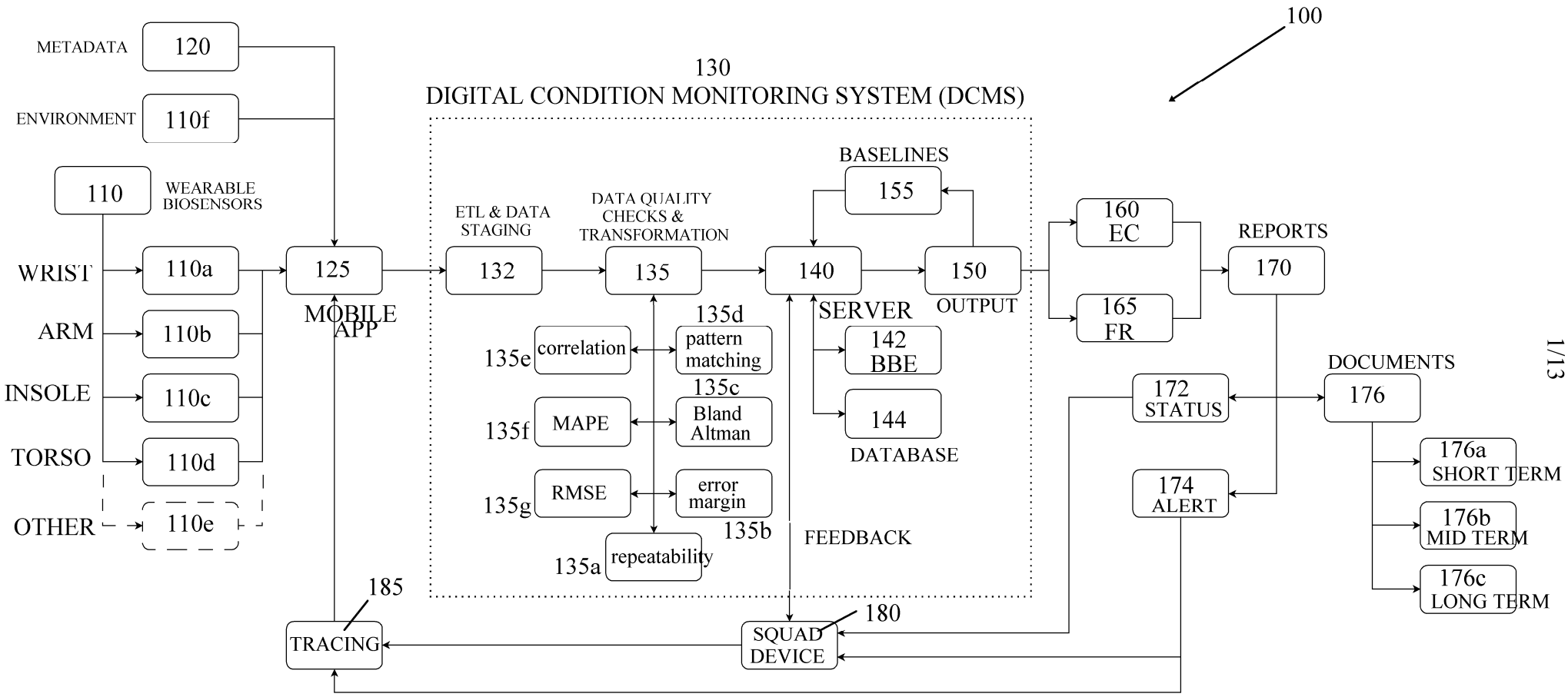

100
130
DIGITAL CONDITION MONITORING SYSTEM (DCMS)
METADATA
120
ENVIRONMENT
110f
110
WEARABLE BIOSENSORS
WRIST
110a
ARM
110b
INSOLE
110c
TORSO
110d
OTHER
110e
125
MOBILE APP
ETL & DATA STAGING
132
DATA QUALITY CHECKS & TRANSFORMATION
135
BASELINES
155
140
SERVER
150
OUTPUT
160 EC
165 FR
REPORTS
170
135d
pattern matching
135e
correlation
135c
Bland Altman
135f
MAPE
135g
RMSE
error margin
135b
135a
repeatability
FEEDBACK
142 BBE
144
DATABASE
172 STATUS
174 ALERT
DOCUMENTS
176
176a SHORT TERM
176b MID TERM
176c LONG TERM
185
TRACING
180
SQUAD DEVICE

FIG. 1

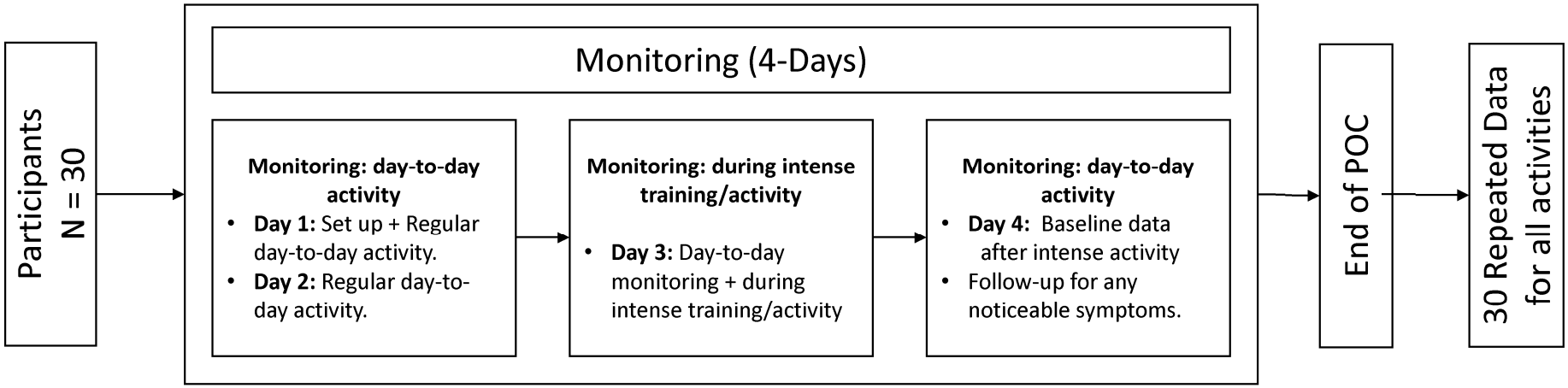

Participants
N = 30
Monitoring (4-Days)
Monitoring: day-to-day activity
• Day 1: Set up + Regular day-to-day activity.
• Day 2: Regular day-to-day activity.
Monitoring: during intense training/activity
• Day 3: Day-to-day monitoring + during intense training/activity
Monitoring: day-to-day activity
• Day 4: Baseline data after intense activity
• Follow-up for any noticeable symptoms.
End of POC
30 Repeated Data for all activities

FIG. 2

Univariate Analysis

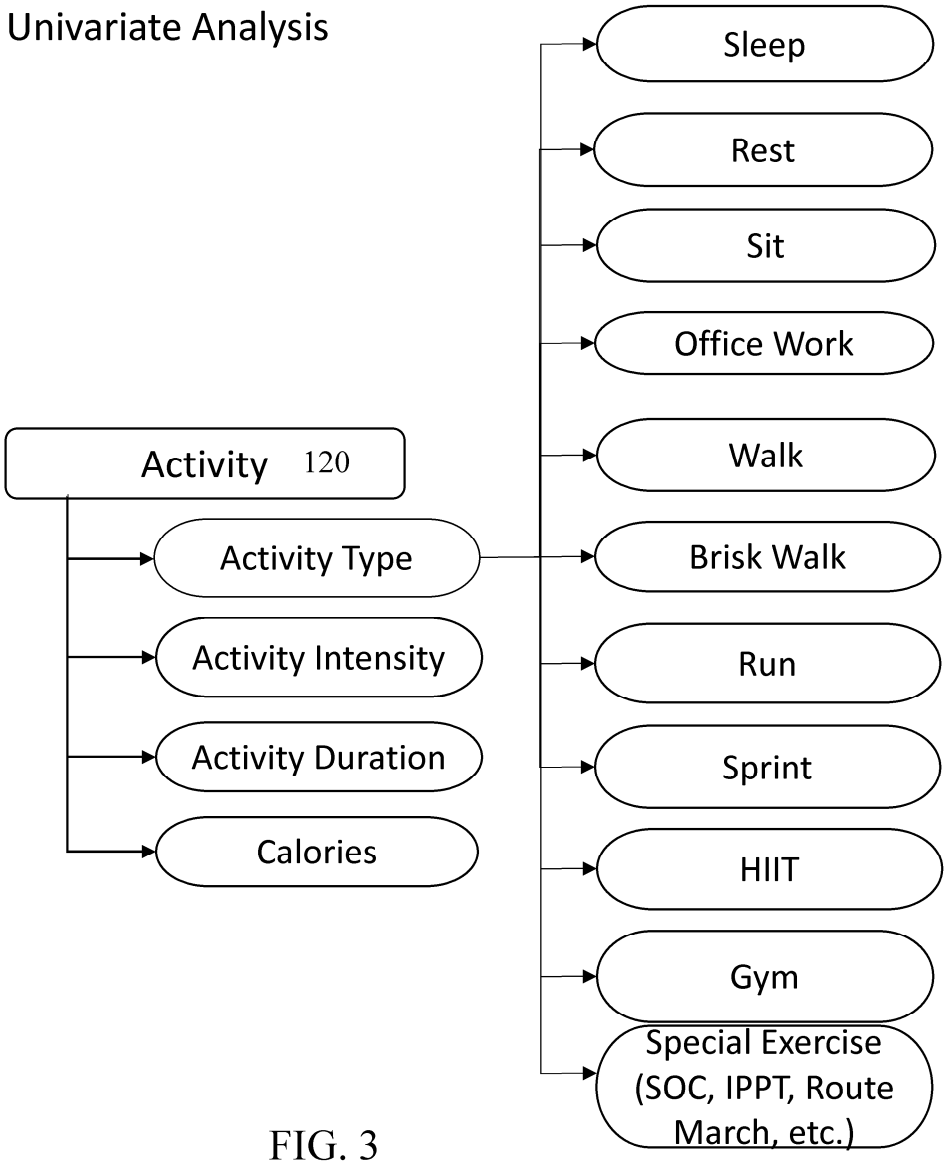


FIG. 3

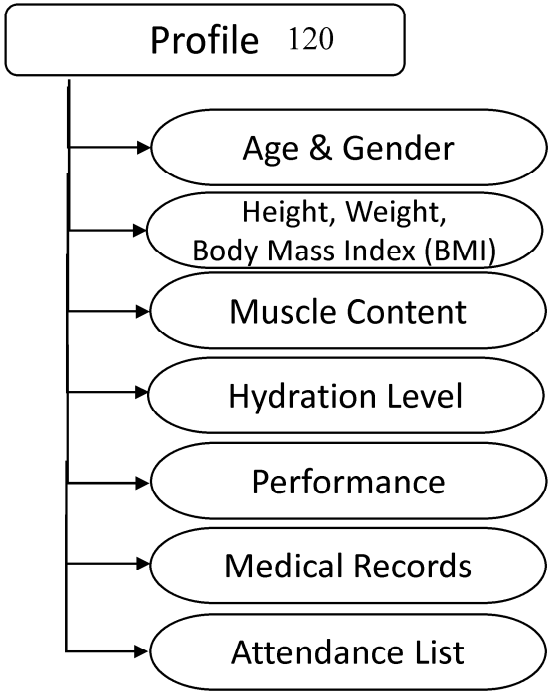


FIG. 4

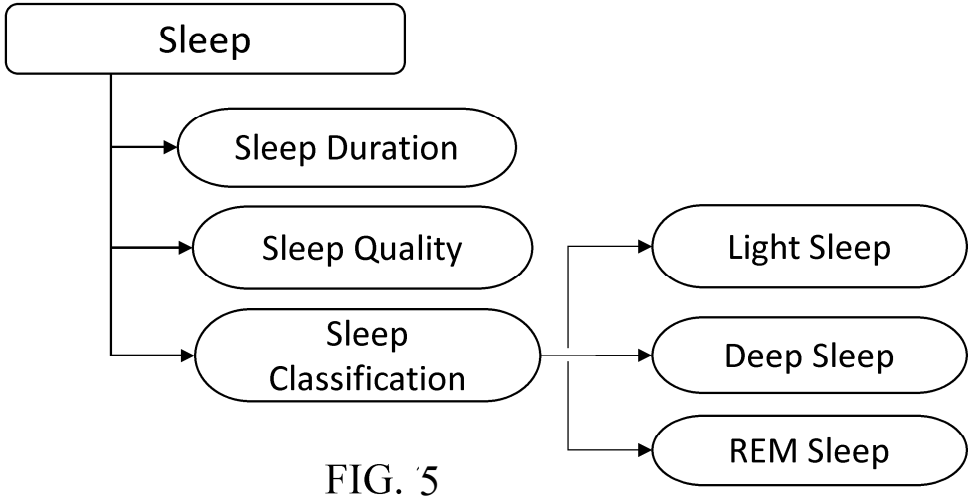


FIG. 5

Univariate Analysis

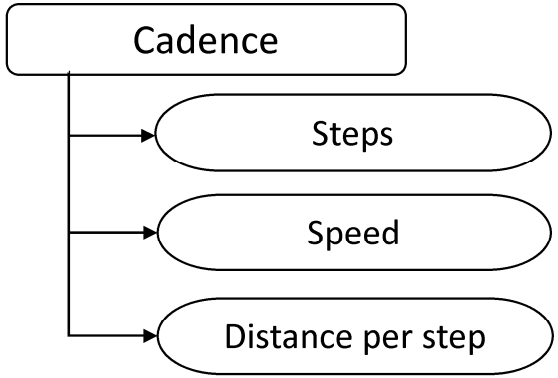


FIG. 6

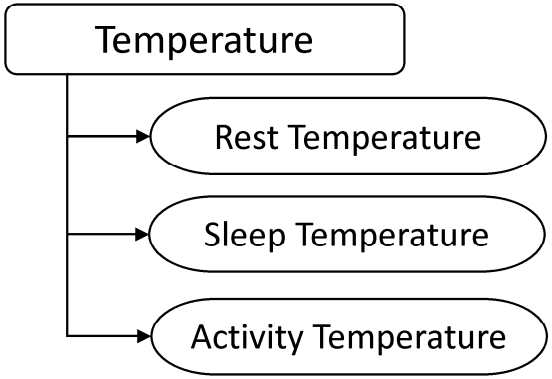


FIG. 7

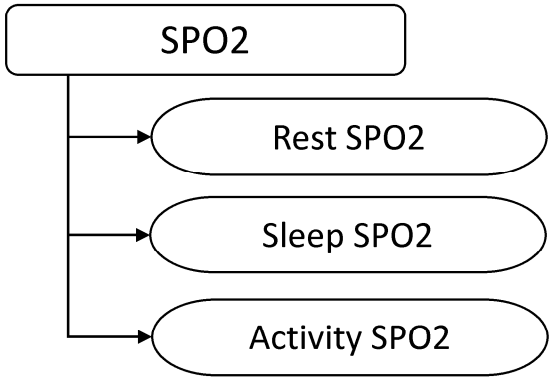


FIG. 8

Univariate Analysis - continued

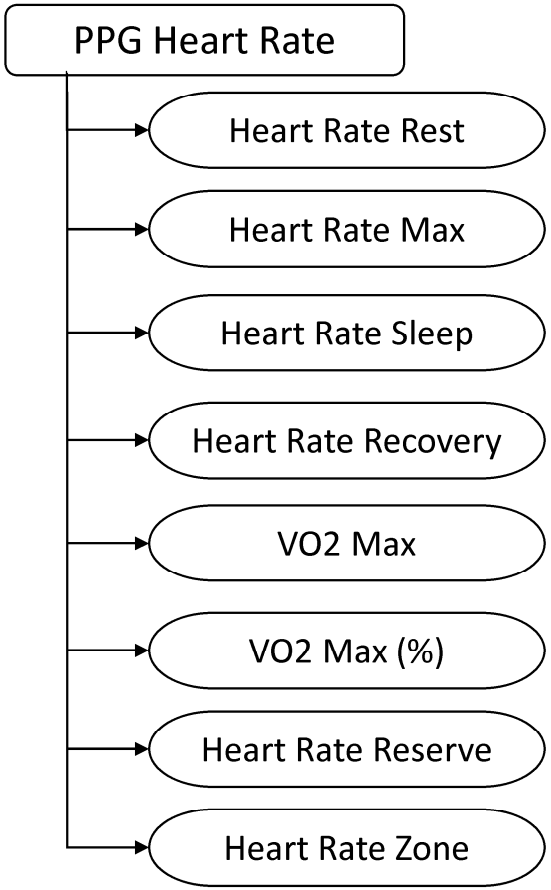


FIG. 9

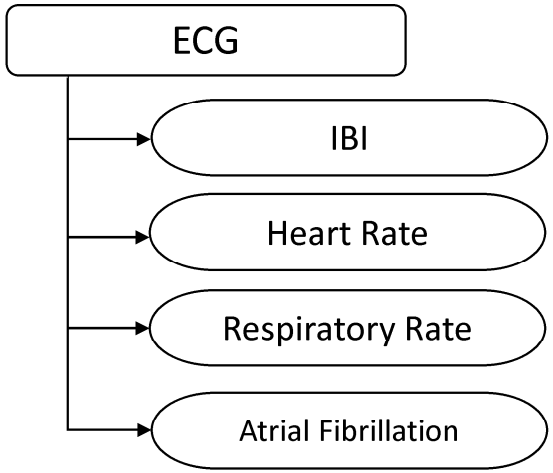


FIG. 10

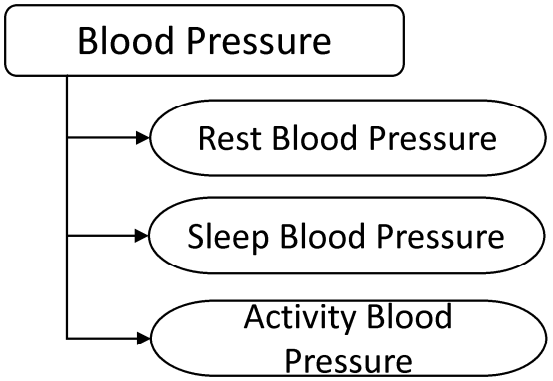


FIG. 11

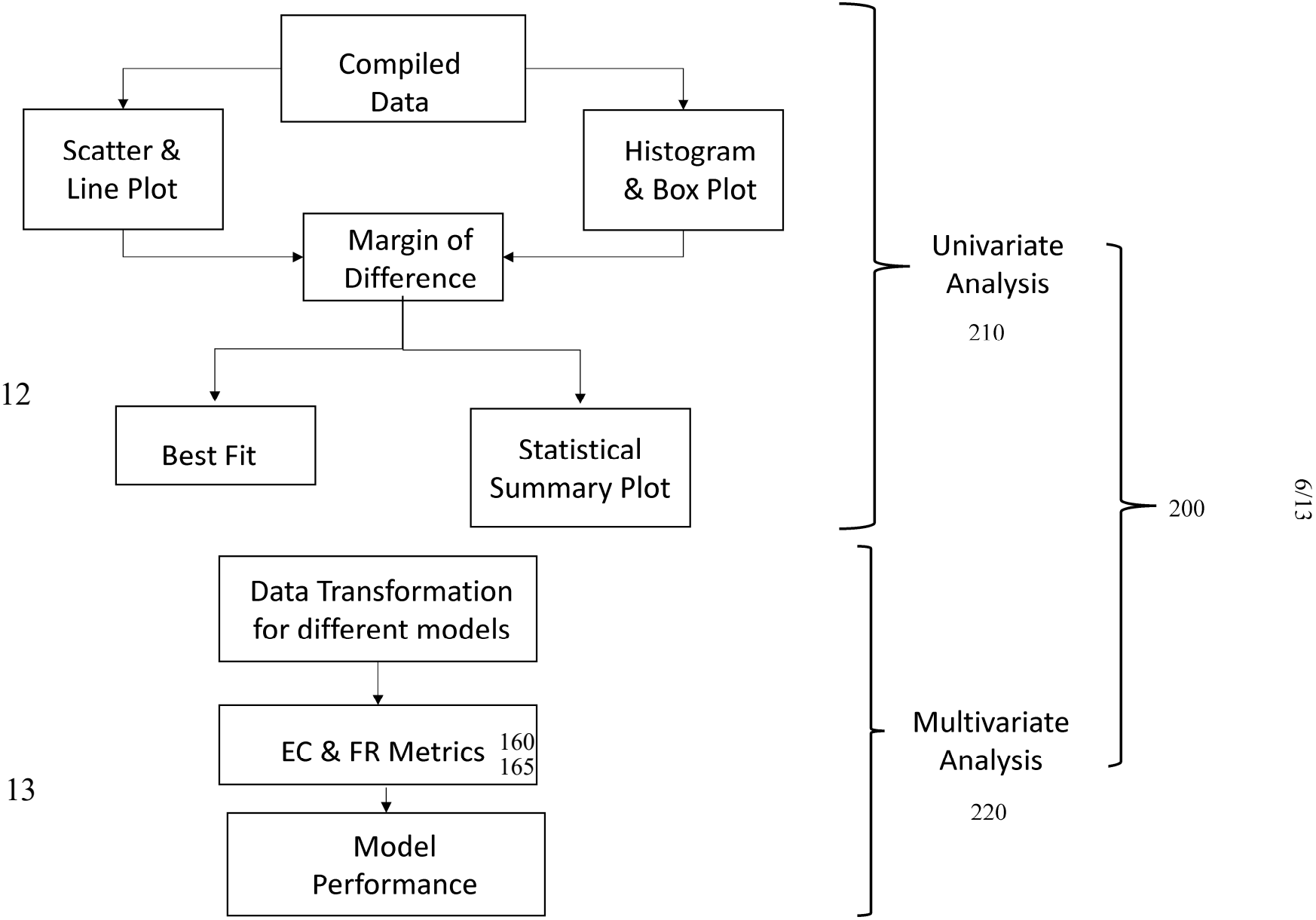

Compiled Data
Scatter & Line Plot
Histogram & Box Plot
Margin of Difference
Best Fit
Statistical Summary Plot
Univariate Analysis
210
Data Transformation for different models
EC & FR Metrics
160
165
Model Performance
Multivariate Analysis
220
200

FIG. 12

FIG. 13

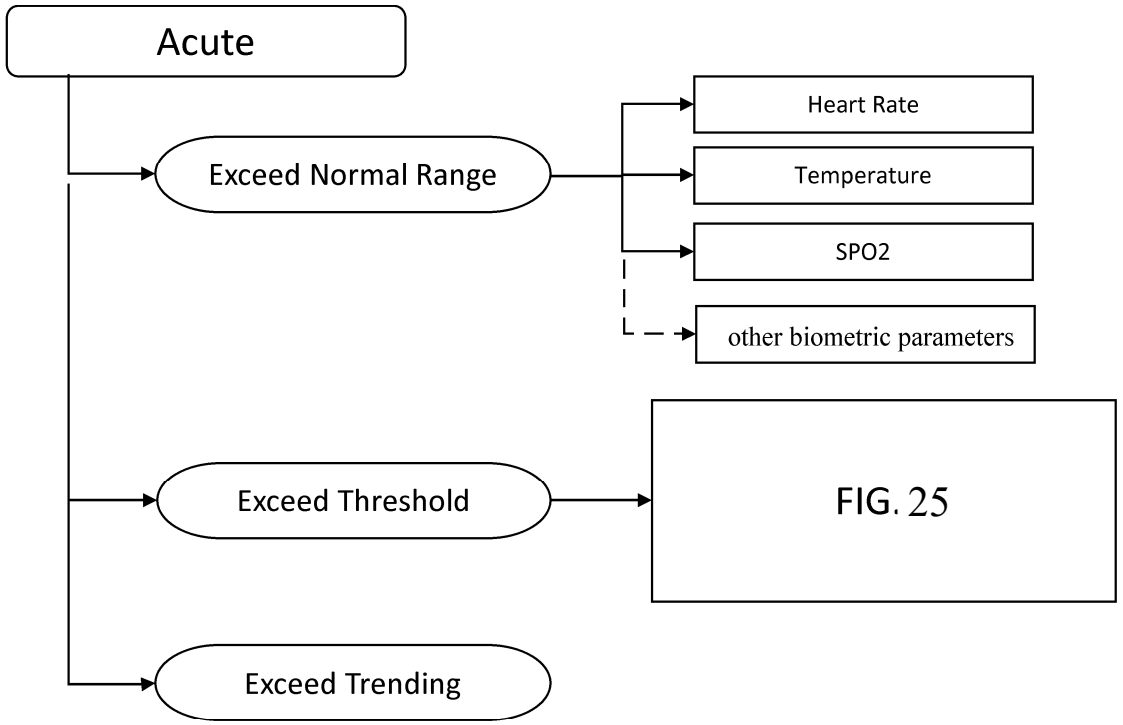

Acute
Exceed Normal Range
Heart Rate
Temperature
SPO2
other biometric parameters
Exceed Threshold
FIG. 25
Exceed Trending

FIG. 14

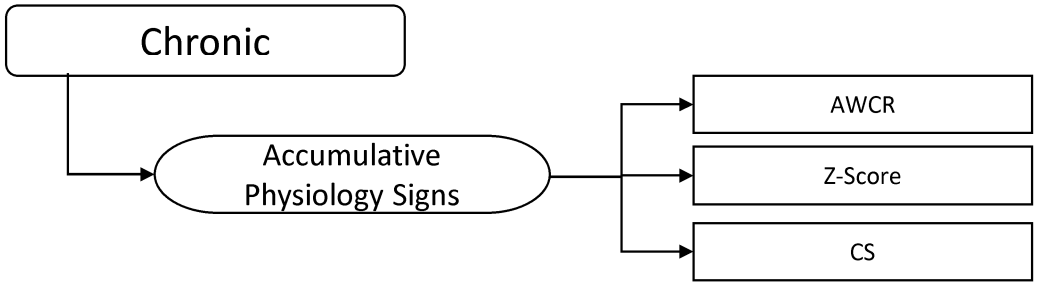

Chronic
Accumulative
Physiology Signs
AWCR
Z-Score
CS

FIG. 15

User 1 Day 1 Activity 1 HR 1

**Only change is day (HR1, HR2...)

**HR1-2 : Best Fit between HR1 & HR2

** Parameter Baseline for x at the activity, with lowest error margin

**CI_HI or CI_LO means Confidence interval High or Low

HR1	CI_HI_HR1	CI_LO_HR1	HR2	HR1-2	CI_HI_HR1-2	CI_LO_HR1-2	HR3	HR1-3	CI_HI_HR1-3	CI_LO_HR1-3	Continuation	HRn	HR1-n	CI_HI_HR1-n	CI_LO_HR1-n
92	105.5712192	96.09544746	94	93	101.5008958	94.83243755	88	91.33333333	99.32664446	94.20668887		88	90.5	100.5452186	96.11311473
96	105.5712192	96.09544746	66	81	101.5008958	94.83243755	94	85.33333333	99.32664446	94.20668887		90	86.5	100.5452186	96.11311473
87	105.5712192	96.09544746	87	87	101.5008958	94.83243755	74	82.66666667	99.32664446	94.20668887		100	87	100.5452186	96.11311473
92	105.5712192	96.09544746	89	90.5	101.5008958	94.83243755	67	82.66666667	99.32664446	94.20668887		115	90.75	100.5452186	96.11311473
91	105.5712192	96.09544746	96	93.5	101.5008958	94.83243755	85	90.66666667	99.32664446	94.20668887		117	97.25	100.5452186	96.11311473
91	105.5712192	96.09544746	105	98	101.5008958	94.83243755	83	93	99.32664446	94.20668887		125	101	100.5452186	96.11311473
96	105.5712192	96.09544746	87	91.5	101.5008958	94.83243755	90	91	99.32664446	94.20668887		132	101.25	100.5452186	96.11311473
133	105.5712192	96.09544746	89	111	101.5008958	94.83243755	92	104.6666667	99.32664446	94.20668887		127	110.25	100.5452186	96.11311473
89	105.5712192	96.09544746	99	94	101.5008958	94.83243755	83	90.33333333	99.32664446	94.20668887		116	96.75	100.5452186	96.11311473
96	105.5712192	96.09544746	122	109	101.5008958	94.83243755	84	100.6666667	99.32664446	94.20668887		135	109.25	100.5452186	96.11311473
86	105.5712192	96.09544746	122	104	101.5008958	94.83243755	95	101	99.32664446	94.20668887		124	106.75	100.5452186	96.11311473
95	105.5712192	96.09544746	130	112.5	101.5008958	94.83243755	90	105	99.32664446	94.20668887		130	111.25	100.5452186	96.11311473
95	105.5712192	96.09544746	122	108.5	101.5008958	94.83243755	84	100.3333333	99.32664446	94.20668887		103	101	100.5452186	96.11311473
92	105.5712192	96.09544746	109	100.5	101.5008958	94.83243755	97	99.33333333	99.32664446	94.20668887		97	98.75	100.5452186	96.11311473
87	105.5712192	96.09544746	127	107	101.5008958	94.83243755	89	101	99.32664446	94.20668887		104	101.75	100.5452186	96.11311473
86	105.5712192	96.09544746	112	99	101.5008958	94.83243755	90	96	99.32664446	94.20668887		122	102.5	100.5452186	96.11311473
86	105.5712192	96.09544746	130	108	101.5008958	94.83243755	77	97.66666667	99.32664446	94.20668887		114	101.75	100.5452186	96.11311473
112	105.5712192	96.09544746	125	118.5	101.5008958	94.83243755	92	109.6666667	99.32664446	94.20668887		120	112.25	100.5452186	96.11311473
125	105.5712192	96.09544746	111	118	101.5008958	94.83243755	94	110	99.32664446	94.20668887		118	112	100.5452186	96.11311473
129	105.5712192	96.09544746	121	125	101.5008958	94.83243755	102	117.3333333	99.32664446	94.20668887		125	119.25	100.5452186	96.11311473
118	105.5712192	96.09544746	105	111.5	101.5008958	94.83243755	91	104.6666667	99.32664446	94.20668887		127	110.25	100.5452186	96.11311473
118	105.5712192	96.09544746	100	109	101.5008958	94.83243755	90	102.6666667	99.32664446	94.20668887		99	101.75	100.5452186	96.11311473
85	105.5712192	96.09544746	109	97	101.5008958	94.83243755	91	95	99.32664446	94.20668887		91	94	100.5452186	96.11311473
106	105.5712192	96.09544746	130	118	101.5008958	94.83243755	92	109.3333333	99.32664446	94.20668887		105	108.25	100.5452186	96.11311473
105	105.5712192	96.09544746	121	113	101.5008958	94.83243755	97	107.6666667	99.32664446	94.20668887		88	102.75	100.5452186	96.11311473
127	105.5712192	96.09544746	113	120	101.5008958	94.83243755	90	110	99.32664446	94.20668887		88	104.5	100.5452186	96.11311473
118	105.5712192	96.09544746	93	105.5	101.5008958	94.83243755	94	101.6666667	99.32664446	94.20668887		93	99.5	100.5452186	96.11311473
84	105.5712192	96.09544746	106	95	101.5008958	94.83243755	97	95.66666667	99.32664446	94.20668887		87	93.5	100.5452186	96.11311473
93	105.5712192	96.09544746	90	91.5	101.5008958	94.83243755	72	85	99.32664446	94.20668887		89	86	100.5452186	96.11311473
88	105.5712192	96.09544746	90	89	101.5008958	94.83243755	95	91	99.32664446	94.20668887		84	89.25	100.5452186	96.11311473
87	105.5712192	96.09544746	89	88	101.5008958	94.83243755	88	88	99.32664446	94.20668887		108	93	100.5452186	96.11311473
85	105.5712192	96.09544746	84	84.5	101.5008958	94.83243755	97	88.66666667	99.32664446	94.20668887		123	97.25	100.5452186	96.11311473
91	105.5712192	96.09544746	84	87.5	101.5008958	94.83243755	80	85	99.32664446	94.20668887		131	96.5	100.5452186	96.11311473
68	105.5712192	96.09544746	88	78	101.5008958	94.83243755	75	77	99.32664446	94.20668887		116	86.75	100.5452186	96.11311473
71	105.5712192	96.09544746	88	79.5	101.5008958	94.83243755	76	78.33333333	99.32664446	94.20668887		129	91	100.5452186	96.11311473
83	105.5712192	96.09544746	90	86.5	101.5008958	94.83243755	85	86	99.32664446	94.20668887		131	97.25	100.5452186	96.11311473
87	105.5712192	96.09544746	89	88	101.5008958	94.83243755	83	86.33333333	99.32664446	94.20668887		127	96.5	100.5452186	96.11311473
125	105.5712192	96.09544746	83	104	101.5008958	94.83243755	85	97.66666667	99.32664446	94.20668887		119	103	100.5452186	96.11311473
129	105.5712192	96.09544746	96	112.5	101.5008958	94.83243755	80	101.6666667	99.32664446	94.20668887		128	108.25	100.5452186	96.11311473
119	105.5712192	96.09544746	96	107.5	101.5008958	94.83243755	79	98	99.32664446	94.20668887		101	98.75	100.5452186	96.11311473
108	105.5712192	96.09544746	86	97	101.5008958	94.83243755	85	93	99.32664446	94.20668887		96	93.75	100.5452186	96.11311473
125	105.5712192	96.09544746	90	107.5	101.5008958	94.83243755	90	101.6666667	99.32664446	94.20668887		94	99.75	100.5452186	96.11311473
126	105.5712192	96.09544746	84	105	101.5008958	94.83243755	99	103	99.32664446	94.20668887		96	101.25	100.5452186	96.11311473
129	105.5712192	96.09544746	88	108.5	101.5008958	94.83243755	107	108	99.32664446	94.20668887		92	104	100.5452186	96.11311473
112	105.5712192	96.09544746	86	99	101.5008958	94.83243755	129	109	99.32664446	94.20668887		100	106.75	100.5452186	96.11311473
116	105.5712192	96.09544746	90	103	101.5008958	94.83243755	101	102.3333333	99.32664446	94.20668887		92	99.75	100.5452186	96.11311473
134	105.5712192	96.09544746	85	109.5	101.5008958	94.83243755	110	109.6666667	99.32664446	94.20668887		90	104.75	100.5452186	96.11311473
132	105.5712192	96.09544746	88	110	101.5008958	94.83243755	95	105	99.32664446	94.20668887		90	101.25	100.5452186	96.11311473
112	105.5712192	96.09544746	84	98	101.5008958	94.83243755	137	111	99.32664446	94.20668887		86	104.75	100.5452186	96.11311473
113	105.5712192	96.09544746	69	91	101.5008958	94.83243755	109	97	99.32664446	94.20668887		69	90	100.5452186	96.11311473
126	105.5712192	96.09544746	86	106	101.5008958	94.83243755	107	106.3333333	99.32664446	94.20668887		70	97.25	100.5452186	96.11311473
70	105.5712192	96.09544746	92	81	101.5008958	94.83243755	87	83	99.32664446	94.20668887		80	82.25	100.5452186	96.11311473
72	105.5712192	96.09544746	65	68.5	101.5008958	94.83243755	84	73.66666667	99.32664446	94.20668887		77	74.5	100.5452186	96.11311473
78	105.5712192	96.09544746	72	75	101.5008958	94.83243755	144	98	99.32664446	94.20668887		68	90.5	100.5452186	96.11311473
89	105.5712192	96.09544746	65	77	101.5008958	94.83243755	143	99	99.32664446	94.20668887		70	91.75	100.5452186	96.11311473
90	105.5712192	96.09544746	86	88	101.5008958	94.83243755	134	103.3333333	99.32664446	94.20668887		81	97.75	100.5452186	96.11311473
96	105.5712192	96.09544746	91	93.5	101.5008958	94.83243755	125	104	99.32664446	94.20668887		94	101.5	100.5452186	96.11311473
107	105.5712192	96.09544746	88	97.5	101.5008958	94.83243755	87	94	99.32664446	94.20668887		89	92.75	100.5452186	96.11311473
84	105.5712192	96.09544746	72	78	101.5008958	94.83243755	87	81	99.32664446	94.20668887		91	83.5	100.5452186	96.11311473
88	105.5712192	96.09544746	76	82	101.5008958	94.83243755	91	85	99.32664446	94.20668887		90	86.25	100.5452186	96.11311473

FIG. 16

Optimsed with least percentage error: with CI Values or HR1 & HR2 values
Most optimised will be baseline
29!

HR (Best Fit/Box Plot)	Margin of difference
HR1	Nil
HR1,1-2	29.63%
HR1, 1-3	45.97%
HR1-2,1-3	23.22%
HR1,1-4	53.23%
HR1-2,1-4	33.54%
Continuation	
HR1-(n-1),1-n	13.43%

FIG. 17

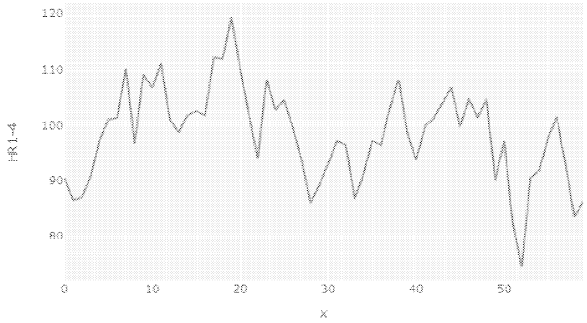


FIG. 18

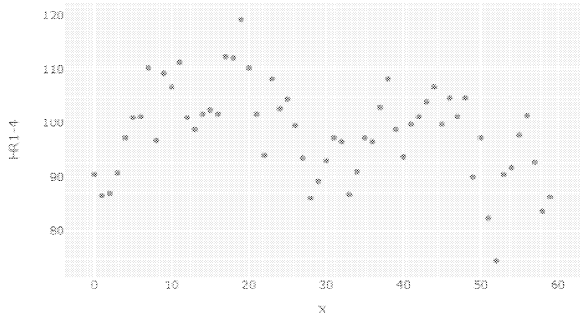


FIG. 19

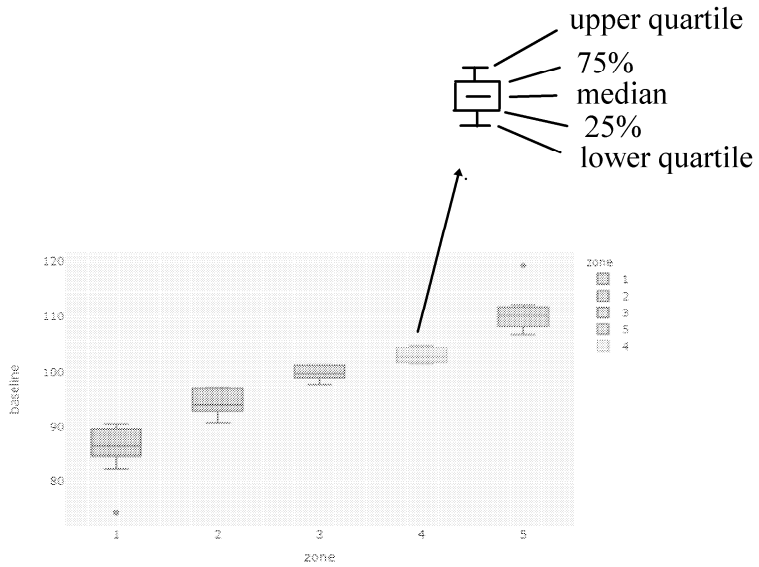


FIG. 20

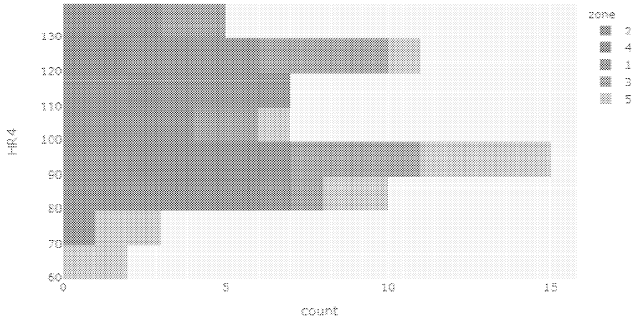


FIG. 21

Zone	Statistics	HR Baseline	95% Confident Interval		SkinTemp Baseline	95% Confident Interval		Spo2 Baseline
1	Max	90.5	..	..	28.65	..	..	..
	Upper quartile	89.625	..	..	28.625	..	..	..
	median	86.625	..	..	28.6	..	..	97.5
	Lower Quartile	84.75	..	..	28.4875	..	..	97.25
	Min	74.5	..	..	28.35	..	..	..
2	Max	97.25	..	..	28.825	..	..	..
	Upper quartile	97.125	..	..	28.825	..	..	..
	median	94	..	..	28.8	..	..	..
	Lower Quartile	92.8125	..	..	28.71875	..	..	..
	Min	90.75	..	..	28.675	..	..	..
3	Max	101.25	..	..	..	..	..	..
	Upper quartile	101.1875	..	..	28.925	..	..	..
	median	99.75	..	..	28.9	..	..	98.25
	Lower Quartile	98.9375	..	..	28.875	..	..	98
	Min	97.75	..	..	28.85	..	..	..
4	Max	104.75	..	..	..	..	..	..
	Upper quartile	104.375	..	..	29	..	..	98.75
	median	102.75	..	..	28.975	..	..	98.5
	Lower Quartile	101.75	..	..	28.95	..	..	..
	Min	101.5	..	..	..	..	..	..
5	Max	119.25	..	..	29.2	..	..	..
	Upper quartile	111.8125	..	..	29.1375	..	..	..
	median	110.25	..	..	29.0625	..	..	..
	Lower Quartile	108.25	..	..	29.025	..	..	..
	Min	106.75	..	..	29.025	..	..	..

FIG. 22

95% Confident Interval		BP Baseline	IBI Baseline	RR Baseline	Calories Baseline	HRV Baseline
..	..	..	..	..	..	..
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FIG. 23

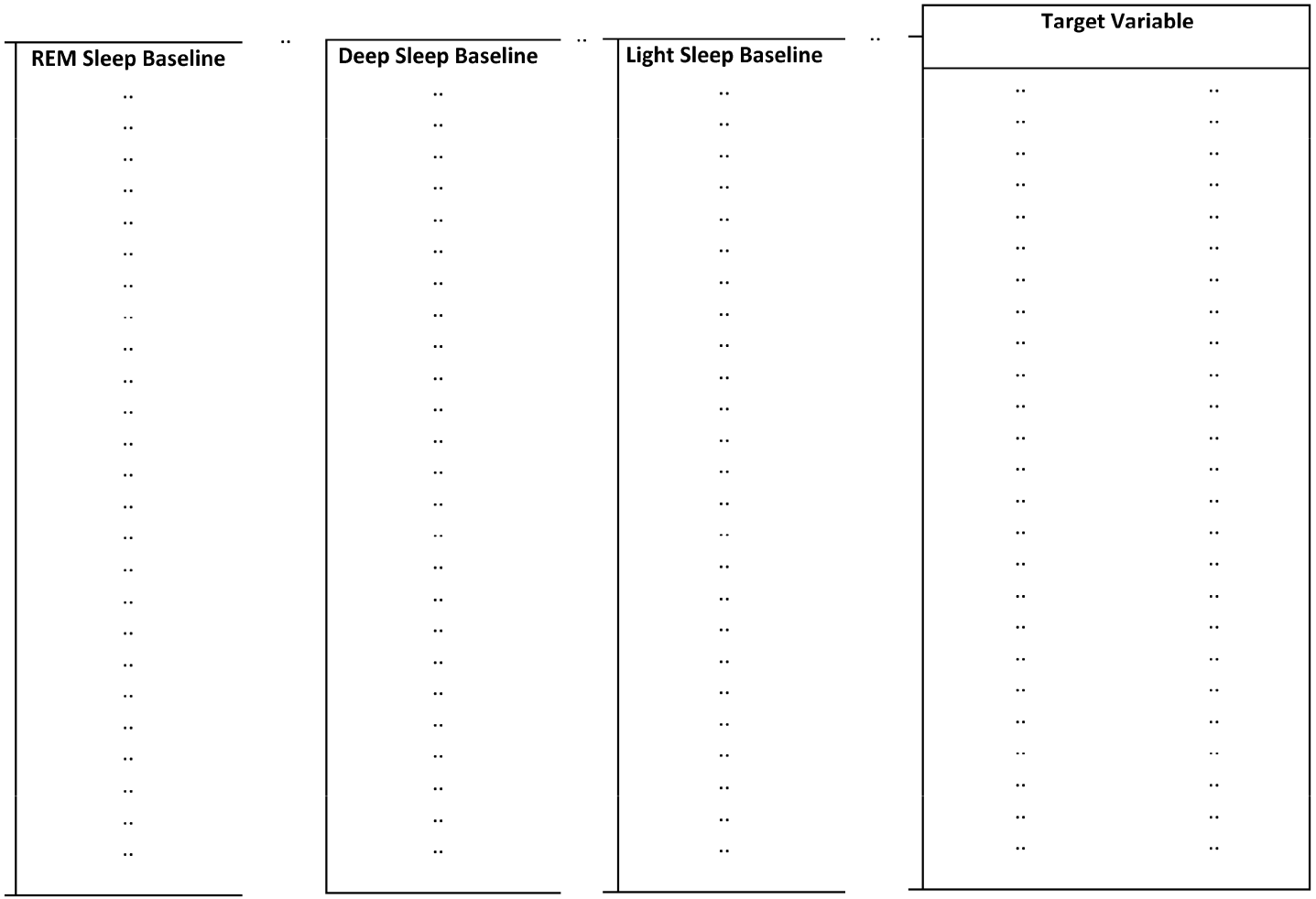

REM Sleep Baseline
Deep Sleep Baseline
Light Sleep Baseline
Target Variable

FIG. 24

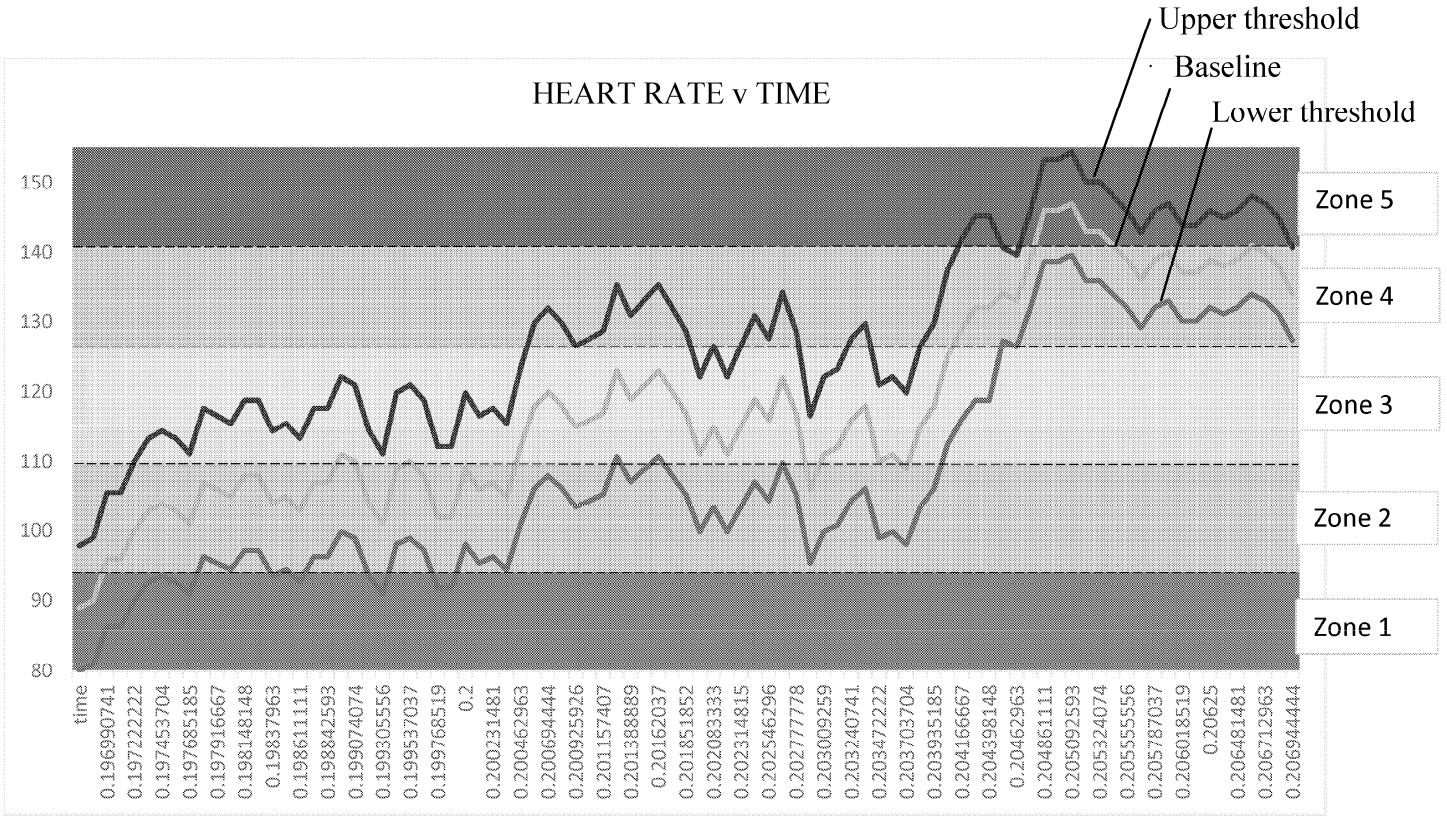

HEART RATE v TIME
Upper threshold
Baseline
Lower threshold
Zone 5
Zone 4
Zone 3
Zone 2
Zone 1
150
140
130
120
110
100
90
80
time
0.196990741
0.197222222
0.197453704
0.197685185
0.197916667
0.198148148
0.19837963
0.198611111
0.198842593
0.199074074
0.199305556
0.199537037
0.199768519
0.2
0.200231481
0.200462963
0.200694444
0.200925926
0.201157407
0.201388889
0.20162037
0.201851852
0.202083333
0.202314815
0.202546296
0.202777778
0.203009259
0.203240741
0.203472222
0.203703704
0.203935185
0.204166667
0.204398148
0.20462963
0.204861111
0.205092593
0.205324074
0.205555556
0.205787037
0.206018519
0.20625
0.206481481
0.206712963
0.206944444

FIG. 25