CLAIMS

1. A processor implemented method, comprising:

acquiring, via one or more hardware processors, a single-lead electrocardiogram (ECG) signal that is recorded for a predefined time interval;

applying in real-time, via the one or more hardware processors, a spectrogram based noisy data removal technique on the acquired single-lead ECG signal to obtain a clean ECG signal;

extracting one or more features from the clean ECG signal;

selecting, using an optimum feature selection technique, one or more optimum features from the one or more extracted features; and

identifying based on the selected one or more optimum features, using a binary cascade classifier, at least one of one or more normal rhythms, a first set of abnormal rhythms, and a second set of abnormal rhythms in at least one of the single-lead electrocardiogram (ECG) signal, and the clean ECG signal,

wherein the step of applying, via the one or more hardware processors, the spectrogram based noisy data removal technique on the acquired single-lead ECG signal comprises:

dividing the acquired single-lead ECG signal into a plurality of windows;

computing a spectrogram of each of the plurality of windows;

performing a comparison of the computed spectrogram of each of the plurality of windows with a dynamically computed threshold;

determining noise in at least a subset of the plurality of windows based on the comparison; and

extracting the clean ECG signal based on the determined noise in the at least a subset of the plurality of windows.

2. The processor implemented method of claim 1, wherein noise is determined in the at least a subset of the plurality of windows when each window from the subset has power that is greater than a threshold power.

3. The processor implemented method of claim 1, wherein the optimum feature

selection technique is at least one of a minimum redundancy maximum relevancy (mRMR) technique and a Maximal Information Coefficient (MIC) technique.

4. The processor implemented method of claim 1, wherein the dynamically computed threshold is based on a signal to noise ratio (SNR).

5. A system comprising:

a memory storing instructions;

one or more communication interfaces; and

one or more hardware processors coupled to the memory via the one or more communication interfaces, wherein the one or more hardware processors are configured by the instructions to:

acquire a single-lead electrocardiogram (ECG) signal that is recorded for a predefined time interval;

apply in real-time, a spectrogram based noisy data removal technique on the acquired single-lead ECG signal to obtain a clean ECG signal;

extract one or more features from the clean ECG signal;

select, using an optimum feature selection technique, one or more optimum features from the one or more extracted features; and

identify based on the selected one or more optimum features, using a binary cascade classifier, at least one of one or more normal rhythms, a first set of abnormal rhythms, and a second set of abnormal rhythms in at least one of the single-lead electrocardiogram (ECG) signal, and the clean ECG signal,

wherein the clean ECG signal is extracted by applying the spectrogram based noisy data removal technique on the acquired single-lead ECG signal by:

dividing the acquired single-lead ECG signal into a plurality of windows;

computing a spectrogram of each of the plurality of windows;

performing a comparison of the computed spectrogram of each of the plurality of windows with a dynamically computed threshold;

determining noise in at least a subset of the plurality of windows based on the comparison; and

extracting the clean ECG signal based on the determined noise in the at least a subset of the plurality of windows.

6. The system of claim 5, wherein noise is determined in the at least a subset of the plurality of windows when each window from the subset have power that is greater than a threshold power.

7. The system of claim 5, wherein the optimum feature selection technique is at least one of a minimum redundancy maximum relevancy (mRMR) technique and a Maximal Information Coefficient (MIC) technique.

8. The system of claim 5, wherein the dynamically computed threshold is based on a signal to noise ratio (SNR).

9. One or more non-transitory machine readable information storage mediums comprising one or more instructions which when executed by one or more hardware processors causes:

acquiring, via the one or more hardware processors, a single-lead electrocardiogram (ECG) signal that is recorded for a predefined time interval;

applying in real-time, via the one or more hardware processors, a spectrogram based noisy data removal technique on the acquired single-lead ECG signal to obtain a clean ECG signal;

extracting one or more features from the clean ECG signal;

selecting, using an optimum feature selection technique, one or more optimum features from the one or more extracted features; and

identifying based on the selected one or more optimum features, using a binary cascade classifier, at least one of one or more normal rhythms, a first set of abnormal rhythms, and a second set of abnormal rhythms in at least one of the single-lead electrocardiogram (ECG) signal, and the clean ECG signal,

wherein the step of applying, via the one or more hardware processors, the spectrogram based noisy data removal technique on the acquired single-lead ECG signal comprises:

dividing the acquired single-lead ECG signal into a plurality of windows;

computing a spectrogram of each of the plurality of windows;

performing a comparison of the computed spectrogram of each of the plurality of windows with a dynamically computed threshold;

determining noise in at least a subset of the plurality of windows based on the comparison; and

extracting the clean ECG signal based on the determined noise in the at least a subset of the plurality of windows.

10. The one or more non-transitory machine readable information storage mediums of claim 9, wherein noise is determined in the at least a subset of the plurality of windows when each window from the subset has power that is greater than a threshold power.

11. The one or more non-transitory machine readable information storage mediums of claim 9, wherein the optimum feature selection technique is at least one of a minimum redundancy maximum relevancy (mRMR) technique and a Maximal Information Coefficient (MIC) technique.

12. The one or more non-transitory machine readable information storage mediums of claim 9, wherein the dynamically computed threshold is based on a signal to noise ratio (SNR).