TECHNIQUES FOR MIGRAINE DETECTION USING A WEARABLE DEVICE

CROSS REFERENCE

[0001] The present Application for Patent claims priority to U.S. Patent Application No. 18/612,879 by Koskimäki, entitled "TECHNIQUES FOR MIGRAINE DETECTION USING A WEARABLE DEVICE," filed March 21, 2024.

FIELD OF TECHNOLOGY

[0002] The following relates to wearable devices and data processing, including techniques for migraine detection using a wearable device.

BACKGROUND

[0003] Some wearable devices may be configured to collect data from users associated with temperature data, sleep time data, heart rate data, and the like. Some users may use the collected data for health insights.

[0004] Aspect(s) of the present disclosure are set out in the independent claim(s). Other aspects and features of the present disclosure are set out in the dependent claims and in the description below.

SUMMARY OF THE INVENTION

[0004a] According to a first aspect of the present invention, there is provided a system for predicting migraine onset, comprising: a wearable device configured to acquire physiological data from a user, the physiological data comprising photoplethysmogram (PPG) data collected via one or more light-emitting components and one or more light-receiving components of the wearable device, the physiological data is collected throughout a first time interval that includes one or more sleep periods of the user; and one or more processors communicatively coupled with the wearable device. The one or more processors are configured to: receive the physiological data acquired via the wearable device via one or more electronic signals; classify, using a first machine learning model trained to perform sleep stage classification, the physiological data collected during the one or more sleep periods into a plurality of sleep stages, the plurality of sleep stages comprising at least a rapid eye movement (REM) sleep stage;

input the physiological data into a second machine learning model, the second machine learning model trained to predict migraine onset based on a plurality of features within a training physiological dataset associated with one or more users, the plurality of features comprising a first feature associated with a decrease in a total sleep duration relative to previous sleep periods of the respective one or more users, and a second feature associated with a decrease in a total REM sleep duration relative to the previous sleep periods of the respective one or more users; generate, using the second machine learning model, a migraine prediction metric based at least in part on the plurality of features within the physiological data during the first time interval, the migraine prediction metric associated with a relative likelihood that the user will experience a migraine during a subsequent time interval; and transmit an instruction to a graphical user interface (GUI) of a user device associated with the wearable device, the instruction configured to cause the GUI to display information associated with the migraine prediction metric.

[0004b] According to a second aspect of the present invention, there is provided a method for predicting migraine onset, comprising: acquiring physiological data from a user using a wearable device, the physiological data comprising photoplethysmogram (PPG) data collected via one or more light-emitting components and one or more light-receiving components of the wearable device, the physiological data is acquired throughout a first time interval that includes one or more sleep periods of the user; classifying, using a first machine learning model trained to perform sleep stage classification, the physiological data collected during the one or more sleep periods into a plurality of sleep stages, the plurality of sleep stages comprising at least a rapid eye movement (REM) sleep stage; inputting the physiological data into a second machine learning model, the second machine learning model trained to predict migraine onset based on a plurality of features within a training physiological dataset associated with one or more users, the plurality of features comprising a first feature associated with a decrease in a total sleep duration relative to previous sleep periods of the respective one or more users, and a second feature associated with a decrease in a total REM sleep duration relative to the previous sleep periods of the respective one or more users; generating, using the second machine learning model, a migraine prediction metric based at least in part on the plurality of features within the physiological data during the

first time interval, the migraine prediction metric associated with a relative likelihood that the user will experience a migraine during a subsequent time interval; and transmitting an instruction to a graphical user interface (GUI) of a user device associated with the wearable device, the instruction configured to cause the GUI to display information associated with the migraine prediction metric.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Implementations of the present disclosure are described below, by way of example, with reference to the accompanying drawings, in which:

[0006] FIG. 1 illustrates an example of a system that supports techniques for migraine detection using a wearable device in accordance with aspects of the present disclosure.

[0007] FIG. 2 illustrates an example of a system that supports techniques for migraine detection using a wearable device in accordance with aspects of the present disclosure.

[0008] FIG. 3 shows an example of data diagrams that support techniques for migraine detection using a wearable device in accordance with aspects of the present disclosure.