Supplementary Material 1:

Robust Feature Selection for Continuous BP Estimation in Multiple Populations: Towards Cuffless Ambulatory BP Monitoring

Ana Cisnal, *Student Member, IEEE*, Yanke Li, Bertram Fuchs, Mehdi Ejtehadi, Robert Riener, *Senior Member, IEEE*, and Diego Paez-Granados[†], *Member, IEEE*

Feature Space from PPG signals

The generated features can be divided into four main groups: time domain (TF), frequency-based (FF), statistical (SF), and demographic features (DF)

1) Time-domain Features (TF)

The proposed time-domain features can be divided into six subcategories regarding intensity, time, area, slope, branch width, and others. Several of these features are computed using one or two fiducial points. The fiducial points include the onset (O), valley (V), systolic peak (S), maximum derivative point (MD), diastolic peak (D), inflection point (IP), dicrotic notch (DN), point a, point b, and intersection point (IT).

Abbreviation	Name	Definition		
	I - Intensity-based features			
i_{x1}	Intensity	Absolute Intensity or amplitude of point x1		
i _{x1-x2}	Relative intensity	Relative intensity or amplitude between point x1 and x2 $I_{X1-X2}=I_{x1}-I_{x2}$		
ir _{X1-X2}	Intensity ratio	Intensity ratio of points x1 and x2 $RI_{X1-X2}=I_{x1}/I_{x2}$		
ni_X	Normalized intensity	Normalized intensity within the range of 0 to 1		
ni_{X1-X2}	Relative normalized intensity	Relative normalized intensity of amplitude between point x1 and x2 $ni_{X1-X2}=ni_{X1-}$ ni_{X2}		
id_{x1}	Intensity of the first derivative	Absolute intensity or amplitude of the first derivative at point x1.		
id _{x1-x2}	Relative intensity of the first derivative	Relative intensity or amplitude between point x1 and x2 in the first derivative		
id2 _{x1}	Intensity of the second derivative	Absolute intensity or amplitude of the second derivative at point x1.		
ird2x1-x2	Relative intensity of the second derivative	Relative intensity or amplitude between point x1 and x2 in the first derivative		
Im	Mean intensity	Mean intensity of the waveform		
mean_irx1	Mean intensity ratio	Mean intensity ratio when dividing the waveform into two segments at point x1.		
		T - Time-based features		
t_{x1}	Relative time	Time between key-point x1 and v Note that t _{v1} is the total duration of the pulse waveform		
t _{x1-x2}	Time difference	Time difference between points x1 and x2 $t_{x1-x2} = t_{x1} - t_{x2}$		

Normalized time Interval I			NY 12 1.2 C . 4 4
trs_is_2 Time ratio between points Time ratio between points Time ratio Time ratio between points Time ratio differences Time ratio between points Time ratio between points Time ratio between points Time ratio between points Time ratio defined points Time ratio between points Time ratio points, time ratio between points Time ratio points, time ratio between points time ratio between	tn_{x1}	NT 1: 1.:	Normalized time from the onset to the x1 point with respect to the total
trs.+22		Normalized time	<u> </u>
Time ratio to x2. tra_1+2			
tra_st_22 Area Area Related features A_st_22 Area Area Area Related features A_st_23 Area Area Area Related features ART_st_32 Area Area Area under the curve defined by points x ₁ and x ₂ Total area ratio between S and D. Ratio of the area under the curve between S, and D. Ratio of the area under the curve between S, and D. Ratio of the area under the pulse waveform. ART_st_32 = A_st_3 A_sc_3 ARS_ Ratio of areas Break the area under PPG into two parts based on the key point x, where A ₁ and A ₂ are the areas of the first and second parts. SLP_x1 Slope Slope from v to key-point x1 SLP_x1 = (A_st_1-V_1) / ts_1 SLP_x1 = (A_st_1	tr_{x1-x2}		
Normalized time ratio between points ratio Interlegal elaboration Total area and To		Time ratio	
A - A - A - A - A - A - A - A - A - A	$\operatorname{trn}_{x1-x2}$		<u> </u>
Area Area under the curve defined by points x, and x2 Total area ratio Total area ratio between S and D. Ratio of the area under the curve between x, and x2 to the total area under the pulse waveform. ARS_4		ratio	
Total area ratio between S and D. Ratio of the area under the curve between X ₁ and X ₂ to the total area under the pulse waveform.			
Total area ratio between x ₁ and x ₂ to the total area under the pulse waveform. ART _{x1,x2} = A _{x1,x2} /A _{x-x1}	A_{x1-x2}	Area	
ART_1/32 = Ax1-x/Ax-v1	ART_{x1-x2}		
Break the area under PPG into two parts based on the key point x, where A ₁ and A ₂ are the areas of the first and second parts. RA= A _{V-x} / A _{x-1}		Total area ratio	=
Ratio of areas A1 and A2 are the areas of the first and second parts.			$ART_{x1-x2} = A_{x1-x2}/A_{v-v1}$
SLPxi	ARs_x		Break the area under PPG into two parts based on the key point x, where
SLP _{x1}		Ratio of areas	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			
Slope SLP _{X1} = (I _{X1} -I _V) / I _{X1}			SLP - Slope
SLP _{X1-In} Normalized slope Slope from v to key-point x1 nSLP _{X1} = (I _{x1} -I _v) / I _{x1}	SLP_{X1}	Slope	Slope from v to key-point x1
Normanized stope nSLPx1 = (Lx1-lv) / tnx1		Slope	
BW- Branch-width related features x = 10%, 25%, 33%, 50%, 66%, 75% and 90% SBWx	SLP_{x1-n}	Normalizad alana	Slope from v to key-point x1
SBW, Systolic Branch Width DBWx Diastolic Branch Width BWx Branch Width Branch Width Branch width at x% of the pulse height of PPG BWx SBWx+DBWx DO - Others COT Autocorrelation Centroid Centroid Minimum peaks Maximum peaks Number of local minima of the signal Mean absolute differences Mean of differences of the signal Median absolute differences of the signal Median absolute differences of the signal Median of differences Median of differences of the signal Absolute energy of the signal Absolute energy of the signal		Normanzed stope	$nSLP_{X1} = (I_{x1}-I_{V}) / tn_{x1}$
SBWx Width DBWx Diastolic Branch Width BWx Branch Width Branch Width Branch Width Ratio Branch Width Art % of the pulse height of PPG BWx = SBWx + DBWx Branch Width at x% of the pulse height of PPG BWR = DBWx/SBWx O - Others O- Other			BW - Branch-width related features
DBWx Diastolic Branch Width BWx Branch Width BWRx Branch Width Branch width at x% of the pulse height of PPG BWx SBWx+DBWx BWRx Branch Width Branch width at at x% of the pulse height of PPG BWx SBWx+DBWx BWx DFWx/SBWx O Others Corr Autocorrelation Centroid Centroid Minimum peaks Number of local minima of the signal max_p Maximum peaks Number of local maxima of the signal Mean absolute differences Mean absolute differences of the signal mean_diff Median of differences Median absolute differences of the signal med_diff Distance Signal traveled distance using the hypotenuse between 2 points sadif Sum of absolute differences of the signal Zero cross First Derivative Number of times that the first derivative cross zero Number of times that the second derivative cross zero Total energy Slope Slope of the signal Absolute energy of the signal Entropy Entropy calculated by KDE (Kernel Density Estimate))		$\mathbf{x} = 10$	9%, 25%, 33%, 50%, 66%, 75% and 90%
Diastolic Branch Width Width	SBW_x	Systolic Branch	Systolic branch width at x% of pulse height of PPG
BWx Branch Width Branch Width Branch Width Branch width at x% of the pulse height of PPG BWx = SBWx + DBWx BWRx Branch Width Ratio Branch width at x% of the pulse height of PPG BWx = DBWx/SBWx		Width	
BWx Branch Width Branch width at x% of the pulse height of PPG BWx=SBWx+DBWx Branch Width Ratio Branch width ratio at x% of the pulse height of PPG BWx = DBWx/SBWx O Others Corr Autocorrelation Centroid Centroid Minimum peaks Mumber of local minima of the signal Mean absolute differences Mean of differences Mean of differences Median absolute differences Median absolute differences Median of differences Of the signal Median of differences Median of differences Of the signal Median of differences Of the signal Median of differences Of the signal Median of Distance Signal traveled distance using the hypotenuse between 2 points Sum of absolute differences of the signal Derivative Number of times that the first derivative cross zero Total Cero cross Third Derivative Number of times that the second derivative cross zero Number of times that the third derivative cross zero Slope Slope of the signal Absolute energy of the signal Entropy Entropy calculated by KDE (Kernel Density Estimate))	DBW_X	Diastolic Branch	Diastolic branch width at x% of pulse height of PPG
BWRx Branch Width Branch width ratio at x% of the pulse height of PPG BWRx DBWRx DBWRx/SBWx		Width	
BWRx Branch Width Branch width ratio at x% of the pulse height of PPG BWRx DBWRx DBWRx/SBWx	BW_x	D	Branch width at x% of the pulse height of PPG
BWRx Branch Width Ratio Branch width ratio at x% of the pulse height of PPG BWRx = DBWx/SBWx COT Autocorrelation Autocorrelation centr Centroid Centroid min_p Minimum peaks Number of local minima of the signal max_p Maximum peaks Number of local maxima of the signal mean_abs_diff Mean absolute differences Mean absolute differences of the signal mean_diff Median of differences Median absolute differences of the signal med_diff Median of differences Median of differences of the signal med_diff Sum of absolute differences of the signal med_diff Sum of differences Sum of differences of the signal		Branch Width	
Ratio BWR _x = DBW _x /SBW _x O - Others Corr Autocorrelation Centroid Centroid min_p Minimum peaks Number of local minima of the signal max_p Maximum peaks Number of local maxima of the signal mean_abs_diff differences Mean absolute differences of the signal mean_diff Median of differences Median absolute differences of the signal med_diff differences Median of differences of the signal med_diff differences Median of differences of the signal med_diff Distance Signal traveled distance using the hypotenuse between 2 points sadif Sum of absolute differences of the signal zc1d Zero cross First Derivative Number of times that the first derivative cross zero zc2d Second Derivative Number of times that the second derivative cross zero zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	BWR _x	Branch Width	
corr Autocorrelation Autocorrelation centr Centroid Centroid min_p Minimum peaks max_p Maximum peaks Number of local minima of the signal mean_abs_diff Mean absolute differences Mean absolute differences of the signal meal_diff Median absolute differences Median absolute differences of the signal med_diff Median of differences Median of differences of the signal med_diff Median of differences Median of differences of the signal med_diff Distance Signal traveled distance using the hypotenuse between 2 points sadif Sum of absolute differences of the signal Zero cross First Derivative Number of times that the first derivative cross zero zc2d Second Derivative Number of times that the second derivative cross zero total_ene Slope Slope Slope of the signal Absolute energy of the signal Absolute energy of the signal Entropy calculated by KDE (Kernel Density Estimate))		Ratio	· •
centr Centroid Minimum peaks Mumber of local minima of the signal Maximum peaks Mean absolute differences Mean absolute differences Mean absolute differences Mean of differences Median absolute differences Median absolute differences Median absolute differences Median absolute differences Median of differences of the signal Median of differences Sum of absolute differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences of the signal Median of differences Median of differences Median of differences Median of differences of the signal Median of differences Median of difference			
min_p Minimum peaks max_p Maximum peaks mean_abs_diff mean_abs_diff mean_diff mean_diff mean_diff med_abs_diff med_abs_diff med_differences med_abs_diff med_differences med_diff med_differences med_diff med_differences of the signal med_diff med_differences of the signal med_diff m	corr	Autocorrelation	Autocorrelation
max_p Maximum peaks Mean absolute differences Mean absolute differences Mean absolute differences of the signal mean_diff Mean of differences Mean of differences of the signal med_abs_diff Median absolute differences of the signal med_abs_diff Median absolute differences of the signal med_diff Median of differences Median of differences of the signal dist Distance Signal traveled distance using the hypotenuse between 2 points sadif Sum of absolute differences of the signal zc1d Zero cross First Derivative Number of times that the first derivative cross zero zc2d Zero cross Third Derivative Number of times that the second derivative cross zero zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope Slope of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	centr	Centroid	Centroid
max_p Maximum peaks Mean absolute differences Mean absolute differences Mean absolute differences of the signal mean_diff Mean of differences Mean of differences of the signal med_abs_diff Median absolute differences of the signal med_abs_diff Median absolute differences of the signal med_diff Median of differences Median of differences of the signal dist Distance Signal traveled distance using the hypotenuse between 2 points sadif Sum of absolute differences of the signal zc1d Zero cross First Derivative Number of times that the first derivative cross zero zc2d Zero cross Third Derivative Number of times that the second derivative cross zero zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope Slope of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	min p	Minimum peaks	Number of local minima of the signal
mean_abs_diff mean_diff mean_diff mean_diff mean_diff med_abs_diff med_abs_diff med_differences Median absolute differences of the signal med_diff med_diff med_diff med_diff med_diff Distance Signal traveled distance using the hypotenuse between 2 points Sum of absolute differences of the signal Sum of absolute differences of the signal Zero cross First Derivative Zero cross Zero cross Zero cross Second Derivative Number of times that the first derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Slope Slope Slope Slope of the signal Mean absolute differences of the signal Median absolute differences of the signal Number of times that the first derivative cross zero Number of times that the first derivative cross zero total_ene Total energy Slope Slope of the signal Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			ĕ
mean_abs_diff mean_diff mean_diff mean_diff mean_diff mean_diff med_abs_diff med_abs_diff med_differences med_abs_diff med_differences med_differences med_differences med_diff med_dif	•		Ç
mean_diffMean of differencesMean of differences of the signalmed_abs_diffMedian absolute differencesMedian absolute differences of the signalmed_diffMedian of differencesMedian of differences of the signaldistDistanceSignal traveled distance using the hypotenuse between 2 pointssadifSum of absolute differencesSum of absolute differences of the signalzc1dZero cross First DerivativeNumber of times that the first derivative cross zerozc2dSecond DerivativeNumber of times that the second derivative cross zerozc3dZero cross Third DerivativeNumber of times that the third derivative cross zerototal_eneTotal energyTotal energyslopeSlopeSlope of the signalabs_eneAbsolute energyAbsolute energy of the signalent_kdeEntropyEntropy calculated by KDE (Kernel Density Estimate))	mean_abs_diff		Mean absolute differences of the signal
mean_diff differences Mean of differences of the signal med_abs_diff Median absolute differences Median absolute differences of the signal med_diff Median of differences Median of differences of the signal med_diff Distance Signal traveled distance using the hypotenuse between 2 points sadif Sum of absolute differences of the signal zcld Zero cross First Derivative Number of times that the first derivative cross zero zc2d Second Derivative Number of times that the second derivative cross zero zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope of the signal abs_ene Absolute energy Entropy calculated by KDE (Kernel Density Estimate))			
med_abs_diffMedian absolute differencesMedian absolute differences of the signalmed_diffMedian of differencesMedian of differences of the signaldistDistanceSignal traveled distance using the hypotenuse between 2 pointssadifSum of absolute differencesSum of absolute differences of the signalzc1dZero cross First DerivativeNumber of times that the first derivative cross zerozc2dSecond DerivativeNumber of times that the second derivative cross zerozc3dZero cross Third DerivativeNumber of times that the third derivative cross zerototal_eneTotal energyTotal energyslopeSlopeSlope of the signalabs_eneAbsolute energyAbsolute energy of the signalent_kdeEntropyEntropy calculated by KDE (Kernel Density Estimate))	mean_diff		Mean of differences of the signal
med_abs_diff med_diff med_diff med_diff differences Median absolute differences of the signal Median of differences of the signal Distance Signal traveled distance using the hypotenuse between 2 points Sum of absolute differences of the signal Zero cross First Derivative Number of times that the first derivative cross zero Zero cross Third Derivative Number of times that the second derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Slope Slope Slope Slope of the signal Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			The state of the signal
med_diffMedian of differencesMedian of differences of the signaldistDistanceSignal traveled distance using the hypotenuse between 2 pointssadifSum of absolute differencesSum of absolute differences of the signalzc1dZero cross First DerivativeNumber of times that the first derivative cross zerozc2dSecond DerivativeNumber of times that the second derivative cross zerozc3dZero cross Third DerivativeNumber of times that the third derivative cross zerototal_eneTotal energyTotal energyslopeSlopeSlope of the signalabs_eneAbsolute energyAbsolute energy of the signalent_kdeEntropyEntropy calculated by KDE (Kernel Density Estimate))	med_abs_diff		Median absolute differences of the signal
dist Distance Signal traveled distance using the hypotenuse between 2 points Sum of absolute differences Sum of absolute differences of the signal Zero cross First Derivative Number of times that the first derivative cross zero Zero cross Second Derivative Number of times that the second derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero Sope Slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			The state of the signal
dist Distance Signal traveled distance using the hypotenuse between 2 points Sum of absolute differences Sum of absolute differences of the signal zc1d Zero cross First Derivative Number of times that the first derivative cross zero Zero cross Second Derivative Number of times that the second derivative cross zero zc2d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	med_diff		Median of differences of the signal
Sum of absolute differences	dist		
differences Sum of absolute differences of the signal Zero cross First Derivative Number of times that the first derivative cross zero Zero cross Second Derivative Number of times that the second derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero Total_ene Total energy Total energy Slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	dist		Signal traveled distance using the hypotenuse between 2 points
Zero cross First Derivative Zero cross Zero cross Zero cross Zecond Derivative Number of times that the first derivative cross zero Zero cross Zero cross Third Derivative Number of times that the second derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero Total energy Slope Slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	sadif		Sum of absolute differences of the signal
Derivative Number of times that the first derivative cross zero Zero cross zc2d Second Derivative Number of times that the second derivative cross zero zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			Sum of absolute unforchees of the signal
Zero cross Second Derivative Number of times that the second derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero Total_ene Total energy Slope Slope Slope Slope Slope of the signal abs_ene Absolute energy Entropy calculated by KDE (Kernel Density Estimate))	zc1d		Number of times that the first derivative cross zero
zc2d Second Derivative Number of times that the second derivative cross zero zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			runioer of times that the first derivative cross Zero
Derivative Number of times that the second derivative cross zero Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	7c2d		
zc3d Zero cross Third Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	zczu		Number of times that the second derivative cross zero
Derivative Number of times that the third derivative cross zero total_ene Total energy Total energy slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			rvamoer of times that the second derivative cross zero
total_ene Total energy Total energy slope Slope Slope of the signal abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	zc3d		Number of times that the third desiretion are a
slope Slope of the signal abs_ene Absolute energy ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	4-4-1		
abs_ene Absolute energy Absolute energy of the signal ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))			
ent_kde Entropy Entropy calculated by KDE (Kernel Density Estimate))	•	•	
	_		
ent_gauss Entropy Entropy calculated by Gauus			
	ent_gauss	Entropy	Entropy calculated by Gauus

coef _x	Polynomial	The coefficients of a 15th-order polynomial are employed to accurately
COEIX	coefficient x	fit the PPG pulse waveform.
RI or AI	Reflexion index	$RI = I_{IP}/I_{S}$
LASI	Large Artery	LASI = $h/\Delta T_{S-I}$, where H is the height of the subject (H \approx 1).
LASI	Stiffness Index	
mNPV	Normalized Pulse	mNPV= I_{ac} / (I_{ac} + I_{dc}), where I_{ac} is the peak-to-peak amplitude and I_{dc} is
IIINPV	Volume	the average of the pulse
PPGK	characteristic	$PPGK = (I_m - I_v)/(I_s - I_v)$
	value or K value	respect to the baseline

2) Frequency-based features (FT)

These features were derived from the beat-to-beat PPG pulse waveforms and PPG segments, which were constructed exclusively using validated PPG pulses (i.e., removing invalid pulses from the original 30-second segment during the signal processing). Features labeled with an asterisk (*) denote extraction from PPG segments, whereas those without an asterisk were derived from pulse waveforms.

Ab	Code Name	Name	Definition
		Relative	Ratio between two frequency bands. The frequency
		power	bandwidth for the ratios' numerator is from 1 to 2.25 Hz
fsqi	fsqi	power	and ratios' denominator is from 0 to 8 Hz
		Relative	Ratio between two frequency bands. The frequency
		power at the	bandwidth for the ratios' numerator is from 0 to frequency
		first	of first harmonic and ratios' denominator is the whole
fsqi1	fsqi1	harmonic	spectrum
		Relative	Ratio between two frequency bands. The frequency
		power at the	bandwidth for the ratios' numerator is from 0 to frequency
		second	of second harmonic and ratios' denominator is the whole
fsqi2	fsqi2	harmonic	spectrum
		Relative	Ratio between two frequency bands. The frequency
		power at the	bandwidth for the ratios' numerator is from 0 to frequency
		third	of third harmonic and ratios' denominator is the whole
fsqi3	fsqi3	harmonic	spectrum
f1		Frequency	
		of the first	Predominant frequency of the signal
	f1	harmonic	
mag_{fl}		Magnitude	
		of the first	
	mag_f1	harmonic	Magnitude of the predominant frequency of the signal
f2		Frequency	
		of the	Frequency of the second harmonic of the signal
		second	requestey of the second narmonic of the signar
	f2	harmonic	
mag_{f2}		Magnitude	
		of the	
		second	
	mag_f2	harmonic	Magnitude of the second harmonic of the signal
f3		Frequency	
		of the third	Frequency of the third harmonic of the signal
	f3	harmonic	
mag_{f3}		Magnitude	
		of the third	
	mag_f3	harmonic	Magnitude of the third harmonic of the signal
Sp. distance	spectral_dista	Spectral	Distance of the signal's cumulative sum of the FFT
	nce	distance	elements to the respective linear regression.
Fundamental	fundamental_	Fundamenta	Predominant frequency of the signal
f	frequency	1 frequency	
Max PS		Maximum	
	max_power_s	power	Maximum value of the power spectrum density
	pectrum	spectrum	

Max f	max_frequen	Maximum frequency	Maximum frequency of the signal.
Med f	median_frequency	Median frequency	Median frequency of the signal.
Sp. centroid	spectral_centr	Spectral centroid	Barycenter of the spectrum
Sp. decrease	spectral_decr ease	Spectral decrease	Represents the amount of decreasing of the spectra amplitude.
Sp. K	spectral_kurt osis	Spectral kurtosis	Measures the flatness of a distribution around its mean value.
Sp. S	spectral_skew ness	Spectral skewness	Measures the asymmetry of a distribution around its mean value.
Sp. spread	spectral_spre ad	Spectral spread	Measures the spread of the spectrum around its mean value.
Sp. SLP	spectral_slop e	Spectral slope	Computes the spectral slope.
Sp. variation	spectral_varia	Spectral variation	Computes the amount of variation of the spectrum along time. Spectral variation is computed from the normalized cross-correlation between two consecutive amplitude spectra.
Sp. Max Peaks	spectral_max peaks	Spectral maxpeaks	Number of maximum spectral peaks of the signal.
Sp. Roll-off	spectral_roll_	Spectral Roll-off	The spectral roll-off corresponds to the frequency where 95% of the signal magnitude is contained below of this value.
Sp. Roll-on	spectral_roll_ on	Spectral Roll-on	The spectral roll-on corresponds to the frequency where 5% of the signal magnitude is contained below of this value.
HRER	human_range _energy	Human range energy ratio	The human range energy ratio is given by the ratio between the energy in frequency 0.6-2.5Hz and the whole energy band.
PW	power_bandw	Power spectrum density bandwidth	It corresponds to the width of the frequency band in which 95% of its power is located.
SE	spectral_entro	Spectral entropy	Computes the spectral entropy of the signal based on Fourier transform.
WE	wavelet_entro	Wavelet entropy	Computes CWT Shannon entropy of the signal.

3) Statistical features (SF)

Ab.	Name/Definition	
s	Skewness	
k	Kurtosis	
mav	Mean Absolute Value	
median	Median	
mad	Mean Absolute Deviation	
med_ad	Median Absolute Deviation	
rms	Root-Mean-Square	
sd	Standard Deviation	
sf	Shape Factor	
if	Impulse Factor	
cf	Crest Factor	

v	Variance
irq	Interquartile range
p	Perfusion

4) Demographic features (DF)

Abbreviation	Name/Definition
age	Age
weight	Weight
bmi	Body Mass Index
baseline_sbp	Systolic Blood Pressure at rest
baseline_dbp	Diastolic Blood pressure at rest