ECGSMART Features

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| **Feature** | **Description** |
| RR interval | Calculated as the difference between consecutive global R peaks in the 10-second recording. The average RR interval was calculated by keeping the longest 50% of the RR intervals and taking the median of them. |
| P area (per lead) | Area between 200 msec before global R peak and local QRS onset |
| QRS area (per lead) | Area between local QRS onset and offset |
| T area (per lead) | Area between local QRS offset and T offset |
| ST-Peak area (per lead) | Area between local QRS offset and T peak |
| P amplitude (per lead) | Maximum amplitude between local P onset and offset |
| QRS amplitude (per lead) | Maximum amplitude between local QRS onset and offset |
| T amplitude (per lead) | Maximum amplitude between local T onset and offset |
| ST amplitude (per lead) | Median amplitude between QRS offset and J+80 |
| T/QRS ratio (per lead) | Ratio between T amplitude and QRS amplitude |
| ST slope (per lead) | Slope from J+20 to J+80 |
| QRS slope (per lead) | Slope from QRS onset to QRS offset |
| Beat-to-beat std dev (per lead) | Get standard deviation for each time point across all beats and then take mean across time points |
| Beat-to-beat std dev QRS (per lead) | ^ From QRS onset to QRS offset |
| Beat-to-beat std dev STT (per lead) | ^ From QRS offset to T offset |
| Q amplitude (per lead) |  |
| Q duration (per lead) |  |
| Q area (per lead) |  |
| R amplitude (per lead) |  |
| R duration (per lead) |  |
| R area (per lead) |  |
| S amplitude (per lead) |  |
| S duration (per lead) |  |
| S area (per lead) |  |
| R’ exists? (per lead) |  |
| S’ exists? (per lead) |  |
| VAT (per lead) | Time from QRS onset to largest amplitude within QRS complex |
| P area (global) |  |
| QRS area (global) |  |
| T area (global) |  |
| P duration (global) |  |
| QRS duration (global) |  |
| T duration (global) |  |
| PR interval (global) |  |
| QT interval (global) |  |
| TpTe (global) | Duration from T peak to T offset |
| ST-Peak area (global) |  |
| ST amplitude (global) |  |
| P amplitude (global) |  |
| QRS amplitude (global) |  |
| T amplitude (global) |  |
| T/QRS ratio (global) |  |
| HR | Heart Rate |
| QTc Bazett |  |
| QTc Fridericia |  |
| JT | Duration from QRS offset to T offset |
| JTc Bazett |  |
| JTc Fridericia |  |
| TpTe/QT ratio |  |
| RMS min |  |
| RMS std dev |  |
| RMS mean |  |
| RMS median |  |
| VAT |  |
| PCA | Ratio of second and first principal components using 8 leads |
| PCA QRS | ^ From QRS onset to QRS offset |
| PCA STT | ^ From QRS offset to T offset |
| PCA T | ^ From T onset to offset |
| PCA ST | ^ From QRS offset to J+80 |
| PCA TpTe | ^ From T peak to T offset |
| NDPV | Sum of principal components 4-8 divided by sum of principal components 1-8 |
| NDPV QRS | ^ QRS onset to offset |
| NDPV STT | ^ QRS offset to T offset |
| PSD low | Power spectral density from 0.5-10 Hz |
| PSD medium | Power spectral density from 10-50 Hz |
| PSD high | Power spectral density from 50-100 Hz |
| Lateral concavity | Draw line from QRS offset to T peak per lead. Calculate the maximum vertical distance between this line and the ECG. Take the mean of I, aVL, V5, V6. |
| Anterior concavity | ^ Take the mean of V1, V2, V3, V4 |
| Inferior concavity | ^ Take the mean of II, III, aVF |
| QRS elevation | VCG features using Kors transform |
| QRS elevation1 |  |
| QRS azimuth |  |
| QRS zenith |  |
| QRS magnitude |  |
| T elevation |  |
| T elevation1 |  |
| T azimuth |  |
| T zenith |  |
| T magnitude |  |
| QRS average elevation |  |
| QRS average elevation1 |  |
| QRS average zenith |  |
| QRS average magnitude |  |
| Initial QRS average elevation | Initial QRS is first 40 msec of QRS |
| Initial QRS average elevation1 |  |
| Initial QRS average azimuth |  |
| Initial QRS average zenith |  |
| Initial QRS average magnitude |  |
| Terminal QRS average elevation | Terminal QRS is last 40 msec of QRS |
| Terminal QRS average elevation1 |  |
| Terminal QRS average azimuth |  |
| Terminal QRS average zenith |  |
| Terminal QRS average magnitude |  |
| T average elevation |  |
| T average elevation1 |  |
| T average azimuth |  |
| T average zenith |  |
| T average magnitude |  |
| SVG elevation | SVG is sum of QRS and T amplitudes |
| SVG elevation1 |  |
| SVG azimuth |  |
| SVG zenith |  |
| SVG magnitude |  |
| SVG average elevation |  |
| SVG average elevation1 |  |
| SVG average azimuth |  |
| SVG average zenith |  |
| SVG average magnitude |  |
| QRST angle | Angle between QRS peak amplitude and T peak amplitude |
| QRST average angle | Angle between average QRS amplitude and average T amplitude |
| Aldrich A |  |
| Aldrich I |  |
| Selvester score |  |
| Pace spikes? | Yes/No pace spikes present |
| Ventricular pace spikes? | Yes/No ventricular pace spikes present |
| RBBB? | Yes/No RBBB detected |
| LBBB? | Yes/No LBBB detected |
| RR interval std dev | Heart rate variability metric |
| TMD pre | T wave morphology descriptor T onset to T peak |
| TMD post | ^ T peak to T offset |
| TMD | ^ T onset to offset |
| TCRT | Total cosine R to T |
| Asymmetry score | Asymmetry of T wave |
| Notch score | How notched T wave is |
| Flatness score | Flatness of T wave |
| MCS | T wave morphology combination score.  MCS = asymmetry + notch + 1.6\*flatness |
| Age | Patient age |
| Sex | Patient biological sex |