Time domain features

N.	Name	Formula
1	Mean	$T1 = \frac{1}{N}\sum_{i=1}^{N} x_i$
2	Variance	$T2 = \frac{1}{N}\sum_{i=1}^{N} (x_i - T1)^2$
3	Standar Desviation	$T3 = \sqrt{\frac{1}{N}\sum_{i=1}^{N} (x_i - T1)^2}$
4	Root Mean Square	$T4 = \sqrt{\frac{1}{N}\sum_{i=1}^{N} (x_i)^2}$
5	Max Value	$T5 = max(x)$
6	Kurtosis	$T6 = \frac{N\sum_{i=1}^{N}(x_i - T1)^4}{[\sum_{i=1}^{N}(x_i - T1)^2]^2}$
7	Skewness	$T7 = \frac{N\sum_{i=1}^{N}(x_i - T1)^3}{T3^3}$
8	Kurtosis Energy Operator	$T8 = \frac{N^2\sum_{i=1}^{N}(\Delta y_i - \Delta\bar{y})^4}{[\sum_{i=1}^{N}(\Delta y_i - \Delta\bar{y})^2]^2}$
9	Absolute Media	$T9 = \frac{1}{N}\sum_{i=1}^{N} \lvert x_i \rvert$
10	CPT1	$T10 = \frac{max\lvert x_i \rvert}{SRAV}$
11	CPT2	$T11 = \frac{max\lvert x_i \rvert}{RMS}$
12	CPT3	$T12 = \frac{max\lvert x_i \rvert}{MAV}$
13	CPT4	$T13 = \frac{\sum_{i=1}^{N} log(\lvert x_i \rvert + 1)}{N log(T3+1)}$
14	CPT5	$T14 = \frac{\sum_{i=1}^{N} exp(x_i)}{N * exp(T3)}$
15	CPT6	$T15 = \frac{\sum_{i=1}^{N} \sqrt{\lvert x_i \rvert}}{N * Var}$
16	Fifth statistic moment	$T16 = \sum (x_i - T1)^5$
17	Shape Factor	$T17 = \frac{RMS}{\frac{1}{N}\sum_{i=1}^{N} \lvert x_i \rvert}$
18	Impulse Factor	$T18 = \frac{max(x_i)}{\frac{1}{N}\sum_{i=1}^{N} \lvert x_i \rvert}$
19	Clearance Factor	$T19 = \frac{max(\lvert x_i \rvert)}{\frac{1}{N}\sum_{i=1}^{N} (x_i)^2}$
20	Delta RMS	$T20 = RMS_{i+1} - RMS_i$
21	Root sum of Squares	$T21 = \sqrt{\sum_{l=1}^{n} \lvert x_i \rvert^2}$
22	Energy	$T22 = \sum_{l=1}^{n} \lvert x_i \rvert^2$

23	Latitude Factor	$T23 = \frac{max(\lvert x_i \rvert)}{(\frac{1}{N}\sum_{i=1}^{N}\sqrt{\lvert x_i \rvert})^2}$
24	Weighted SSR absolute	$T24 = \frac{1}{N}(\sum_{i=1}^{N}\sqrt{\lvert x_i \rvert})^2$
25	Pulse Index	$T25 = X_{max}/mean(X)$
26	Mean Square Error	$T26 = \frac{1}{N}\sum_{i=1}^{N}(x_i - T1)^2$
27	Normalized Normal Negative Likelihoog	$T27 = ln\frac{T3}{RMS}$
28	Mean Deviation	$T28 = \frac{\frac{1}{N}\sum_{i=1}^{N} x_i}{\sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - T1)^2}}$
29	Standard Deviation Impulse Factor	$T29 = \frac{std(x)}{mean(\lvert x \rvert)}$
30	Log - Log Ratio	$T30 = \frac{1}{log(std(x))}\sum_{i=1}^{N} log(\lvert x_i \rvert + 1)$
31	Kth Central Moment	$T31 = E[(x - E[x])^k]$ Where E(x) is the expected value of x. K is set to 3
32	Histogram lower bound	$T32 = min(x) - \frac{1}{2}\frac{max(x) - min(x)}{N-1}$
33	Histogram upper bound	$T33 = max(x) + \frac{1}{2}\frac{max(x) - min(x)}{N-1}$
34	Normalized Moment	$T34 = \frac{\frac{1}{N}\sum_{i=1}^{N}(x_i - mean(x))^5}{\sqrt{(\frac{1}{N}\sum_{i=1}^{N}(x_1 - mean(x))^2)^5}}$
35	Shannon Entropy	$T35 = -\sum_{i=1}^{N} log(x_i^2)$
36	Log energy entropy	$T36 = \sum_{i=1}^{N} log(x_i^2)$ where, log(0)=0
37	Threshold Entropy	$T37 = Threshold \begin{cases} 1, & if \quad \lvert x_i \rvert > p, and \\ 0, & elsewhere \end{cases}$ p is set to 0.2
38	Sure Entropy	$T38 = n - \#\{i \text{ such that } \lvert x_i \rvert \leq p\} + \sum_i min(x_i^2, p^2)$ p is set to 0.2
39	Norm Entropy	$T39 = \sum_{i=1}^{N} \lvert x_i \rvert^p$ p is set to 0.2
40	Peak to peak	$T40 = Max - Min$
41	Minimum value	$T41 = min = min(x_i)$
42	Peak value	$T42 = \frac{1}{2}[Max(x_i) - Min(x_i)]$
43	6th Statistical moment	$T43 = \sum (x_i - T1)^6$
44	Crest Factor	$T44 = \frac{max}{RMS}$
45	Integrated signal	$T45 = \sum_{i=1}^{N} \lvert x_i \rvert$
46	Square root amplitude value	$T46 = (\frac{\sum_{i=1}^{N}\sqrt{\lvert x_i \rvert}}{N})^2$

47	Simple Square Integral	$T47 = \sum_{i=1}^{N} \lvert x_i \rvert^2$
48	Zero crossing	$T48 = \sum_{i=1}^{N} step[Sign(-x_i * x_{i+1})]$ $step = \begin{cases} 1, if \quad x > 0 \\ 0, if \quad x = 0 \\ -1, if \quad x < 0 \end{cases}$ $sign = \begin{cases} 1, if \quad x > 0 \\ \frac{1}{2}, if \quad x = 0 \\ 0, if \quad x < 0 \end{cases}$
49	Wavelength	$T49 = \sum_{i=1}^{N} \lvert x_{i+1} - x_i \rvert$
50	Wilson Amplitude	$T50 = \sum_{i=1}^{N} f(\lvert x_i - x_{i+1} \rvert - T)$ $T =$ threshold set to 0.2 $f = \begin{cases} 1, if \quad x \geq 0 \\ 0, if \quad x < 0 \end{cases}$
51	Slope Sign Change	$T51 = \sum_{i=2}^{N} f[(x_i - x_{i-1}) * (x_i - x_{i+1})]$ $f = \begin{cases} 1, if \quad x \geq threshold \\ 0, \quad otherwise \end{cases}$
52	Log Detector	$T52 = e^{\frac{1}{N} \sum_{i=1}^{N} log \lvert x_i \rvert}$
53	Modified Mean Absolute Value 1	$T53 = \frac{1}{N} \sum_{i=1}^{N} W_i \lvert x_i \rvert$ $W_i = 1; \quad if \quad 0.25N \leq n \leq 0.75N$ $W_i = 0.5; \quad otherwise$
54	Modified mean Absolute Value 2	$T54 = \frac{1}{N} \sum_{i=1}^{N} W_i \lvert x_i \rvert$ $W_i = 1; \quad if \quad 0.25N \leq n \leq 0.75N$ $W_i = \frac{4n}{N}; \quad if \quad n < 0.25N$ $W_i = \frac{4(n-N)}{N}; \quad if \quad n > 0.75N$
55	Mean Absolute Value Slope	$T55 = MAV_{i+1} - MAV_i$
56	Mean of Amplitude	$T56 = \sum_{i=1}^{N} * x_{i-1} - x_i)$
57	Log RMS	$T57 = log(X_{rms})$
58	Conduction Velocity of Signal	$T58 = (\frac{1}{N-1} \sum_{i=1}^{N} x_i^2)$
59	Average Amplitude Change	$T59 = \frac{1}{N} \sum_{i=1}^{N-1} x_i^2$
60	V-ORDER 2	$T60 = \sqrt{\frac{1}{N} \sum_{i=1}^{N} x_i^2}$
61	V-ORDER 3	$T61 = \sqrt[3]{\frac{1}{N} \sum_{i=1}^{N} x_i^3}$

62	Maximum Fractal Length	$T62 = log_{10}\sqrt{\sum_{i=1}^{N-1}(x_i - x_{i+1})^2}$
63	Difference Absolute Strandard Deviation	$T63 = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N-1}(x_{i+1} - x_i)^2}$
64	Myopulse percentage rate	$T64 = \frac{1}{N}\sum_{i=1}^{N}[f(x_i)]$; $f(x) = \begin{cases} 1, & if \quad x \geq threshold \\ 0, & otherwise \end{cases}$ the threshold is set to 0.2
65	Higher order Temporal Moments	$T65 = \lvert\frac{1}{N}\sum_{i=1}^{N} x_i^m\rvert$ Where m is set to 3 as default
66	Difference Absolute Variance Value	$T66 = \frac{1}{N-2}\sum_{i=1}^{N-1}(x_{i+1} - x_i)^2$
67	Margin Index	$T67 = (\frac{max(x)}{(\frac{1}{N})\sum_{i=1}^{N}\sqrt{x_1}})^2$
68	Waveform Indicators	$T68 = \frac{VO2}{\frac{\sum_{i=1}^{N} x_i}{N}}$
69	Weibull Negative Log-Likelihood	$T69 = -\sum_{i=1}^{N} log[(SF * \eta)^{-sf}\lvert x_i\rvert^{sf-1} exp\frac{\lvert x_i\rvert}{\eta}^{sf}]$ Where η is the scale factor and SF the Shape Factor
70	Pulse Indicators	$T70 = \frac{Max(x_i)}{\frac{1}{N}\sum_{i=1}^{N}\lvert x_i\rvert}$

Table 1: Time domain indicators