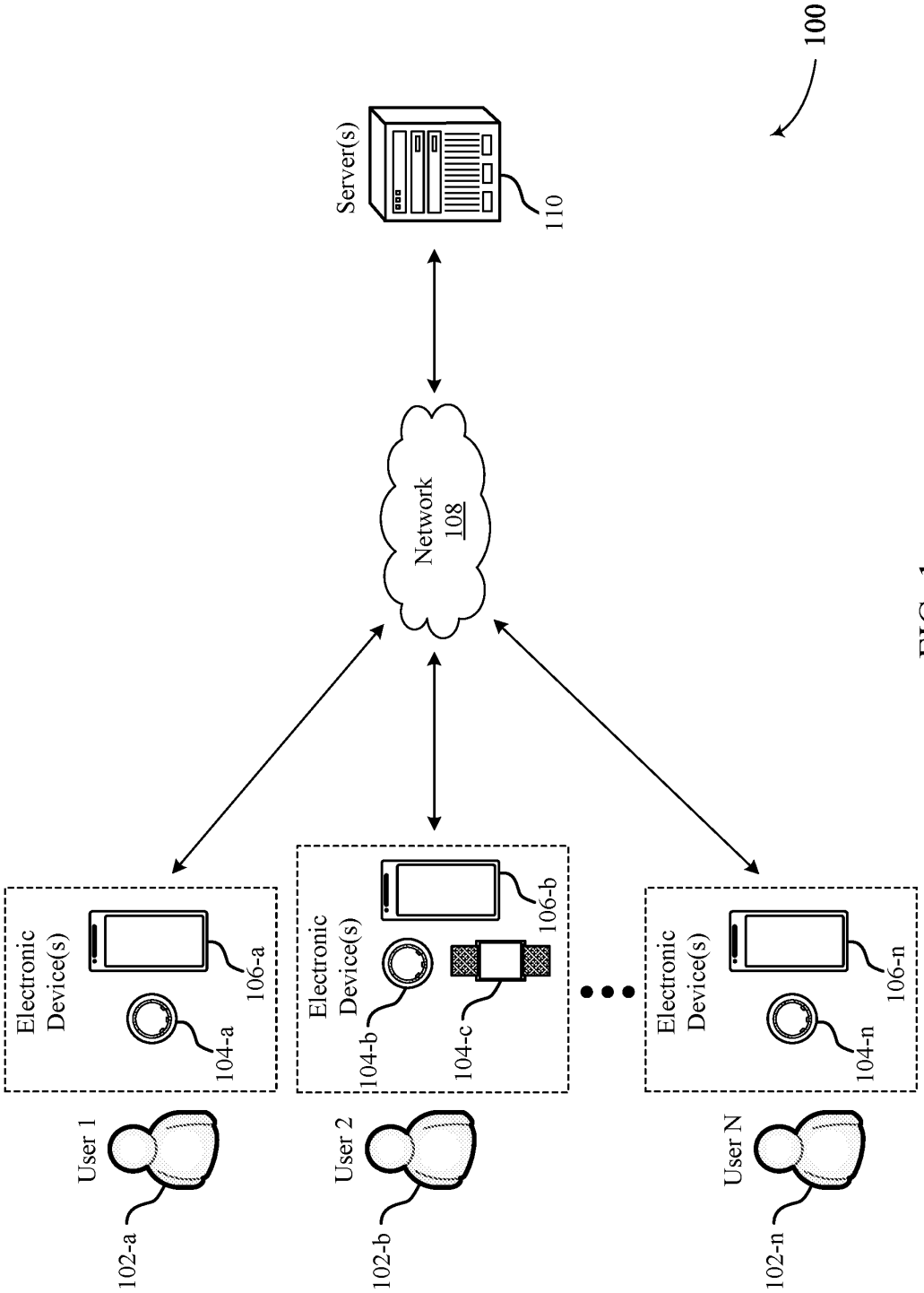

100
Server(s)
110
Network
108
Electronic
Device(s)
106-a
104-a
User 1
102-a
Electronic
Device(s)
106-b
104-b
104-c
User 2
102-b
Electronic
Device(s)
106-n
104-n
User N
102-n

FIG. 1

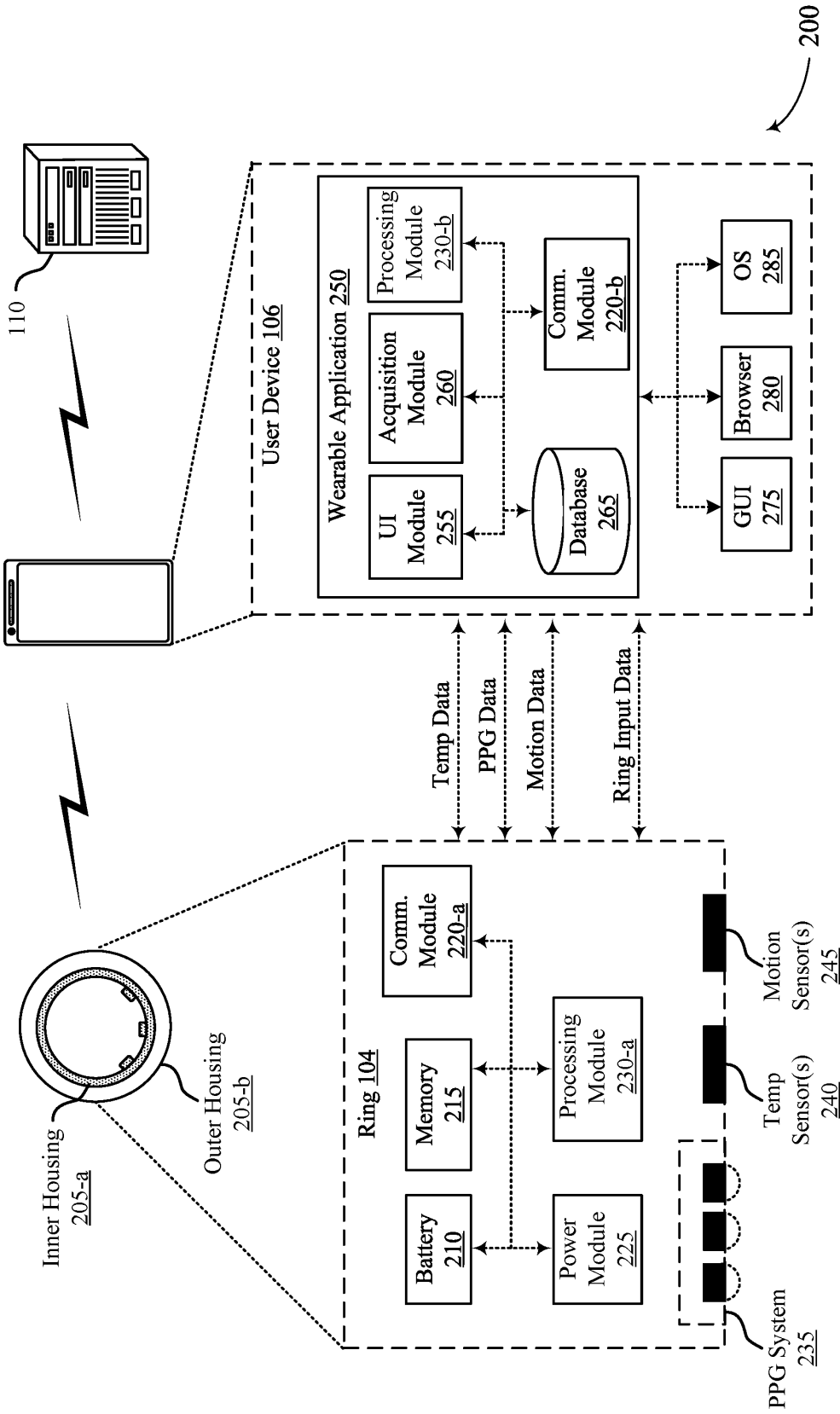
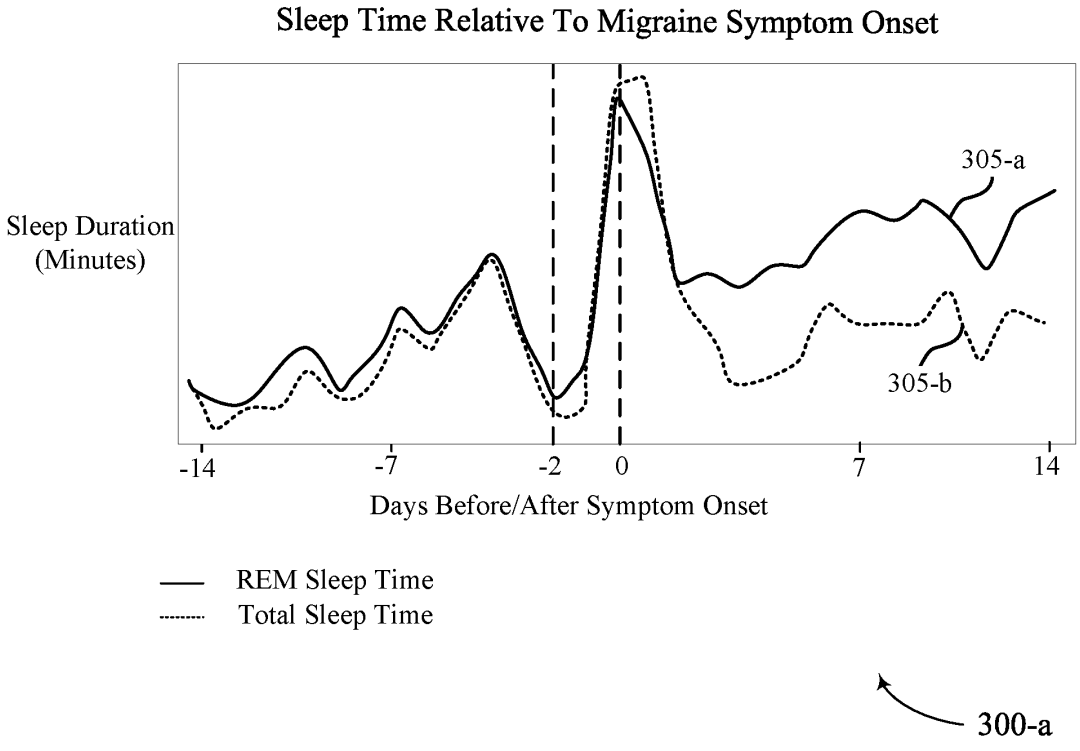

200
110
User Device 106
Wearable Application 250
UI Module 255
Acquisition Module 260
Processing Module 230-b
Database 265
Comm. Module 220-b
GUI 275
Browser 280
OS 285
Temp Data
PPG Data
Motion Data
Ring Input Data
Ring 104
Comm. Module 220-a
Memory 215
Processing Module 230-a
Battery 210
Power Module 225
Inner Housing 205-a
Outer Housing 205-b
Motion Sensor(s) 245
Temp Sensor(s) 240
PPG System 235

FIG. 2


Sleep Time Relative To Migraine Symptom Onset
Sleep Duration (Minutes)
305-a
305-b
-14
-7
-2
0
7
14
Days Before/After Symptom Onset
REM Sleep Time
Total Sleep Time
300-a

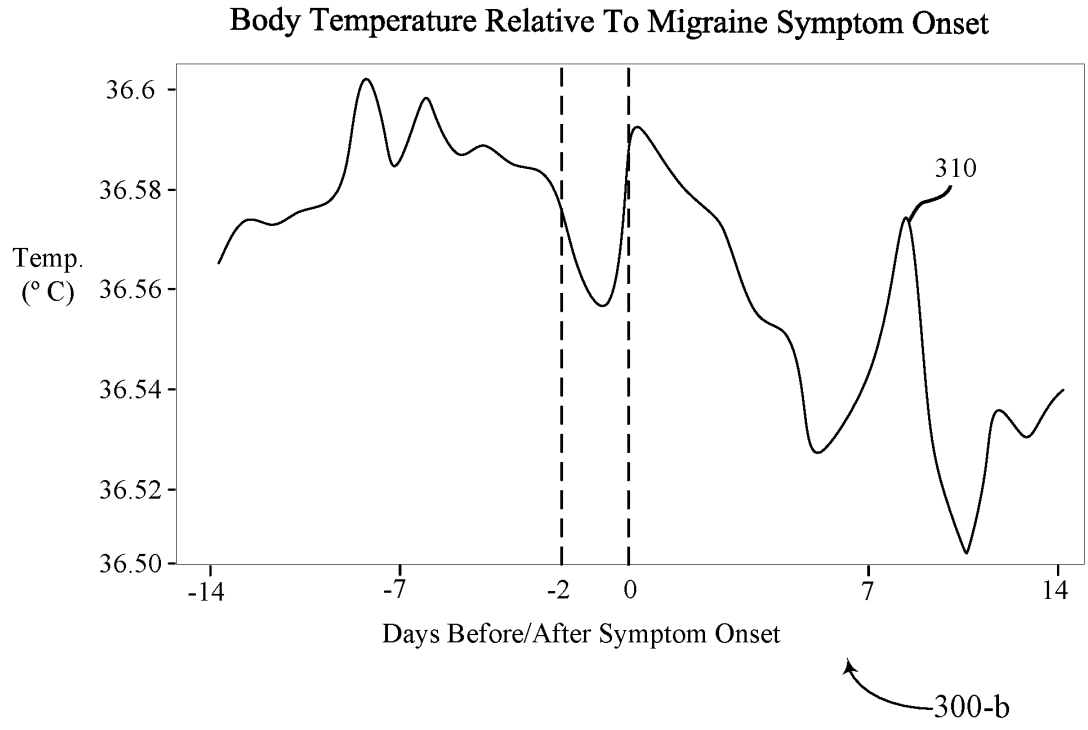

Body Temperature Relative To Migraine Symptom Onset
Temp. (° C)
36.6
36.58
36.56
36.54
36.52
36.50
310
-14
-7
-2
0
7
14
Days Before/After Symptom Onset
300-b

FIG. 3

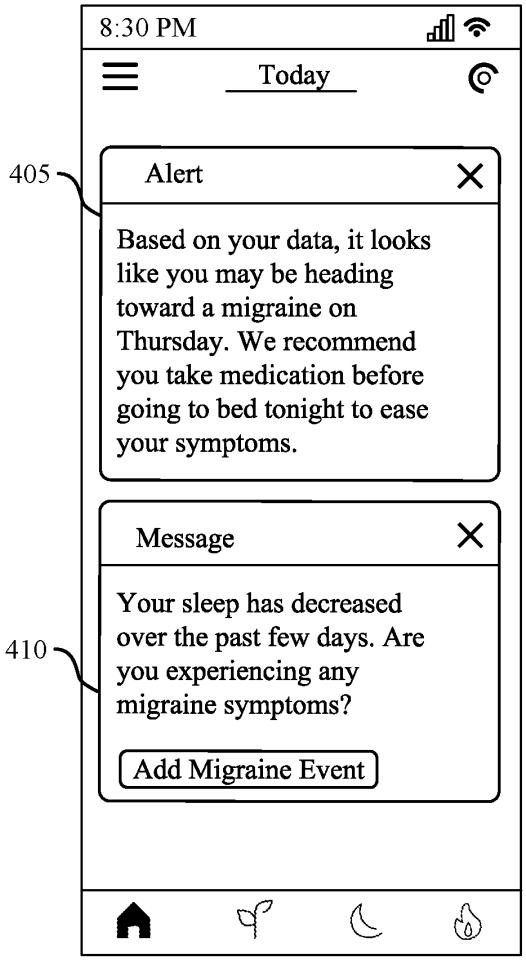

8:30 PM
Today
405
Alert
Based on your data, it looks like you may be heading toward a migraine on Thursday. We recommend you take medication before going to bed tonight to ease your symptoms.
Message
410
Your sleep has decreased over the past few days. Are you experiencing any migraine symptoms?
Add Migraine Event
400

FIG. 4

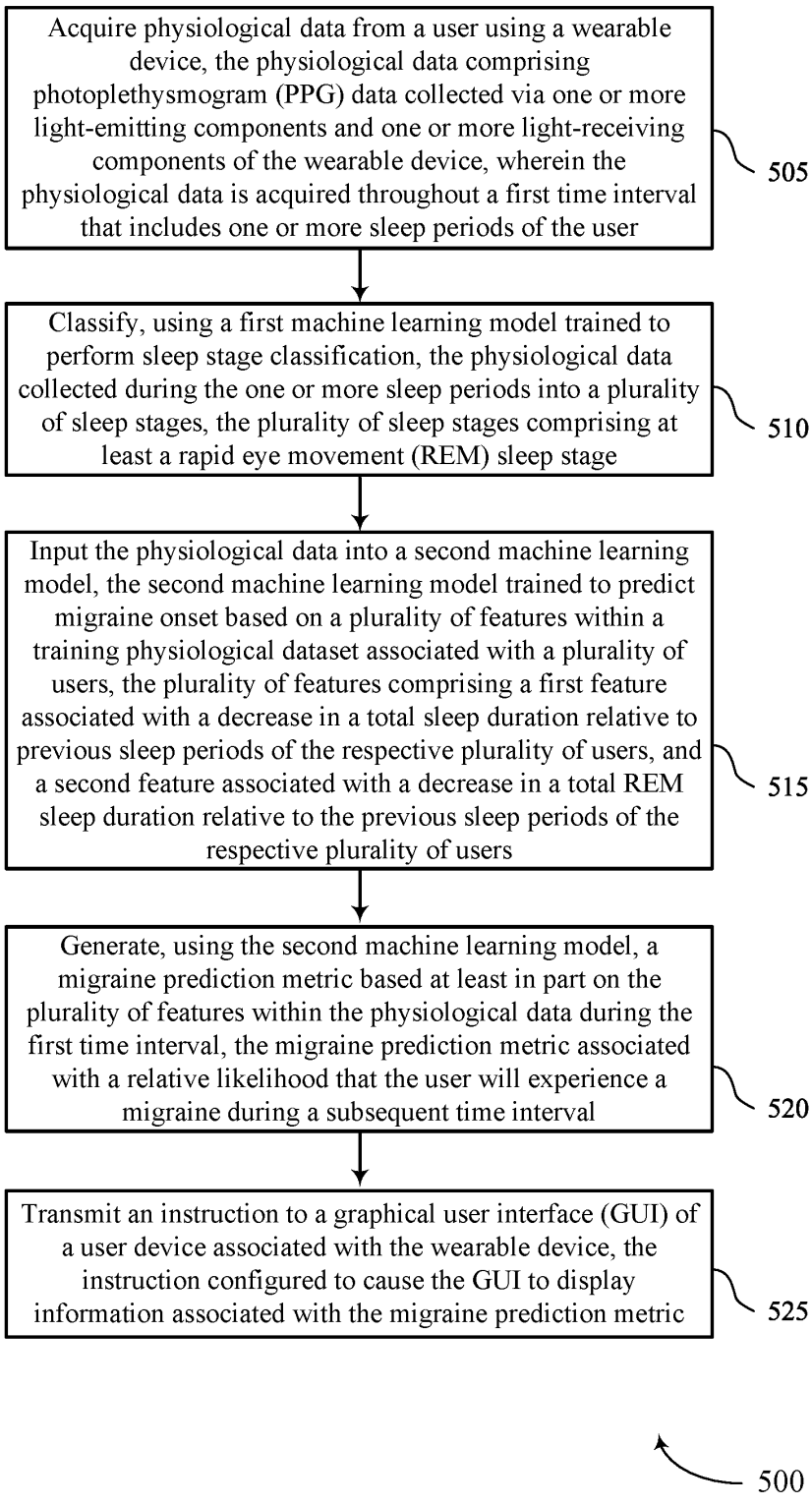

Acquire physiological data from a user using a wearable device, the physiological data comprising photoplethysmogram (PPG) data collected via one or more light-emitting components and one or more light-receiving components of the wearable device, wherein the physiological data is acquired throughout a first time interval that includes one or more sleep periods of the user
505
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
510
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 a plurality of 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 plurality of users, and a second feature associated with a decrease in a total REM sleep duration relative to the previous sleep periods of the respective plurality of users
515
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
520
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
525
500

FIG. 5

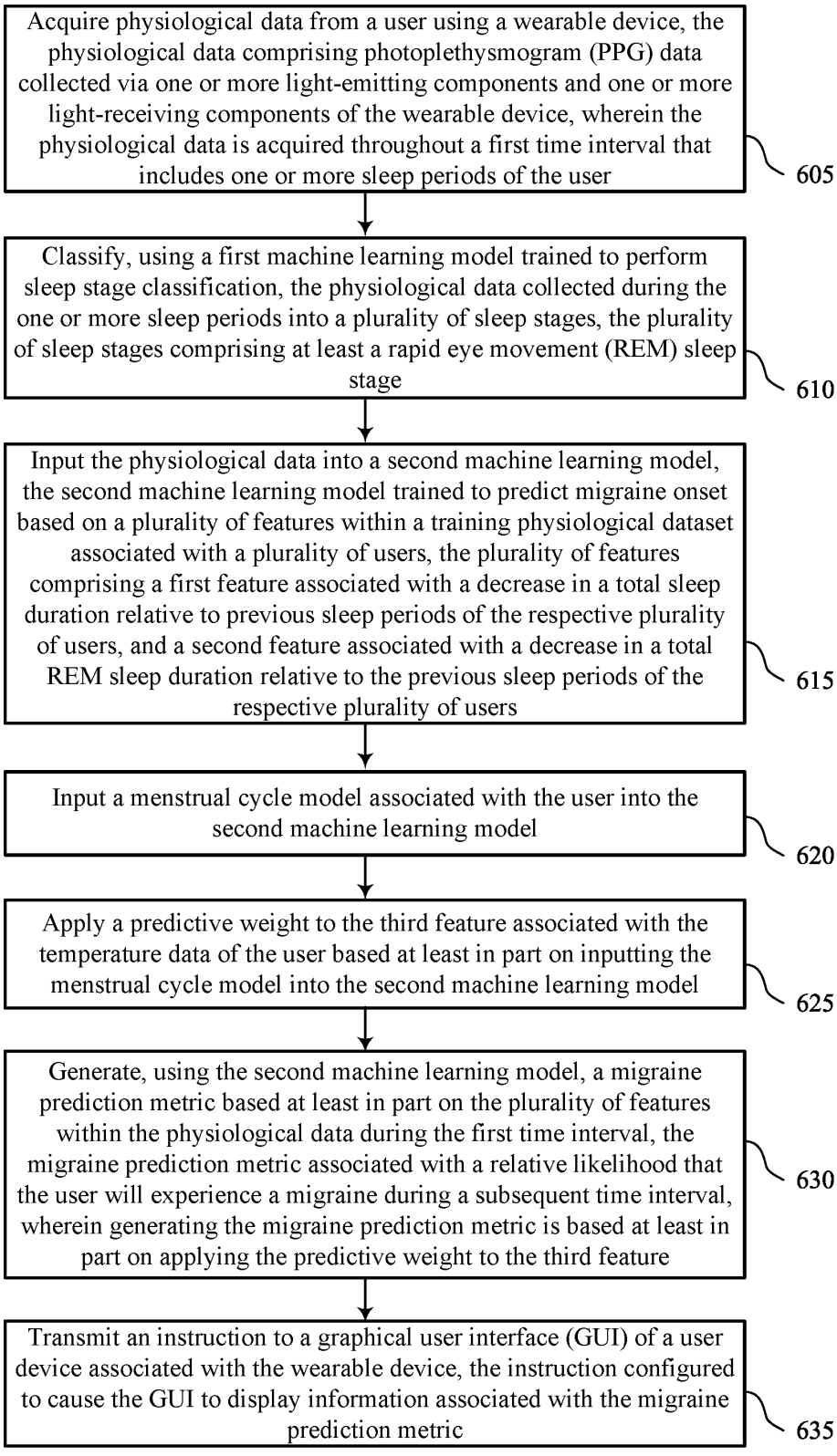

Acquire physiological data from a user using a wearable device, the physiological data comprising photoplethysmogram (PPG) data collected via one or more light-emitting components and one or more light-receiving components of the wearable device, wherein the physiological data is acquired throughout a first time interval that includes one or more sleep periods of the user
605
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
610
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 a plurality of 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 plurality of users, and a second feature associated with a decrease in a total REM sleep duration relative to the previous sleep periods of the respective plurality of users
615
Input a menstrual cycle model associated with the user into the second machine learning model
620
Apply a predictive weight to the third feature associated with the temperature data of the user based at least in part on inputting the menstrual cycle model into the second machine learning model
625
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, wherein generating the migraine prediction metric is based at least in part on applying the predictive weight to the third feature
630
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
635
600

FIG. 6