



(51) International Patent Classification:
H04N 21/258 (2011.01)

(21) International Application Number:
PCT/CN2017/077017

(22) International Filing Date:
17 March 2017 (17.03.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201610166640.9 22 March 2016 (22.03.2016) CN

(71) Applicants: **LE HOLDINGS (BEIJING) CO., LTD.** [CN/CN]; Room 1102, 10 Layer Building 3, 105 Yaojiayuan Road, ChaoYang District, Beijing 100025 (CN). **LE SHI INTERNET INFORMATION & TECHNOLOGY CORP., BEIJING** [CN/CN]; 10th Layer Letv Building, No.105 Yaojiayuan Road, ChaoYang District, Beijing 100025 (CN).

(72) Inventor: **HUA, Yanting**; 10th Layer Letv Building, No.105 Yaojiayuan Road, ChaoYang District, Beijing 100025 (CN).

(74) Agent: **BEIJING RUN ZEHENG INTELLECTUAL PROPERTY LAW FIRM**; 702, Shenzhou Building, No.31 South Street,Zhongguancun, Haidian District, Beijing 100081 (CN).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

— with international search report (Art. 21(3))

(54) Title: METHOD AND APPARATUS FOR MULTIMEDIA EVALUATION BASED ON HEART RATE MEASUREMENT

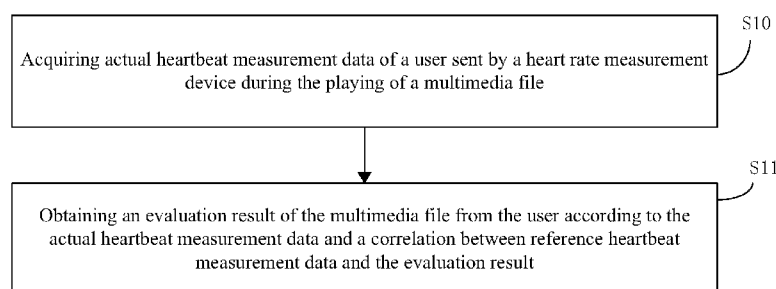


Fig. 1

(57) Abstract: A method and apparatus are provided for evaluating multimedia based on heart rate measurement. The method includes: acquiring actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file; and obtaining an evaluation result of the multimedia file by the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and the evaluation result. In the method and apparatus for multimedia evaluation based on heart rate measurement provided in the present disclosure, actual heartbeat measurement data of a user during the playing of a multimedia file is acquired and an evaluation result of the multimedia file from the user is obtained according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and the evaluation result.

METHOD AND APPARATUS FOR MULTIMEDIA EVALUATION BASED ON HEART RATE MEASUREMENT

CROSS-REFERENCE TO RELATED APPLICATION

- 5 [0001] This application claims priority to Chinese Patent Application No. 201610166640.9, filed on Mar. 22, 2016, which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

- 10 [0002] The embodiments of the present disclosure relate to the technical field of multimedia playing control, and in particular to a method for multimedia evaluation method and apparatus for multimedia evaluation based on heart rate measurement.

BACKGROUND

- 15 [0003] When a person experiences relatively obvious emotion fluctuations such as nervous, exciting, happy and so on, some physical signs may also change relatively obviously. Heart rate is one of these physical signs which is easy to measure and calculate. During the process of browsing a multimedia file, the emotion of a user may fluctuate with the development of the plots and thus heart rate thereof will also change. By measuring a trend of change and amplitude of the heart rate of the user, the effect on the user by the multimedia file may be
20 effectively determined. If the heart rate of a user during browsing a multimedia file can be quantized and analyzed and the multimedia file is scored based thereon, the popularity of the multimedia file can be determined more accurately, and other users may select multimedia files with higher scores so as to save their selection time.

25 SUMMARY

- [0004] The present disclosure discloses a method, an apparatus, a computer program product and a computer readable medium.

- 30 [0005] According to a first aspect of the present disclosure, a method for multimedia evaluation based on heart rate measurement provided in the embodiments of the present disclosure includes: acquiring actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file; and obtaining an evaluation

result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result.

[0006] Optionally, the reference heartbeat measurement data includes a standard value of the heart rate of the user, and the obtaining an evaluation result of the multimedia file from the user may include: calculating an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data; and calculating an offset of the average heart rate value with respect to the standard value, calculating and reporting a score of evaluation on the multimedia file by the user according to the offset.

[0007] Optionally, at least one important plot time period is preset in the multimedia file, and the calculating an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data may include: counting the heartbeats of the user within each of the at least one important plot time period according to the actual heartbeat measurement data and dividing the heartbeats by the length of the important plot time period to obtain an average heart rate value of the user within each important plot time period; and calculating a mean value of the average heart rate value of the user within each important plot time period to obtain the average heart rate value of the user within the specified time interval during the playing of the multimedia file.

[0008] Optionally, after acquiring actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file, the method may include: monitoring heart rate of the user according to the actual heartbeat measurement data; recording a time at which the heart rate of the user rises to exceed a preset first threshold, as a starting time point; recording a time at which the heart rate of the user falls to be smaller than the first threshold as an ending time point; and correcting the moments of a starting point and an ending point of the important time period by respectively comparing the starting time point and the ending time point with the starting point and the ending point of the important plot time period.

[0009] Optionally, the calculating an offset amplitude of the average heart rate value to the standard value and calculating and reporting an evaluation score of the multimedia file from the user according to the offset amplitude may include: measuring an average heart rate value of the user in a peaceful state and taking the same as a preset standard value N ; and calculating an evaluation score $S = (S_{\max} - S_{\min}) \frac{n}{N} + 2S_{\min} - S_{\max}$, wherein $S_{\max}$ is a

preset highest evaluation score, $S_{\min}$ is a preset lowest evaluation score, and n is the average heart rate value of the user within the specified time interval during the playing of the multimedia file.

[0010] According to a second aspect of the present disclosure, an apparatus for multimedia evaluation based on heart rate measurement provided in the embodiments of the present disclosure may include: a data acquisition unit configured to acquire actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file; and a data processing unit configured to obtain an evaluation result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result.

[0011] Optionally, the reference heartbeat measurement data may include a standard value of the heart rate of the user, and the data processing unit is configured to calculate an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data; calculate an offset of the average heart rate value with respect to the standard value; and calculate and report a score of evaluation on the multimedia file by the user according to the offset amplitude.

[0012] Optionally, the multimedia file is provided with at least one important plot time period in advance, and the data processing unit may further include: an important plot processing module configured to count the heartbeats of the user within each of the at least one important plot time period according to the actual heartbeat measurement data and divide the heartbeats number by the length of the important plot time period to obtain an average heart rate value of the user within each important plot time period; and may be further configured to calculate a mean value of the average heart rate value of the user within each important plot time period to obtain the user's average heart rate value within the specified time interval during the playing of the multimedia file.

[0013] Optionally, the data processing unit may include: an important plot correction module configured to: monitor the heart rate of the user according to the actual heartbeat measurement data; record a time at which the heart rate of the user rises to exceed a preset first threshold as a starting time point; and record a time at which the heart rate of the user falls to be smaller than the first threshold as an ending time point. The important plot correction module may be further configured to correct the moments of a starting point and an ending point of the important time period by comparing the starting time point and the ending time point with the starting point and the ending point of the important plot time period

respectively.

[0014] Optionally, the data acquisition unit is configured to measure an average heart rate value of the user in a peaceful state and take the same as a preset standard value N ; and the data processing unit may further include an evaluation module configured to calculate an

5 evaluation score $S = (S_{\max} - S_{\min}) \frac{S}{N} + 2S_{\min} - S_{\max}$, wherein $S_{\max}$ is a preset highest evaluation score, $S_{\min}$ is a preset lowest evaluation score, and n is the average heart rate value of the user within the specified time interval during the playing of the multimedia file.

[0015] According to a third aspect of the present disclosure, an electronic device for multimedia evaluation is provided. The electronic device may include at least one processor; and a memory communicably connected with the at least one processor for storing instructions executable by the at least one processor, wherein execution of the instructions by the at least one processor causes the at least one processor to perform a method according to any one of embodiments disclosed above in the first aspect.

10 [0016] In a fourth aspect of the present disclosure, a non-transitory computer-readable storage medium is provided. The non-transitory computer-readable storage medium may store executable instructions for multimedia evaluation, wherein the instructions, when executed by an electronic device, cause the electronic device to perform a method according to any one of embodiments disclosed above in the first aspect.

[0017] In a fifth aspect of the present disclosure, a computer program product for multimedia evaluation is provided. The computer program product may include a computer program stored on a non-transitory computer-readable storage medium, and the computer program may include program code which, when executed on a computer, causes the computer to perform a method according to any one of embodiments disclosed above in the first aspect.

20 [0018] It can be seen from the above that in the method and apparatus for multimedia evaluation based on heart rate measurement provided in the embodiments of the present disclosure, actual heartbeat measurement data of a user during the playing of a multimedia file is acquired and an evaluation result of the multimedia file from the user is obtained according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result. Since the evaluation result is generated based on the actual heartbeat measurement data of the user, the obtained evaluation result is a reflection of the real emotion of the user to the multimedia file, which can provide better reality and

reference value compared to the manual scoring method and provide a reliable basis for multimedia file evaluation.

BRIEF DESCRIPTION OF THE DRAWINGS

- 5 [0019] One or more embodiments are illustrated by way of example, and not by limitation, in the figures of the accompanying drawings, wherein elements having the same reference numeral designations represent like elements throughout. The drawings are not to scale, unless otherwise disclosed.
- [0020] Fig. 1 is a flowchart of a method for multimedia evaluation based on heart rate measurement according to an embodiment of the present disclosure;
- 10 [0021] Fig. 2 is a flowchart of a method for multimedia evaluation based on heart rate measurement according to an optional embodiment of the present disclosure;
- [0022] Fig. 3 is a flowchart of a method for multimedia evaluation based on heart rate measurement according to an optional embodiment of the present disclosure;
- 15 [0023] Fig. 4 is a flowchart of a method for multimedia evaluation based on heart rate measurement according to an optional embodiment of the present disclosure; and
- [0024] Fig. 5 is a block diagram showing modules of a apparatus for multimedia evaluation based on heart rate measurement according to an embodiment of the present disclosure.
- [0025] FIG. 6 provides an example of an apparatus according to one or more embodiments
- 20 of the present disclosure.
- [0026] Skilled artisans will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions and/or relative positioning of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of various examples
- 25 of the present application. Also, common but well-understood elements that are useful or necessary in a commercially feasible example are often not depicted in order to facilitate a less obstructed view of these various examples. It will further be appreciated that certain actions and/or steps may be described or depicted in a particular order of occurrence while those skilled in the art will understand that such specificity with respect to sequence is not
- 30 actually required. It will also be understood that the terms and expressions used herein have the ordinary technical meaning as is accorded to such terms and expressions by persons skilled in the technical field as set forth above, except where different specific meanings have

otherwise been set forth herein

DETAILED DESCRIPTION

5 [0027] In order to make the purpose, technical solutions, and advantages of the embodiments of the disclosure clearer, technical solutions of the embodiments of the present disclosure will be described in detail in conjunction with the figures.

[0028] Fig. 1 shows a flowchart of a method for multimedia evaluation based on heart rate measurement according to an embodiment of the present disclosure. As shown in Fig. 1, a
10 method for multimedia evaluation based on heart rate measurement provided according to an embodiment of the present disclosure includes the following steps.

[0029] S10: actual heartbeat measurement data of a user sent by a heart rate measurement device is acquired during the playing of a multimedia file.

[0030] The heart rate measurement device may be a device worn by the user and having a
15 communication function with a apparatus, such as a smart watch, a smart band and so on. This device can detect the heartbeat (pulse) of the user and reports a time point of each heartbeat to the apparatus. After receiving the time point of each heartbeat, the apparatus can calculate the real-time heart rate of the user based on the received time point or calculate an average heart rate value of the user during the playing of the multimedia file; or the heart beat measurement
20 device calculates and reports the real-time heart rate of the user to the apparatus.

[0031] S11: an evaluation result of the multimedia file made by the user is obtained according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result.

[0032] The reference heartbeat measurement data is a heart rate value of the user in a normal
25 peaceful state. Optionally, an average heart rate value of the user in a peaceful state within a certain time can be measured in advance and used as reference heartbeat measurement data.

[0033] This embodiment provides a basic method for scoring a multimedia file by detecting the heart rate of a user. The measurement of actual heartbeat measurement data of a user during the playing of a multimedia file by a heart rate measurement device does not need the
30 user to perform other operations, which is simple and convenient. An evaluation result of the multimedia file by the user is obtained according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result. This evaluation result is directly obtained according to the heart rate of the user, which reflects the

user's real emotion, can more accurately determine the popularity of the multimedia file, and avoids problems such as inaccurate score and so on.

[0034] Fig. 2 shows a flowchart of a method for multimedia evaluation based on heart rate measurement according to an optional embodiment of the present disclosure. As shown in Fig. 2, in an optional embodiment, the reference heartbeat measurement data includes a standard value of the heart rate of the user. The step S11 of obtaining an evaluation result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result includes the following steps.

[0035] S12: an average heart rate value of the user within a specified time interval is calculated during the playing of the multimedia file according to the actual heartbeat measurement data.

[0036] S13: an offset of the average heart rate value with respect to the standard value is calculated and a score of evaluation on the multimedia file by the user is calculated according to the offset and the score is reported.

[0037] In this embodiment, the step of obtaining an evaluation result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and the evaluation result is further described. Since during the playing of a multimedia file, the heart rate values of a user are easy to fluctuate merely in some intervals with nervous plots, by selecting these specified intervals to obtain an average heart rate value, the obtained result has better reference value compared to measuring an average heart rate value of the whole process. When the measurement result is calculated finally, taking an offset of the average heart rate relative to a standard value as a calculation standard is more accurate compared to other calculation methods.

[0038] Fig. 3 shows a flowchart of a method for multimedia evaluation based on heart rate measurement according to an optional embodiment of the present disclosure. As shown in Fig. 3, in an optional embodiment, the specified time interval is a preset important plot time period, and the multimedia file is provided with at least one important plot time period in advance. The step S12 of calculating an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data includes the following steps.

[0039] S20: the heartbeats of the user within each of the at least one important plot time period is counted according to the actual heartbeat measurement data and the heartbeats are

divided by the length of the important plot time period to obtain an average heart rate value of the user within each important plot time period.

[0040] S21: a mean value of the average heart rate value of the user within each important plot time period is calculated to obtain an average heart rate value of the user within the specified time interval during the playing of the multimedia file.

[0041] Since the plots and durations which can make the heart rate of the user change in most multimedia files merely occupy a small portion of the total length of the multimedia files, if the average value of the heart rate values of the user during the entire playing of the multimedia file is taken as the above average heart rate value, the deviation of the obtained data from the heart rate value of the user in a normal state is relatively small, which is inconvenient to accurately determine the change of the user's emotion.

[0042] In this embodiment, by setting an "important plot time period", the key plots of the multimedia file are marked out in advance, and an average heart rate value of the user merely within the important plot time period is calculated. This method can further highlight the change of the user's heart rate in the key plots. In addition, since the user may perform other activities within other periods of the multimedia file except the important plot time period, such as pouring water, washing hands and even doing housework and so on, these activities may affect the determination accuracy when an overall average heart rate value is calculated. However, within the time periods of the important plot time period which may be attractive, the user usually browses the multimedia file carefully, and thus the heart rate values of the user within these time periods are of higher accuracy.

[0043] Fig. 4 shows a flowchart of a method for multimedia evaluation based on heart rate measurement according to an optional embodiment of the present disclosure. As shown in Fig. 4, in an optional embodiment, after the step S10 of acquiring actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file, the following steps are included.

[0044] S30: the heart rate of the user is monitored according to the actual heartbeat measurement data.

[0045] S31: if the heart rate of the user rises and exceeds a preset first threshold, this moment is recorded as a starting time point.

[0046] S32: if the heart rate of the user falls and is smaller than the first threshold, this moment is recorded as an ending time point.

[0047] S33: the moments of a starting point and an ending point of the important time period

are corrected by comparing the starting time point and the ending time point with the starting point and the ending point of the important plot time period.

[0048] The important plot time period is defined manually in advance, the determination of which is subjective to some extent. If it is found that the offset value between the time when the real-time heart rates of many users fluctuate and a preset important plot time period is relatively large, the starting point and the ending point of the important plot time period can be adjusted to be more accurate.

[0049] Optionally, when correcting the moments of the starting point and the ending point of the important plot time period, the heart rate change conditions of a certain number of users before and after each important plot time period can be determined, and if the difference between the starting points where the heart rates of most users fluctuate and the difference between the ending points where the heart rates of most users fluctuate are both small and the difference between the mean value of the starting points where the heart rates of most users fluctuate and the starting point of the important plot time period and the difference between the mean value of the ending points where the heart rates of most users fluctuate and the ending point of the important plot time period are both large, the starting point and the ending point of the important plot time period may be changed to the mean value of the starting points and the mean value of the ending points where the heart rates of most users fluctuate so that the subsequent measurement and calculation are more accurate.

[0050] It should be noted that expressions such as “first” and “second” used in the embodiments of the present disclosure are used for distinguishing two different entities or different parameters with the same name. Therefore, it would be appreciated that “first” and “second” are merely for the sake of convenience of description and should not be understood as a limitation to the embodiments of the present disclosure. This point will not be repeated in the subsequent embodiments.

[0051] As shown in the figure, in an optional embodiment, after step S12 of calculating an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data, the following step may be included.

[0052] S40: it is determined whether the difference between the average heart rate of the user and the standard value reaches a preset first threshold within a first duration after the playing of the multimedia file is started, and if yes, then it is determined that the result of this measurement is invalid.

[0053] In order to prevent a user from performing other physical activities while browsing a multimedia file which may affect the accuracy in determining the heart rate, an average heart rate value of the user is calculated within a certain time after the playing of the multimedia file is started, and it is determined whether difference between the average heart rate value of the user and a standard value reaches a certain threshold at this moment, that is, whether the average heart rate value of the user at this moment is too high (or too low, for example, caused by an improper wearing of the heart rate measurement device). If yes, then it is determined that this measurement result is invalid, avoiding the effect to the mean value of the overall evaluation score by the measured abnormal data, thus the scoring of the multimedia file is more accurate.

[0054] In an optional embodiment, in step S12, the calculating offset of the average heart rate value with respect to the standard value and calculating and reporting an evaluation score of the multimedia file by the user according to the offset may include the following steps.

[0055] S50: an average heart rate value of the user in a peaceful state is measured to be taken as a preset standard value N.

[0056] S51: an evaluation score $S = (S_{\max} - S_{\min}) \frac{n}{N} + 2S_{\min} - S_{\max}$ is calculated,

wherein $S_{\max}$ is a preset highest evaluation score, $S_{\min}$ is a preset lowest evaluation score, and n is the average heart rate value of the user within the specified time interval during the playing of the multimedia file.

[0057] Optionally, if S is greater than Smax or smaller than Smin, it is determined whether the deviation between S and Smax or between S and Smin is too large. A too large deviation indicates that an error occurs in this heart rate measurement process, and the result is not correct and should not be reported.

[0058] In other optional embodiments, other calculation formulas may be used to calculate the score. For example, according to the above calculation method, S is multiplied with an adjustment coefficient which increases with the increasing of the different between n and N. As such, if the deviation between the measurement average heart rate value of the user and the standard value is too large, this difference can be further expanded, so as to fully reflect the change of the user's heart rate.

[0059] In an optional embodiment, S50 for measuring an average heart rate value of the user in a peaceful state includes the following steps.

[0060] S60: after a measurement instruction is acquired, time is kept from zero and the

heartbeats of the user are measured. The measurement instruction is sent out by the user. For example, an option of “measuring standard heart rate” may be added in the apparatus, after pressed down by the user, the apparatus receives a measurement instruction, and the user is prompted to keep calm through text or voice and so on. Then, the apparatus starts to keep and perform measurements.

[0061] S61: if the $\left(\frac{B_0 - B_1}{T} - \frac{B_1 - B_2}{T} \right)$ measured at a time t is smaller than a preset second

threshold, an average heart rate value of the user within a second time period is measured from the time t and is used as the average heart rate of the user in a peaceful state. T is a preset time interval, B0 is the total heartbeats of the user before the time t, B1 is the total heartbeats of the user before the time t-T, and B2 is the total heartbeats of the user before the time t-2T. The meaning of this step is to compare whether the change of the average heartbeats of the user within two adjacent time intervals is small enough. If it is small enough, it indicates that the user has come into a relatively peaceful state, and the average heart rate of the user calculated within a certain time from this time may obtain a more accurate average heart rate value of the user in a peaceful state.

[0062] Fig. 5 shows a module diagram of an apparatus for multimedia evaluation based on heart rate measurement according to an embodiment of the present disclosure. As shown in Fig. 5, an apparatus for multimedia evaluation based on heart rate measurement provided according to an embodiment of the present disclosure includes: a data acquisition unit 70 configured to acquire actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file; and a data processing unit 71 configured to obtain an evaluation result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result.

[0063] In this embodiment, the measurement of actual heartbeat measurement data of a user during the playing of a multimedia file acquired by the data acquisition unit 70 does not need the user to perform other operations, which is simple and convenient. An evaluation result of the multimedia file by the user is obtained by the data processing unit 71 according to the actual heartbeat measurement data and a correlation between a reference heartbeat measurement data and an evaluation result. This evaluation result is directly obtained according to the heart rate of the user, which reflects the real emotion of the user, can be used to determine more accurately the popularity of the multimedia file, and avoids problems such

as an inaccurate score and so on.

[0064] In an optional embodiment, the reference heartbeat measurement data includes a standard value of the heart rate of the user, and the data processing unit 71 is configured to: 1) calculate an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data; 2) calculate an offset of the average heart rate value with respect to the standard value; and 3) calculate and report an evaluation score of the multimedia file by the user according to the offset.

[0065] In an optional embodiment, the multimedia file is provided with at least one important plot time period in advance, and the data processing unit 71 includes: an important plot processing module 72 configured to count heartbeats of a user within each of the at least one important plot time period according to the actual heartbeat measurement data and divide the counted heartbeats number by the length of the important plot time period to obtain an average heart rate value of the user within each important plot time period; and further configured to calculate a mean value of the average heart rate value of the user within each important plot time period to obtain the average heart rate value of the user within the specified time interval during the playing of the multimedia file.

[0066] In an optional embodiment, the data processing unit 71 includes: an important plot correction module 73 configured to: monitor the heart rate of a user according to the actual heartbeat measurement data; record a time at which the heart rate of the user rises to exceed a preset first threshold as a starting time point; and record a time at which the heart rate of the user falls to be smaller than the first threshold as an ending time point. The important plot correction module 73 may be further configured to correct the times of a starting point and an ending point of the important time period by comparing the starting time point and the ending time point with the starting point and the ending point of the important plot time period.

[0067] In an optional embodiment, the data acquisition unit 70 is configured to obtain an average heart rate value of a user measured in a peaceful state as a preset standard value N. The data processing unit 71 includes an evaluation unit 74 configured to calculate an

evaluation score $S = (S_{\max} - S_{\min}) \frac{n}{N} + 2S_{\min} - S_{\max}$, wherein $S_{\max}$ is a preset highest

evaluation score, $S_{\min}$ is a preset lowest evaluation score, and n is the average heart rate value of the user within the specified time interval which is measured during the playing of the multimedia file.

[0068] It can be seen from the above that in the method and apparatus for multimedia evaluation based on heart rate measurement provided in the embodiments of the present disclosure, actual heartbeat measurement data of a user during the playing of a multimedia file is acquired and an evaluation result of the multimedia file from the user is obtained according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and an evaluation result. Since the evaluation result is generated based on the actual heartbeat measurement data of the user, the obtained evaluation result is a reflection of the real emotion of the user to the multimedia file, which can provide better reality and reference value compared to the manual scoring method and provide a reliable basis for multimedia file evaluation.

[0069] FIG. 6 provides an example of an apparatus according to one or more embodiments of the present disclosure. As shown in FIG. 6, the apparatus includes a central processing unit (CPU) 71, a storage medium 72, and a bus 73 that connects the CPU 71 and the storage medium 72. The storage medium 72 may store the computer executable instructions. When the computer executable instructions are executed by the CPU 71, the apparatus may perform the methods disclosed in this disclosure.

[0070] As would be appreciated by those skilled in the art, any of the embodiments discussed above is only exemplary and is not intended to imply that the scope of the present disclosure (including the claims) is limited to the examples. Without departing from the concept of the disclosure, the above embodiments or technical features of different embodiments may be combined, the steps may be performed in an arbitrary order, and there exist many other alterations for the above-described present disclosure in different aspects. For simplicity, these modified embodiments are not described in detail here.

[0071] In addition, in order to simply explain and discuss as well as not to obscure the present disclosure, well-known power/grounding connection of integrated circuit (IC) chips and other components may be shown or may not be shown in the provided drawings. Moreover, the devices may be illustrated via block diagrams to avoid obscuring the present disclosure; and moreover, real circumstances are also taken into account. That is, the details of the embodiments of these devices shown as the block diagrams are highly dependent on a platform for implementing the present disclosure, which indicates that these details should be totally in an understandable scope of those skilled in the art. Under the condition that the

specific details (e.g., circuits) are elaborated to describe the exemplary embodiments of the present disclosure, it is apparent for those skilled in the art that the present disclosure may be implemented if there is no specific detail or the specific details have changed. Therefore, the descriptions should be considered as illustrative but not restrictive.

5 [0072] Although the present disclosure is described with specific embodiments, based on the forgoing descriptions, lots of alternatives, modifications and variations of the embodiments will be apparent for ordinary skilled in the art. For example, other memory architectures (e.g., a dynamic RAM (DRAM)) may be used in the discussed embodiments.

[0073] The present disclosure may include dedicated hardware implementations such as
10 application specific integrated circuits, programmable logic arrays and other hardware devices. The hardware implementations can be constructed to implement one or more of the methods described herein. Applications that may include the apparatus and systems of various examples can broadly include a variety of electronic and computing systems. One or more examples described herein may implement functions using two or more specific
15 interconnected hardware modules or devices with related control and data signals that can be communicated between and through the modules, or as portions of an application-specific integrated circuit. Accordingly, the computing system disclosed may encompass software, firmware, and hardware implementations. The terms "module," "sub-module," "unit," or "sub-unit" may include memory (shared, dedicated, or group) that stores code or instructions
20 that can be executed by one or more processors.

[0074] The embodiments of the present disclosure are intended to embrace all such alternatives, modifications and variations that fall within the wide range of the appended claims. Thus, any omission, modification, equivalent replacement, improvement and so on made within the spirit and principle of the present disclosure shall be encompassed by the
25 protection scope of the present disclosure.

WHAT IS CLAIMED IS

1. A method for multimedia evaluation based on heart rate measurement, comprising:

5 acquiring actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file; and

obtaining an evaluation result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and the evaluation result.

10

2. The method according to claim 1, wherein the reference heartbeat measurement data comprises a standard value of the heart rate of the user, and the obtaining an evaluation result of the multimedia file from the user according to the actual heartbeat measurement data and a correlation between reference

15 heartbeat measurement data and the evaluation result comprises:

calculating an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data; and

20 calculating an offset of the average heart rate value with respect to the standard value, calculating and reporting a score of evaluation on the multimedia file by the user according to the offset.

3. The method according to claim 2, wherein at least one important plot time period is preset in the multimedia file, and the calculating an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data comprises:

25 counting heartbeats of the user within each important plot time period according to the actual heartbeat measurement data and dividing the counted heartbeats number by the length of the important plot time period to obtain an average heart rate value of the user within each important plot time period; and

30 calculating a mean value of the average heart rate value of the user within each important plot time period to obtain the average heart rate value of the user

within the specified time interval during the playing of the multimedia file.

4. The method according to claim 3, wherein after acquiring actual heartbeat measurement data of a user sent by a heart rate measurement device

5 during the playing of a multimedia file, the method comprises:

monitoring the heart rate of the user according to the actual heartbeat measurement data;

recording a time at which the heart rate of the user rises to exceed a preset first threshold as a starting time point;

10 recording a time at which the heart rate of the user falls to be smaller than the first threshold as an ending time point; and

correcting the time of a starting point and an ending point of the important time period by comparing the starting time point and the ending time point with the starting point and the ending point of the important plot time period.

15

5. The method according to claim 2, wherein the calculating an offset of the average heart rate value with respect to the standard value and calculating a score of evaluation on the multimedia file by the user according to the offset amplitude comprises:

20 measuring an average heart rate value of the user in a peaceful state as a preset standard value N; and

calculating an evaluation score $S = (S_{\max} - S_{\min}) \frac{n}{N} + 2S_{\min} - S_{\max}$,

wherein $S_{\max}$ is a preset highest evaluation score, $S_{\min}$ is a preset lowest evaluation score, and n is the average heart rate value of the user within the

25 specified time interval during the playing of the multimedia file.

6. An apparatus for multimedia evaluation based on heart rate measurement, comprising:

30 a data acquisition unit configured to acquire actual heartbeat measurement data of a user sent by a heart rate measurement device during the playing of a multimedia file; and

a data processing unit configured to obtain an evaluation result of the

multimedia file by the user according to the actual heartbeat measurement data and a correlation between reference heartbeat measurement data and evaluation result.

- 5 7. The apparatus according to claim 6, wherein the reference heartbeat measurement data comprises a standard value of the heart rate of the user, and the data processing unit is configured to: calculate an average heart rate value of the user within a specified time interval during the playing of the multimedia file according to the actual heartbeat measurement data; calculate an offset of the
10 average heart rate value to the standard value; and calculate and report a score of evaluation on the multimedia file by the user according to the offset.

8. The apparatus according to claim 7, wherein the multimedia file is provided with at least one important plot time period in advance, and the data
15 processing unit comprises:

 an important plot processing module configured to count the heartbeats of the user within each important plot time period according to the actual heartbeat measurement data and divide the counted heartbeats number by the length of the important plot time period to obtain an average heart rate value of the user within
20 each important plot time period; and further configured to calculate a mean value of the average heart rate value of the user within each important plot time period to obtain an average heart rate value of the user within the specified time interval during the playing of the multimedia file.

- 25 9. The apparatus according to claim 8, wherein the data processing unit comprises:

 an important plot correction module configured to: monitor the heart rate of the user according to the actual heartbeat measurement data; record a time at which the heart rate of the user rises to exceed a preset first threshold as a
30 starting time point; and record a time at which the heart rate of the user falls to be smaller than the first threshold as an ending time point; and the important plot correction module is further configured to correct the moments of a starting point and an ending point of the important time period by comparing the starting time

point and the ending time point with the starting point and the ending point of the important plot time period.

10. The apparatus according to claim 7, wherein the data acquisition unit
 5 is configured to measure an average heart rate value of the user in a peaceful state and take same as a preset standard value N; and
 the data processing unit comprises an evaluation unit configured to calculate an evaluation score $S = (S_{\max} - S_{\min}) \frac{n}{N} + 2S_{\min} - S_{\max}$, wherein $S_{\max}$ is a preset highest evaluation score, $S_{\min}$ is a preset lowest evaluation score, and
 10 n is the average heart rate value of the user within the specified time interval during the playing of the multimedia file.

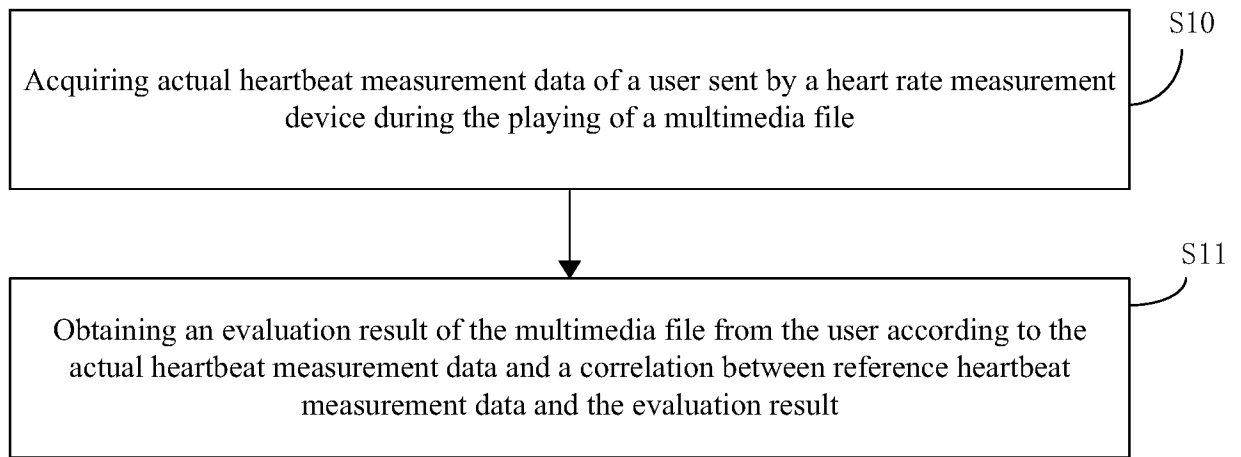
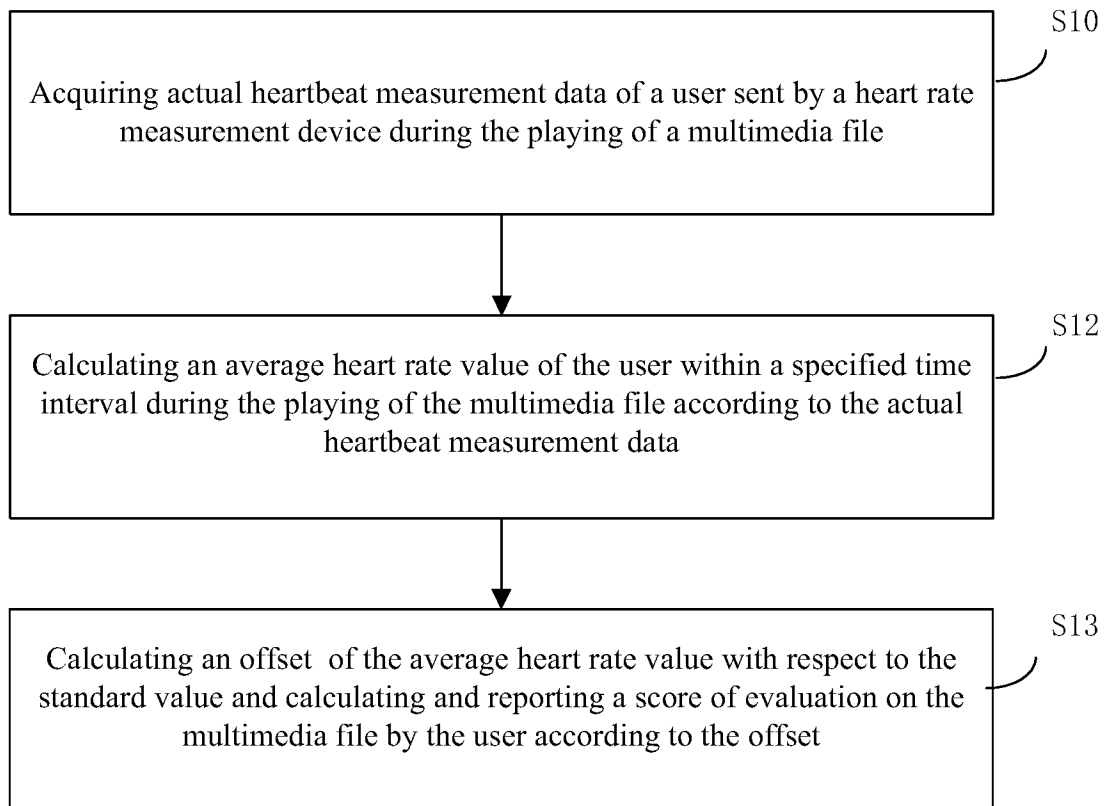
11. An electronic device, comprising:
 at least one processor; and
 15 a memory communicably connected with the at least one processor for storing instructions executable by the at least one processor, wherein execution of the instructions by the at least one processor causes the at least one processor to perform a method according to any one of claims 1 to 5.

20 12. A non-transitory computer-readable storage medium storing executable instructions, wherein the instructions, when executed by an electronic device, cause the electronic device to perform a method according to any one of claims 1 to 5.

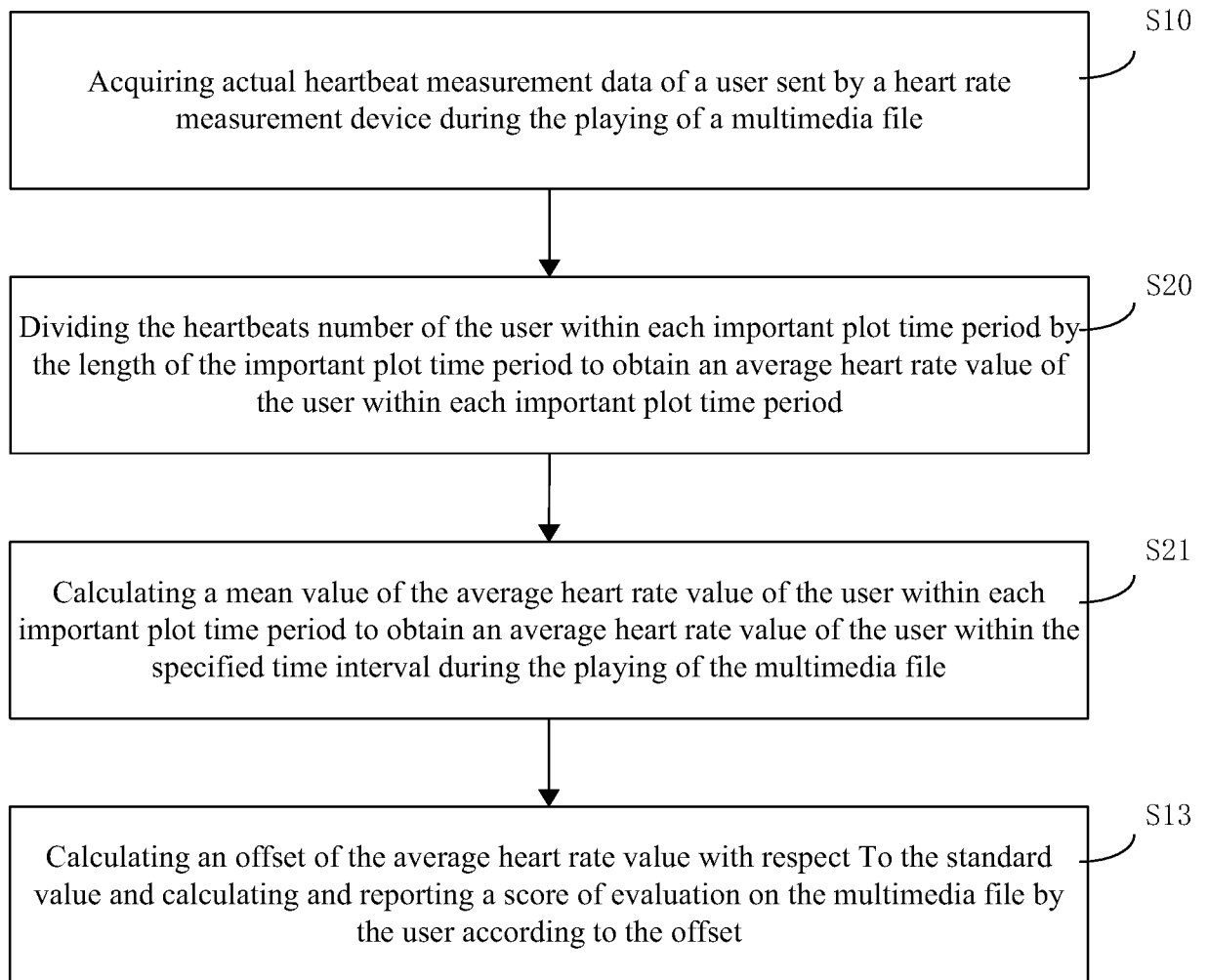
25 13. A computer program product, the computer program product comprising a computer program stored on a non-transitory computer-readable storage medium, the computer program comprising program code which, when executed on a computer, causes the computer to perform a method according to any one of claims 1 to 5.

30

1/4

**Fig. 1****Fig. 2**

2/4

**Fig. 3**

3/4

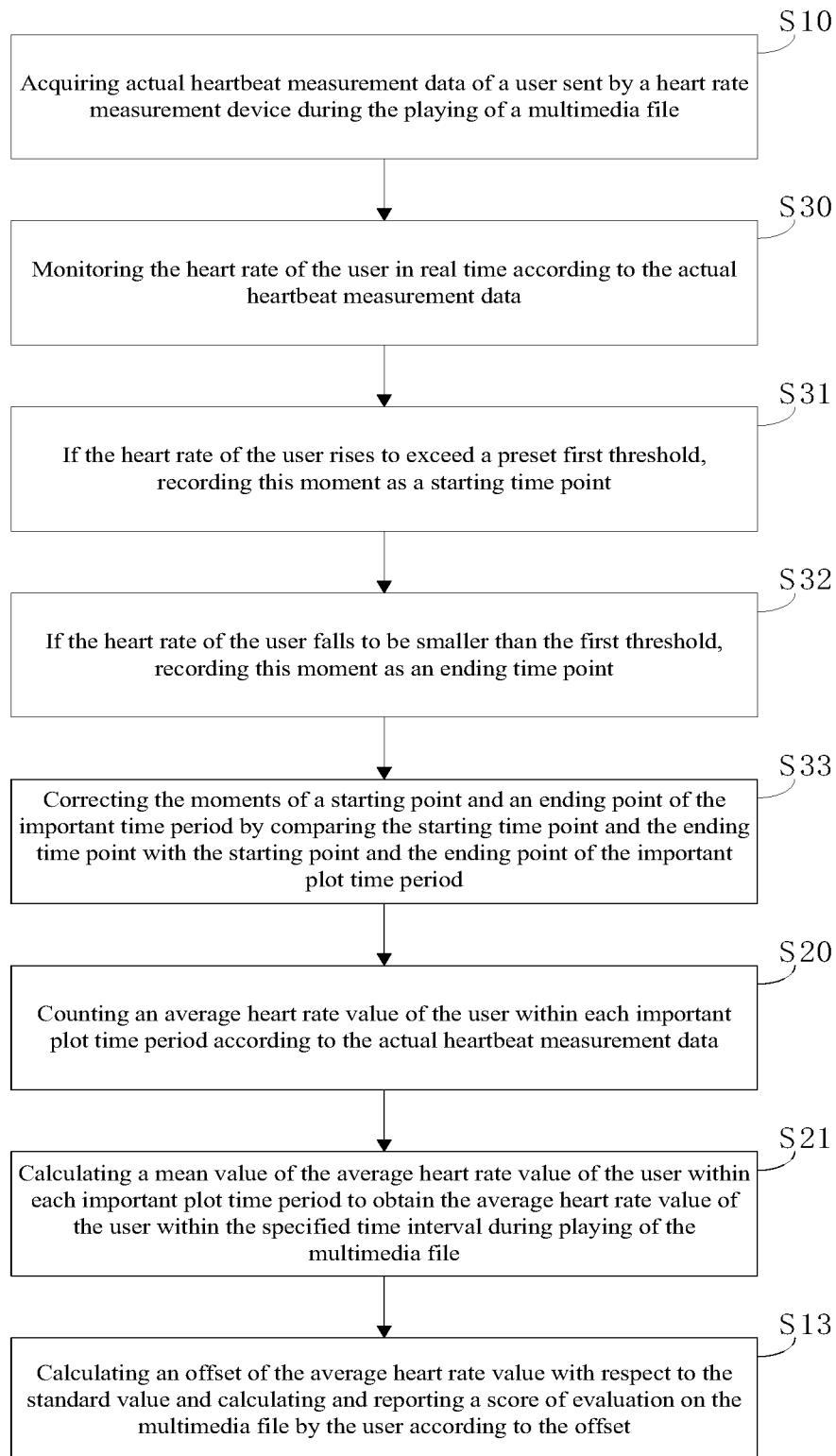


Fig. 4

4/4

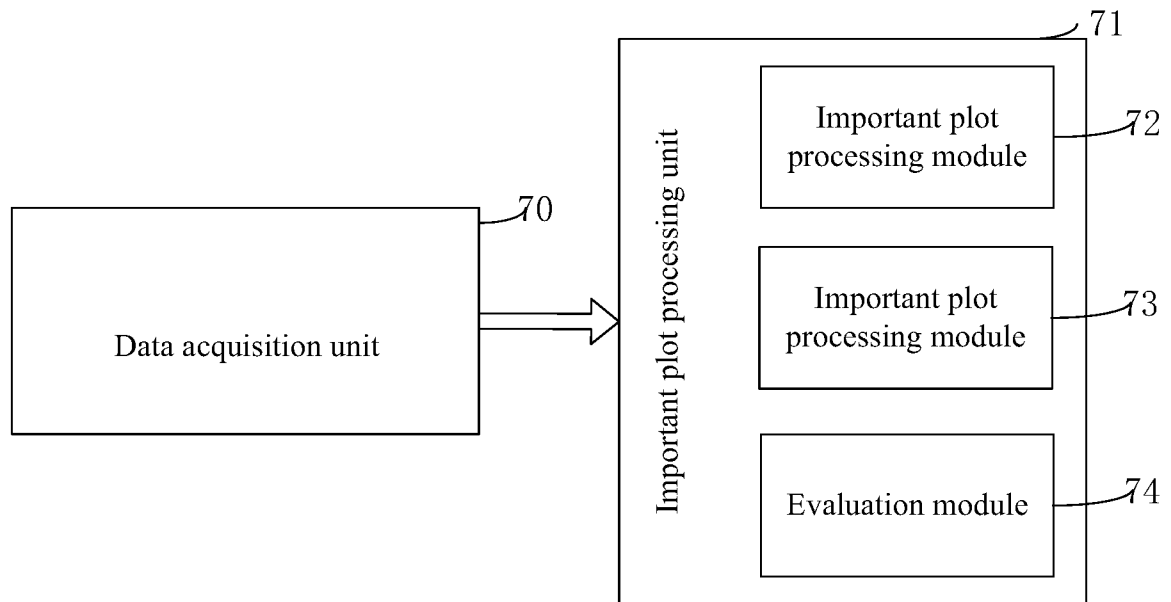


Fig. 5

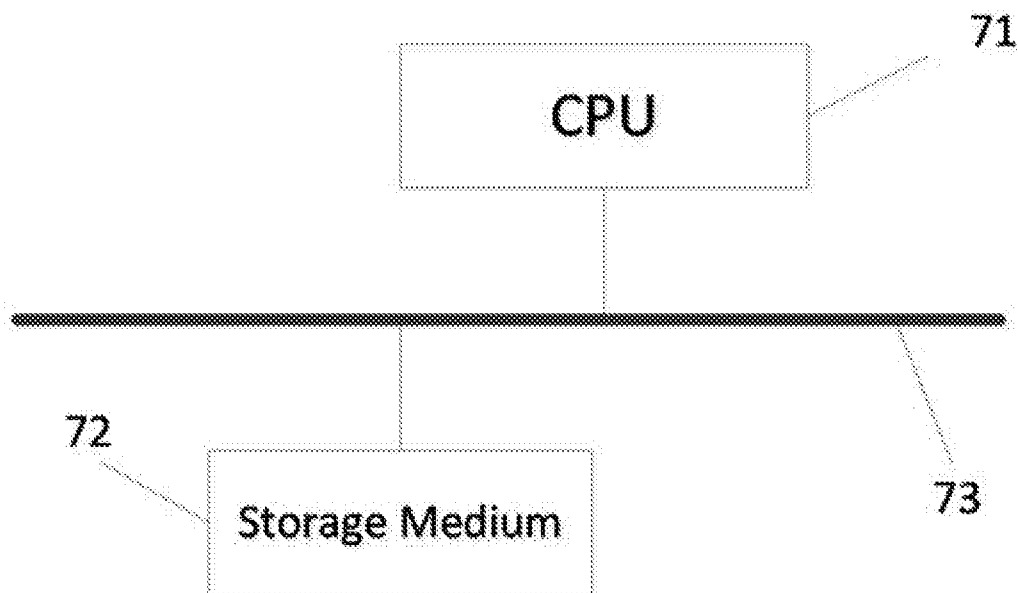


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/077017

A. CLASSIFICATION OF SUBJECT MATTER

H04N 21/258(2011.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04N; A61B; G06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI,CNPAT,EPODOC,WPI:television, program, video, score, appraisal, value, evaluate, heartbeat, heart rate, average, reference

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102523493 A (SHENZHEN TCL NEW TECHNOLOGY CO., LTD.) 27 June 2012 (2012-06-27) Description, paragraphs [0004]-[0020] [0044]-[0080]	1-2, 6-7, 11-13
PX	CN 105852838 A (LETV INFORMATION TECH. BEIJING CO., LTD.) 17 August 2016 (2016-08-17) The whole document	1-13
A	CN 105139695 A (UNIV. NANTONG) 09 December 2015 (2015-12-09) The whole document	1-13
A	CN 104349206 A (LETV ZHIXIN ELECTRONICS TECHNOLOGY TIANJIN CO., LTD.) 11 February 2015 (2015-02-11) The whole document	1-13
A	US 2010190607 A1 (THINKFIT, LLC) 29 July 2010 (2010-07-29) The whole document	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

26 May 2017

Date of mailing of the international search report

20 June 2017

Name and mailing address of the ISA/CN

**STATE INTELLECTUAL PROPERTY OFFICE OF THE
P.R.CHINA**
**6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing
100088
China**

Facsimile No. (86-10)62019451

Authorized officer

YU,Lei

Telephone No. (86-10)62413218

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2017/077017

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	102523493	A	27 June 2012	None	
CN	105852838	A	17 August 2016	None	
CN	105139695	A	09 December 2015	None	
CN	104349206	A	11 February 2015	None	
US	2010190607	A1	29 July 2010	None	