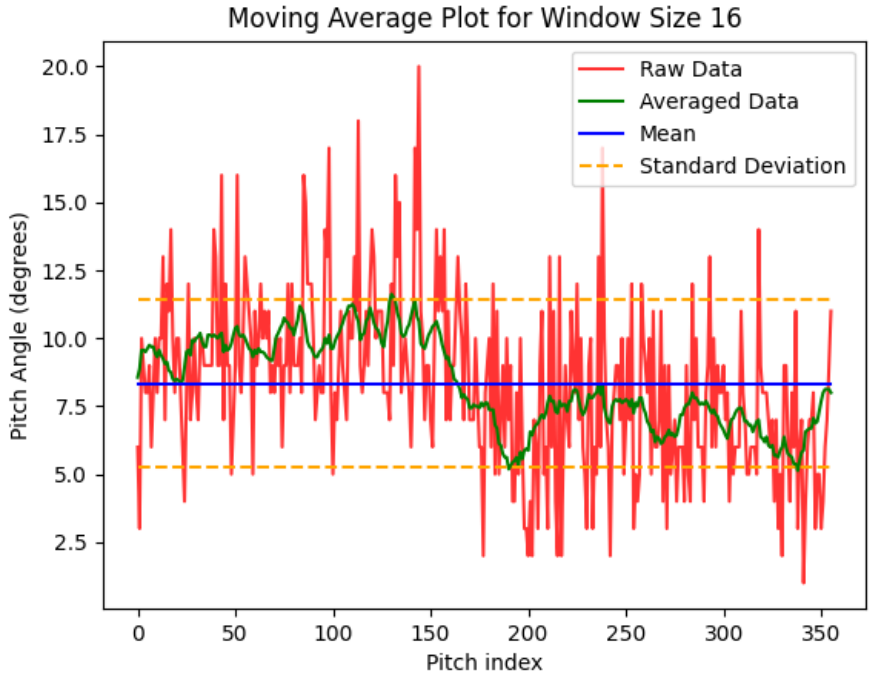
The following plot is for a window size of 2. As the legend suggests the red plot is the raw data, and the green plot is the result of the moving average. The mean is plotted as the blue line and standard deviation(upper and lower) as orange.



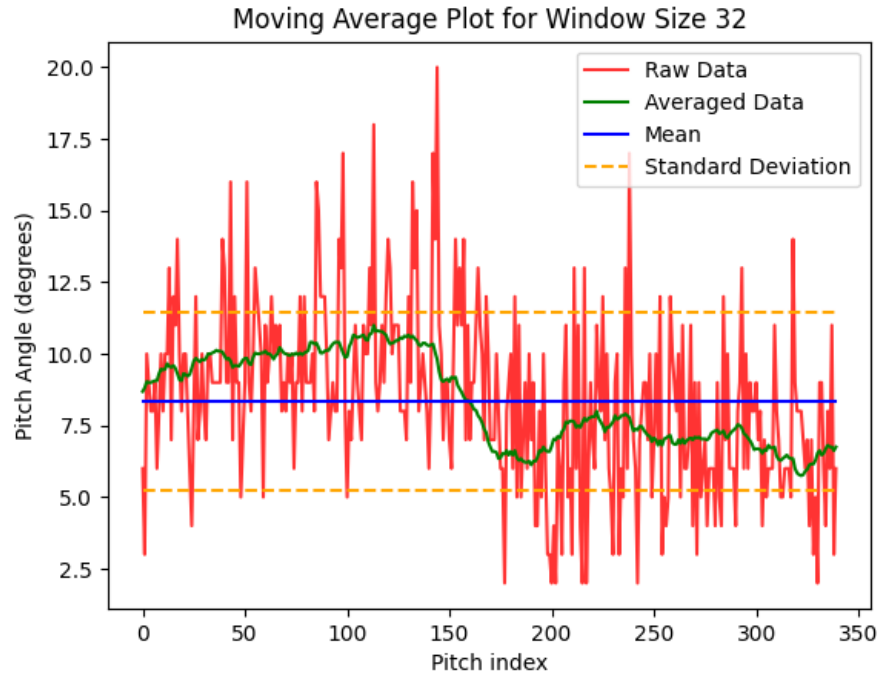
The moving average functions as a low pass filter which essentially gets rid of the high frequency components.

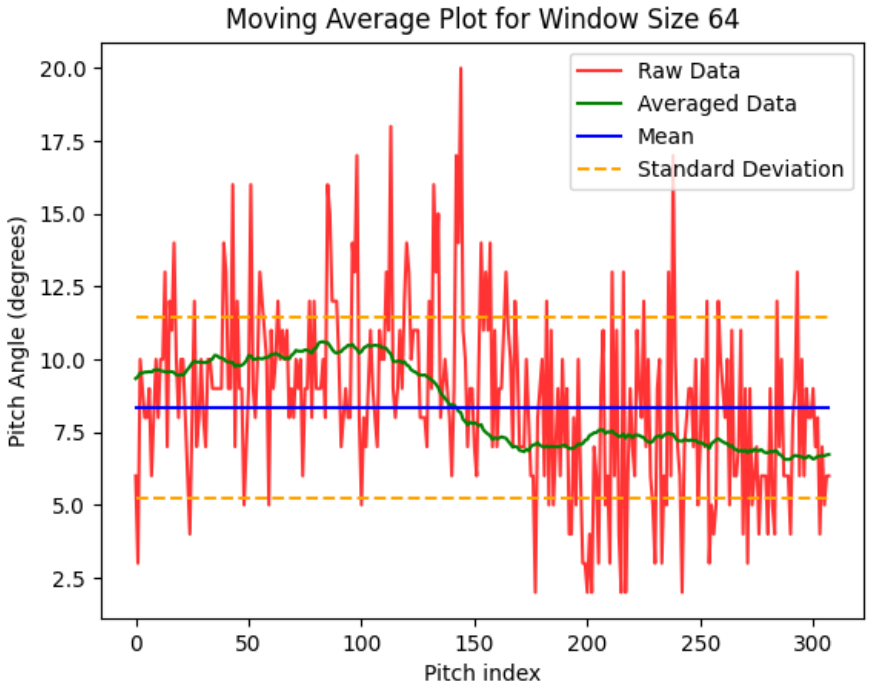


The advantage of this kind of filter is that it can get rid of high frequency noise, but the obvious disadvantage is that the low frequency noise can still cause issues.

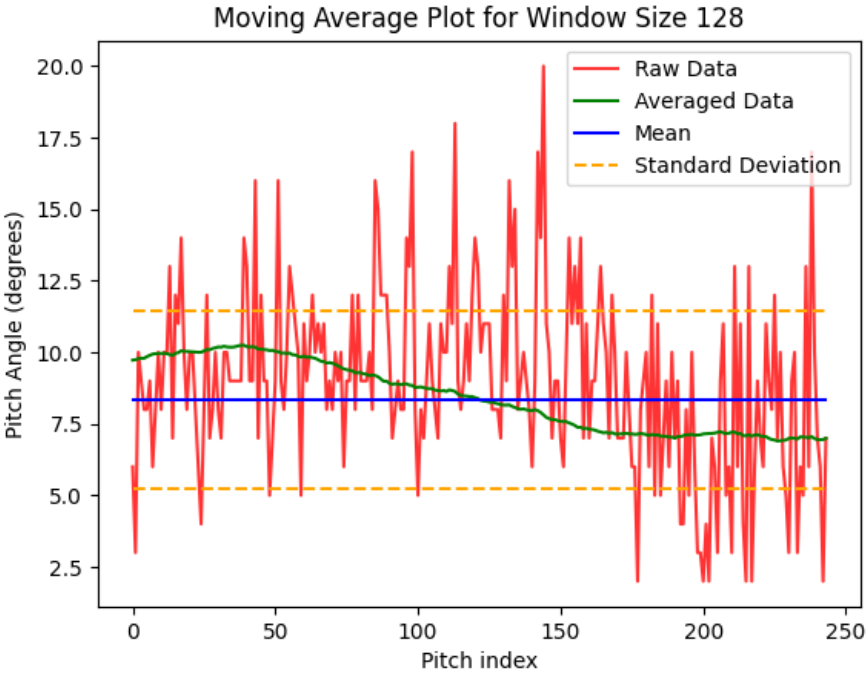


The cutoff frequency decreases as the window size increases. Hence they are inversely proportional.





We can see the impact of increasing the window size. The output(Averaged data) becomes steadier with the increase in window size.


Moving Average Plot for Window Size 128
Raw Data
Averaged Data
Mean
Standard Deviation
Pitch Angle (degrees)
Pitch index
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0
50
100
150
200
250