

[0006] Figure 3 illustrates a method for measuring the blood pressure of the subject, in accordance with an implementation of the present subject matter.

SUMMARY

[0006a] In one aspect, there is provided a device for measuring blood pressure of a subject, the device comprising:

- a processor; and
- a blood pressure measurement (BPM) module coupled to the processor to,
 - obtain a plurality of photoplethysmogram (PPG) features associated with the subject;
 - ascertain one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters; and
 - determine blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

[0006aa] In one aspect, there is provided a device for measuring blood pressure of a subject, the device comprising:

- a processor; and
- a blood pressure measurement (BPM) module coupled to the processor to,
 - obtain a plurality of photoplethysmogram (PPG) features associated with the subject;
 - ascertain one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters;
 - ascertain the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;
 - correlate a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of a subject in real time;

and

determine blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

[0006b] In one aspect, there is provided a method for measuring blood pressure of a subject, the method comprising:

- obtaining a plurality of photoplethysmogram (PPG) features associated with the subject;
- ascertaining one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters; and
- determining blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

[0006bb] In one aspect, there is provided a method for measuring blood pressure of a subject, the method comprising:

obtaining a plurality of photoplethysmogram (PPG) features associated with the subject;

ascertaining one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters;

ascertaining the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;

correlating a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of a subject in real time;

and

determining blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

[0006c] In one aspect, there is provided a modeling system for measuring blood pressure of a subject, the modeling system comprising:

a processor; and

an analysis module coupled to the processor to,

obtain a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;

process, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;

compute, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value; and

determine, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

[0006cc] In one aspect, there is provided a modeling system for measuring blood pressure of a subject, the modeling system comprising:

a processor; and

an analysis module coupled to the processor to,

obtain a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;

process, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;

compute, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value;

ascertain the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;

correlate a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of the test subject in real time;

and

determine, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

[0006d] In one aspect, there is provided a method for measuring blood pressure of a subject, the method comprising:

receiving a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;

processing, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;

computing, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value; and determining, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

[0006dd] In one aspect, there is provided a method for measuring blood pressure of a subject, the method comprising:

receiving a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data

comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;

processing, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;

computing, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value;

ascertaining the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;

correlating a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of the test subject in real time;

and

determining, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

[0006e] In one aspect, there is provided a non-transitory computer readable medium having a set of computer readable instructions that, when executed, cause a device to:

obtain a plurality of photoplethysmogram (PPG) features associated with the subject;

ascertain one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters; and

determine blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

Claims

1. A device for measuring blood pressure of a subject, the device comprising:
 - a processor; and
 - a blood pressure measurement (BPM) module coupled to the processor to,
 - obtain a plurality of photoplethysmogram (PPG) features associated with the subject;
 - ascertain one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters;
 - ascertain the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;
 - correlate a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of a subject in real time;
 - and
 - determine blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.
2. The device as claimed in claim 1, wherein the BPM module further is to analyze a PPG waveform associated with the subject for obtaining the plurality of PPG features.

3. The device as claimed in claim 2, wherein each PPG feature from amongst the plurality of PPG features is extracted in one of a time domain and a frequency domain.
4. A method for measuring blood pressure of a subject, the method comprising:
 - obtaining a plurality of photoplethysmogram (PPG) features associated with the subject;
 - ascertaining one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters;
 - ascertaining the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;
 - correlating a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of a subject in real time;
 - and
 - determining blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

5. The method as claimed in claim 4, wherein each PPG feature from amongst the plurality of PPG features is extracted in one of a time domain and a frequency domain.
6. A modeling system for measuring blood pressure of a subject, the modeling system comprising:
 - a processor; and
 - an analysis module coupled to the processor to,
 - obtain a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;
 - process, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;
 - compute, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value;
 - ascertain the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;
 - correlate a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of the test subject in real time;

and

determine, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

7. The modeling system as claimed in claim 6, wherein the analysis module is further configured to determine the reference model based on a machine learning technique.
8. The modeling system as claimed in claim 6, wherein the analysis module is further configured to extract the plurality of PPG features from the PPG waveform in one of a time domain and a frequency domain.

9. A method for measuring blood pressure of a subject, the method comprising:

receiving a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;

processing, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;

computing, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value;

ascertaining the blood pressure by using a two-element windkessel model with at least one of arterial compliance and a capacitance to determine peripheral resistance of blood;

correlating a plurality of latent parameters and the PPG feature for a test subject based on a reference model, said reference model deployed in the device to facilitate measurement of blood pressure of the test subject in real time;

and

determining, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

10. The method as claimed in claim 9, wherein the determining the reference model is based on a machine learning technique.

11. The method as claimed in claim 9, wherein the processing comprises extracting the plurality of PPG features from the PPG waveform in one of a time domain and a frequency domain.

I/We claim:

1. A device for measuring blood pressure of a subject, the device comprising:
a processor; and
a blood pressure measurement (BPM) module coupled to the processor to,
obtain a plurality of photoplethysmogram (PPG) features associated with the subject;
ascertain one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters; and
determine blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.
2. The device as claimed in claim 1, wherein the BPM module further is to analyze a PPG waveform associated with the subject for obtaining the plurality of PPG features.
3. The device as claimed in claim 2, wherein each PPG feature from amongst the plurality of PPG features is extracted in one of a time domain and a frequency domain.
4. The device as claimed in claim 1, wherein the one or more latent parameters associated with the subject comprises at least an arterial compliance and a peripheral resistance of the subject.
5. A method for measuring blood pressure of a subject, the method comprising:
obtaining a plurality of photoplethysmogram (PPG) features associated with the subject;
ascertaining one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters; and

determining blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.

6. The method as claimed in claim 5, wherein the one or more latent parameters associated with the subject comprises at least an arterial compliance and a peripheral resistance of the subject.

7. The method as claimed in claim 5, wherein each PPG feature from amongst the plurality of PPG features is extracted in one of a time domain and a frequency domain.

8. A modeling system for measuring blood pressure of a subject, the modeling system comprising:

a processor; and

an analysis module coupled to the processor to,

obtain a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;

process, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;

compute, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value; and

determine, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.

9. The modeling system as claimed in claim 8, wherein the analysis module further is to determine the reference model based on a machine learning technique.
10. The modeling system as claimed in claim 8, wherein the analysis module further is to extract the plurality of PPG features from the PPG waveform in one of a time domain and a frequency domain.
11. A method for measuring blood pressure of a subject, the method comprising:
receiving a sample dataset comprising physiological data associated with each of a test subject from amongst a plurality of test subjects, wherein the physiological data comprises at least one ground truth value of blood pressure associated with the test subject and a PPG waveform associated with the test subject;
processing, for each of the plurality of test subjects, the physiological data associated with the test subject to obtain a plurality of PPG features;
computing, for each of the plurality of test subjects, one or more latent parameters associated with the test subject based on the plurality of PPG features and the at least one ground truth value; and
determining, based on the one or more latent parameters and the PPG features associated with each of the plurality of test subjects, a reference model for measuring blood pressure of the subject in real time, wherein the reference model indicates a correlation between the one or more latent parameters and the PPG features associated with each of the plurality of test subjects.
12. The method as claimed in claim 11, wherein the determining the reference model is based on a machine learning technique.
13. The method as claimed in claim 11, wherein the processing comprises extracting the plurality of PPG features from the PPG waveform in one of a time domain and a frequency domain.
14. A non-transitory computer readable medium having a set of computer readable instructions that, when executed, cause a device to:

obtain a plurality of photoplethysmogram (PPG) features associated with the subject;

ascertain one or more latent parameters associated with the subject based on the plurality of PPG features and a reference model, wherein the reference model indicates a correlation between the plurality of PPG features and the one or more latent parameters; and

determine blood pressure of the subject based on the one or more latent parameters and the plurality of PPG features.