

HUMAN-MACHINE INPUT OPERATION IDENTIFICATION METHOD, APPARATUS AND DEVICE, AND READABLE STORAGE MEDIUM

[0001] This application claims priority to the Chinese Patent Application No. 201711234839.1, filed with the National Intellectual Property Administration, PRC on November 29, 2017, and entitled "HUMAN-MACHINE INPUT OPERATION IDENTIFICATION METHOD, APPARATUS AND DEVICE, AND READABLE STORAGE MEDIUM", which is incorporated herein by reference in its entirety.

[0002] TECHNICAL FIELD

[0003] This application relates to the technical field of computer applications, and in particular, to a human-machine input operation identification method, apparatus and device, and a readable storage medium.

[0004] BACKGROUND

[0005] At present, the long-term and disorderly development of Internet financial behaviors has made it possible for the development of "dark industry producers", who make use of features of existing loan platforms, such as a mobile APP having a weak risk control capability, and using big data online auditing, to continuously explore loopholes or weaknesses in risk control rules to gain loans by counterfeiting or cheating. For example, some existing microfinance platforms have been attacked by the dark industry producers upon launched, which causes a phenomenon of over 10,000 loan applications for days. Therefore, how to effectively identify a dark industry behavior of gaining a loan by cheating has become a problem for all practitioners in the financial industry.

[0006] SUMMARY

[0007] The main purpose of this application is to provide a human-machine input operation identification method, apparatus and device, and a readable storage medium, aiming at resolving the technical problem in the prior art of the difficulty in the identification of a dark industry behavior of gaining loan by cheating due to that a machine operation behavior cannot be effectively identified.

- [0008] In order to achieve the foregoing purpose, this application provides a human-machine input operation identification method, including:
- [0009] when a loan input operation is detected on a mobile terminal, determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;
- [0010] when the mobile terminal is located within the preset coordinate range, obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same; and
- [0011] when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to a loan request as a machine operation behavior.
- [0012] Optionally, the step of determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range includes:
- [0013] recording rotation angles of the mobile terminal in different directions by using an angle array value, where the built-in coordinate system includes an X axis, a Y axis, and a Z axis, where pointing directions of the X axis, the Y axis, and the Z axis of the built-in coordinate system are fixed, a direction perpendicular to the ground is taken as a Z-axis direction of the mobile terminal, a rotation angle of the mobile terminal along the Z axis is used for describing a rotation direction of the device in a horizontal plane, in the case that the mobile terminal is placed on a table, the Z-axis direction points from the mobile terminal to the sky, an X-axis direction is from left to right along a horizontal direction of a screen of the mobile terminal, and a Y-axis direction points from the lower left corner of the screen to the top end of the screen along a vertical direction of the screen, and three variables, that is, a first angle value, a second angle value, and a third angle value, respectively represent the rotation angle of the mobile terminal around the Z axis, an inclined angle of the mobile terminal around the X axis, and a roll angle of the mobile terminal around the Y axis; and

- [0014] when a value range of the first angle value is 0° to 90° , a value range of the second angle value is -180° to 0° , and a value range of the third angle value is -45° to 45° , determining that the mobile terminal is located within the preset coordinate range.
- [0015] Optionally, the input data includes a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:
- [0016] obtaining the input data corresponding to the loan input operation, normalizing the input data, and taking the normalized input data as normalized data;
- [0017] obtaining a pre-stored target model constructed on the basis of a BP neural network, and taking the normalized data as an input vector of the target model to obtain an output vector; and
- [0018] when the output vector is located within a preset range, taking the input data as the target input data and using same.
- [0019] Optionally, the step of obtaining the input data corresponding to the loan input operation, and normalizing the input data includes:
- [0020] obtaining the input data corresponding to the loan input operation, and converting the input data into parameter values that can be identified by a computer; and
- [0021] obtaining a maximum value and a minimum value in all the parameter values, subtracting the minimum value from each of the parameter values to obtain a positive parameter value, obtaining a difference between the maximum value and the minimum value, and dividing each positive parameter value by the difference to obtain a normalized positive parameter value.
- [0022] Optionally, the input data includes a time attribute of the loan input operation; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:

- [0023] obtaining a minimum time slot between different loan input operations on the basis of the time attributes of the different loan input operations; and
- [0024] when the minimum time slot is greater than a first preset duration, obtaining the input data corresponding to the loan input operations, taking the input data as the target input data and using same.
- [0025] Optionally, after the step of obtaining a time slot between different loan input operations, the method includes:
- [0026] when the minimum time slot is less than the first preset duration, obtaining the number of loan input operations within a second preset duration, where the second preset duration is greater than the first preset duration; and
- [0027] when the number of loan input operations is greater than a preset number, discarding the input data and not using same.
- [0028] Optionally, after the step of when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to the loan request as a machine operation behavior, the method includes:
- [0029] obtaining a mobile terminal ID number corresponding to the machine operation behavior, and prohibiting, within a third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number.
- [0030] In addition, in order to achieve the foregoing purpose, this application also provides a human-machine input operation identification apparatus, including:
- [0031] a determination module, configured to, when a loan input operation is detected on a mobile terminal, determine on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;
- [0032] a first obtaining module, configured to, when the mobile terminal is located within the preset coordinate range, obtain input data corresponding to the loan input operation, take the input data as target input data and use same; and

- [0033] an identification module, configured to, when the mobile terminal is not located within the preset coordinate range, identify the input operation corresponding to a loan request as a machine operation behavior.
- [0034] Optionally, the first obtaining module includes:
- [0035] a first obtaining unit, configured to record rotation angles of the mobile terminal in different directions by using an angle array value, where the built-in coordinate system includes an X axis, a Y axis, and a Z axis, where pointing directions of the X axis, the Y axis, and the Z axis of the built-in coordinate system are fixed, a direction perpendicular to the ground is taken as a Z-axis direction of the mobile terminal, a rotation angle of the mobile terminal along the Z axis is used for describing a rotation direction of the device in a horizontal plane, in the case that the mobile terminal is placed on a table, the Z-axis direction points from the mobile terminal to the sky, an X-axis direction is from left to right along a horizontal direction of a screen of the mobile terminal, and a Y-axis direction points from the lower left corner of the screen to the top end of the screen along a vertical direction of the screen, and three variables, that is, a first angle value, a second angle value, and a third angle value, respectively represent the rotation angle of the mobile terminal around the Z axis, an inclined angle of the mobile terminal around the X axis, and a roll angle of the mobile terminal around the Y axis; and
- [0036] a determination unit, configured to, when a value range of the first angle value is 0° to 90° , a value range of the second angle value is -180° to 0° , and a value range of the third angle value is -45° to 45° , determine that the mobile terminal is located within the preset coordinate range.
- [0037] Optionally, the input data includes a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and the first obtaining module includes:

- [0038] a second obtaining unit, configured to obtain the input data corresponding to the loan input operation, normalize the input data, and take the normalized input data as normalized data;
- [0039] a third obtaining unit, configured to obtain a pre-stored target model constructed on the basis of a BP neural network, and take the normalized data as an input vector of the target model to obtain an output vector; and
- [0040] a first using unit, configured to, when the output vector is located within a preset range, take the input data as the target input data and use same.
- [0041] Optionally, the second obtaining unit includes:
- [0042] an obtaining sub-unit, configured to obtain the input data corresponding to the loan input operation, and convert the input data into parameter values that can be identified by a computer; and
- [0043] a normalization sub-unit, configured to obtain a maximum value and a minimum value in all the parameter values, subtract the minimum value from each of the parameter values to obtain a positive parameter value, obtain a difference between the maximum value and the minimum value, and divide each positive parameter value by the difference to obtain a normalized positive parameter value.
- [0044] Optionally, the input data includes a time attribute of the loan input operation; and the first obtaining module includes:
- [0045] a fourth obtaining unit, configured to obtain a minimum time slot between different loan input operations on the basis of the time attributes of the different loan input operations; and
- [0046] a second using unit, configured to, when the minimum time slot is greater than a first preset duration, obtain the input data corresponding to the loan input operations, take the input data as the target input data and use same.
- [0047] Optionally, the first obtaining module further includes:

- [0048] a fifth obtaining unit, configured to, when the minimum time slot is less than the first preset duration, obtain the number of loan input operations within a second preset duration, where the second preset duration is greater than the first preset duration; and
- [0049] a determination unit, configured to, when the number of loan input operations is greater than a preset number, discard the input data and not use same.
- [0050] Optionally, the human-machine input operation identification apparatus further includes:
- [0051] a second obtaining module, configured to obtain a mobile terminal ID number corresponding to the machine operation behavior, and prohibit, within a third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number.
- [0052] In addition, in order to achieve the foregoing purpose, this application also provides a human-machine input operation identification device, including: a memory, a processor, a communication bus, and a human-machine input operation identification program stored on the memory,
- [0053] the communication bus is configured to implement communication connection between the processor and the memory; and
- [0054] the processor is configured to execute the human-machine input operation identification program, so as to implement the following steps:
- [0055] when a loan input operation is detected on a mobile terminal, determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;
- [0056] when the mobile terminal is located within the preset coordinate range, obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same; and
- [0057] when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to a loan request as a machine operation behavior.

- [0058] Optionally, the step of determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range includes:
- [0059] recording rotation angles of the mobile terminal in different directions by using an angle array value, where the built-in coordinate system includes an X axis, a Y axis, and a Z axis, where pointing directions of the X axis, the Y axis, and the Z axis of the built-in coordinate system are fixed, a direction perpendicular to the ground is taken as a Z-axis direction of the mobile terminal, a rotation angle of the mobile terminal along the Z axis is used for describing a rotation direction of the device in a horizontal plane, in the case that the mobile terminal is placed on a table, the Z-axis direction points from the mobile terminal to the sky, an X-axis direction is from left to right along a horizontal direction of a screen of the mobile terminal, and a Y-axis direction points from the lower left corner of the screen to the top end of the screen along a vertical direction of the screen, and three variables, that is, a first angle value, a second angle value, and a third angle value, respectively represent the rotation angle of the mobile terminal around the Z axis, an inclined angle of the mobile terminal around the X axis, and a roll angle of the mobile terminal around the Y axis; and
- [0060] when a value range of the first angle value is 0° to 90° , a value range of the second angle value is -180° to 0° , and a value range of the third angle value is -45° to 45° , determining that the mobile terminal is located within the preset coordinate range.
- [0061] Optionally, the input data includes a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:
- [0062] obtaining the input data corresponding to the loan input operation, normalizing the input data, and taking the normalized input data as normalized data;

- [0063] obtaining a pre-stored target model constructed on the basis of a BP neural network, and taking the normalized data as an input vector of the target model to obtain an output vector; and
- [0064] when the output vector is located within a preset range, taking the input data as the target input data and using same.
- [0065] Optionally, the step of obtaining the input data corresponding to the loan input operation, and normalizing the input data includes:
- [0066] obtaining the input data corresponding to the loan input operation, and converting the input data into parameter values that can be identified by a computer; and
- [0067] obtaining a maximum value and a minimum value in all the parameter values, subtracting the minimum value from each of the parameter values to obtain a positive parameter value, obtaining a difference between the maximum value and the minimum value, and dividing each positive parameter value by the difference to obtain a normalized positive parameter value.
- [0068] Optionally, the input data includes a time attribute of the loan input operation; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:
- [0069] obtaining a minimum time slot between different loan input operations on the basis of the time attributes of the different loan input operations; and
- [0070] when the minimum time slot is greater than a first preset duration, obtaining the input data corresponding to the loan input operations, taking the input data as the target input data and using same.
- [0071] Optionally, after the step of obtaining a time slot between different loan input operations, the method includes:
- [0072] when the minimum time slot is less than the first preset duration, obtaining the number of loan input operations within a second preset duration, where the second preset duration is greater than the first preset duration; and

- [0073] when the number of loan input operations is greater than a preset number, discarding the input data and not using same.
- [0074] Optionally, after the step of when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to the loan request as a machine operation behavior, the method includes:
- [0075] obtaining a mobile terminal ID number corresponding to the machine operation behavior, and prohibiting, within a third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number.
- [0076] In addition, in order to achieve the foregoing purpose, this application also provides a readable storage medium, having one or more programs stored thereon, where the one or more programs can be executed by one or more processors to:
- [0077] when a loan input operation is detected on a mobile terminal, determine on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;
- [0078] when the mobile terminal is located within the preset coordinate range, obtain input data corresponding to the loan input operation, take the input data as target input data and use same; and
- [0079] when the mobile terminal is not located within the preset coordinate range, identify the input operation corresponding to a loan request as a machine operation behavior.
- [0080] According to this application, when a loan input operation is detected on a mobile terminal, whether the mobile terminal is located within a preset coordinate range is determined on the basis of a built-in coordinate system of the mobile terminal; when the mobile terminal is located within the preset coordinate range, input data corresponding to the loan input operation is obtained, the input data is taken as target input data and used; and when the mobile terminal is not located within the preset coordinate range, the input operation corresponding to the loan request is identified as a machine operation behavior. In this application, whether the mobile terminal is located within the preset coordinate range is determined by means of the built-in coordinate system of the mobile terminal.

That is, the purpose of human-machine operation identification is achieved by determining whether a mobile phone orientation is normal when a user inputs information such as a character. Therefore, the technical problem in the prior art of the difficulty in the identification of a dark industry behavior of gaining loan by cheating due to that a machine operation behavior cannot be effectively identified is resolved, thereby improving the experience.

[0081] **BRIEF DESCRIPTION OF DRAWINGS**

[0082] FIG. 1 is a schematic flowchart of a first embodiment of a human-machine input operation identification method according to this application;

[0083] FIG. 2 is a schematic flowchart of a second embodiment of a human-machine input operation identification method according to this application; and

[0084] FIG. 3 is a schematic structural diagram of a device of a hardware running environment involved in a method according to embodiments of this application.

[0085] The achievement of the purpose, functional features and advantages of this application will be further described in combination of the embodiments and with reference to the accompanying drawings.

[0086] **DESCRIPTION OF EMBODIMENTS**

[0087] It should be understood that the specific embodiments described here are simply used for explaining this application, and are not intended to limit this application.

[0088] This application provides a human-machine input operation identification method. In a first embodiment of the human-machine input operation identification method of this application, referring to FIG. 1, the human-machine input operation identification method includes:

[0089] Step S10: When a loan input operation is detected on a mobile terminal, determine whether the mobile terminal is located within a preset coordinate range on the basis of a built-in coordinate system of the mobile terminal.

- [0090] It should be noted that the human-machine input operation identification method of this embodiment is applied to a loan APP on the mobile terminal, so as to identify a dark industry behavior of batched loan application by a robot in the loan APP.
- [0091] When the loan input operation is detected on the mobile terminal, whether the mobile terminal is located within the preset coordinate range is determined on the basis of the built-in coordinate system of the mobile terminal, where the loan input operation may be operation behaviors, such as the trigger for a loan request, the upload of loan data, and the entry of the identity of a loaner. The mobile terminal includes a mobile phone, a tablet computer, and the like. It should be noted that the mobile terminal is provided with the built-in coordinate system, and the built-in coordinate system is generally a three-dimensional coordinate system.
- [0092] The step S10 includes:
- [0093] Step S11: Record rotation angles of the mobile terminal in different directions by using an angle array value, where the built-in coordinate system includes an X axis, a Y axis, and a Z axis, where pointing directions of the X axis, the Y axis, and the Z axis of the built-in coordinate system are fixed, a direction perpendicular to the ground is taken as a Z-axis direction of the mobile terminal, a rotation angle of the mobile terminal along the Z axis is used for describing a rotation direction of the device in a horizontal plane, in the case that the mobile terminal is placed on a table, the Z-axis direction points from the mobile terminal to the sky, an X-axis direction is from left to right along a horizontal direction of a screen of the mobile terminal, and a Y-axis direction points from the lower left corner of the screen to the top end of the screen along a vertical direction of the screen, and three variables, that is, a first angle value, a second angle value, and a third angle value, respectively represent the rotation angle of the mobile terminal around the Z axis, an inclined angle of the mobile terminal around the X axis, and a roll angle of the mobile terminal around the Y axis.
- [0094] In this embodiment, the terminal is provided with the three-dimensional coordinate system including the X axis, the Y axis, and the Z axis; the pointing directions of the X

axis, the Y axis, and the Z axis of the three-dimensional coordinate system are fixed; the direction perpendicular to the ground is taken as the Z-axis direction of the terminal; the rotation angle of the terminal along the Z axis is used for describing the rotation direction of the device in the horizontal plane; in the case that the mobile phone is placed on a table, the Z-axis direction points from the mobile phone to the sky, the X-axis direction is from left to right along the horizontal direction of the screen, and the Y-axis direction points from the lower left corner of the screen to the top end of the screen along the vertical direction of the screen; the rotation angles of the mobile phone in different directions are recorded by using the angle array value; three angle value variables, that is, the first angle value, the second angle value, and the third angle value, respectively represent the rotation angle of the mobile phone around the Z axis, the inclined angle of the mobile phone around the X axis, and the roll angle of the mobile phone around the Y axis; a value range of the first angle value is 0° - 360° , where 0° represents North, 90° represents East, 180° represents South, and 270° represents West; a value range of the second angle value is that $-180^{\circ} \leq \text{the second angle value} \leq 180^{\circ}$, where the second angle value will change from 0° to -180° in a rotation process that the top of the mobile phone is lifted up (the screen is placed horizontally on a table top in a face-down way) until the mobile phone is rotated by 180° along the X axis, that is, once the top of the mobile phone is lifted up, the second angle value will gradually decrease to -180° . The second angle value will change between 0° to 180° if the bottom of the mobile phone is lifted up until the mobile phone is rotated by 180° along the X axis, that is, the second angle value will gradually increase to 180° ; and a value range of the third angle value is that $-90^{\circ} \leq \text{the third angle value} \leq 90^{\circ}$, where assuming that the screen of the mobile phone is placed horizontally on the table top in a face-up way, if the table top is flat, the third angle value should be 0. If the left side of the mobile phone is gradually lifted up, the third angle value will gradually decrease to -90° when the mobile phone is placed perpendicular to the table top. If the right side of the mobile phone is gradually lifted up, the third angle value will gradually increase to 90° when the mobile phone is placed perpendicular to the table top. The third angle value will

continue to change between -90° to 90° if the mobile phone continues to roll to the right or left from the perpendicular position.

[0095] Step S12: When the value range of the first angle value is 0° to 90° , the value range of the second angle value is -180° to 0° , and the value range of the third angle value is -45° to 45° , determine that the mobile terminal is located within the preset coordinate range.

[0096] It should be noted that during a manual input operation, the orientation of the mobile terminal or the coordinate range of the mobile terminal is definite, that is, it is determined that the mobile terminal is located within the preset coordinate range. In this embodiment, the preset coordinate range is a pre-stored range of the loan APP, and the range may be: the value range of the first angle value is 0° to 90° , the value range of the second angle value is -180° to 0° , and the value range of the third angle value is -45° to 45° . That is, when the value ranges of the first angle value, the second angle value, and the third angle value are met at the same time, it is determined that the mobile terminal is located within the preset coordinate range, and as long as any one of the first angle value, the second angle value, and the third angle value is not in the corresponding range, it is determined that the mobile terminal is not located within the preset coordinate range. Further, it is determined within a preset determination time period whether the first angle value, the second angle value, and the third angle value change, where when any one of the first angle value, the second angle value, and the third angle value changes, it is determined that the mobile terminal is located within the preset coordinate range. If it is determined within the preset determination time period that none of the first angle value, the second angle value, and the third angle value changes, it is determined that the mobile terminal is not located within the preset coordinate range.

[0097] Step S20: When the mobile terminal is located within the preset coordinate range, obtain input data corresponding to the loan input operation, and use the input data as target input data.

[0098] When the mobile terminal is located within the preset coordinate range, the input data corresponding to the loan input operation is obtained, the input data is taken as the target

input data and used, where the input data of a user includes a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and when the mobile terminal is located within the preset coordinate range, the input data corresponding to the loan input operation is obtained, the input data is taken as the target input data and used. That is, the data is taken as manually-input loan data, so as to perform a loan operation procedure according to the input loan data. No detail about the loan operation procedure will be discussed here.

[0099] Step S30: When the mobile terminal is not located within the preset coordinate range, identify the input operation corresponding to a loan request as a machine operation behavior.

[0100] When the mobile terminal is not located within the preset coordinate range, the input operation corresponding to the loan request is identified as the machine operation behavior, or further, when the mobile terminal is not located within the preset coordinate range, whether any one of the first angle value, the second angle value, and the third angle value changes is further determined, and when there is no change, the input operation corresponding to the loan request is identified as the machine operation behavior.

[0101] According to this application, when a loan input operation is detected on a mobile terminal, whether the mobile terminal is located within a preset coordinate range is determined on the basis of a built-in coordinate system of the mobile terminal; when the mobile terminal is located within the preset coordinate range, input data corresponding to the loan input operation is obtained, the input data is taken as target input data and used; and when the mobile terminal is not located within the preset coordinate range, the input operation corresponding to the loan request is identified as a machine operation behavior. In this application, whether the mobile terminal is located within the preset coordinate range is determined by means of the built-in coordinate system of the mobile terminal. That is, the purpose of human-machine operation identification is achieved by determining whether a mobile phone orientation is normal when a user inputs information

such as a character. Therefore, the technical problem in the prior art of the difficulty in the identification of a dark industry behavior of gaining loan by cheating due to that a machine operation behavior cannot be effectively identified is resolved, thereby improving the experience.

[0102] Further, this application provides a second embodiment of a human-machine input operation identification method. In the second embodiment, referring to FIG. 2, input data includes a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:

[0103] Step S21: Obtain the input data corresponding to the loan input operation, normalize the input data, and use the normalized input data as normalized data.

[0104] The step S21 includes:

[0105] Step SA1: Obtain the input data corresponding to the loan input operation, and convert the input data into parameter values that can be identified by a computer.

[0106] After the input data corresponding to the loan input operation is obtained, the input data is further determined to determine whether the data input operation is a machine input behavior or a manual input behavior. It should be noted that the obtained input data of the user further includes the contact area between the finger of the user and the touch screen of the mobile terminal, the contact profile between the finger and the touch screen of the mobile terminal, and the input pressure value during data input by the user. The input data corresponding to the loan input operation is obtained, the obtained input data of the user is first correspondingly converted into the parameter values that can be identified by the computer, and the parameter values are then normalized, so as to convert all data into standard values.

[0107] Step SA2: Obtain a maximum value and a minimum value in all the parameter values, subtract the minimum value from each of the parameter values to obtain a positive

parameter value, obtain a difference between the maximum value and the minimum value, and divide each positive parameter value by the difference to obtain a normalized positive parameter value.

[0108] The normalization process may project all the parameters values correspondingly generated from the input data of the user to 0 to 1. The specific process may perform division by a large number at the same time, where the large number=a maximum value-a minimum value. The maximum value indicates the maximum value among all the parameter values, and the minimum value indicates the minimum value among all the parameter values. In order to avoid the occurrence of a negative number, before dividing by the large number, the minimum value is subtracted from each of the parameter values, and then the large number is divided. For example, if the obtained parameter values is 100, 10, 20, -1, then the maximum value is 100 and the minimum value is -1. In order to avoid the occurrence of the negative number, the minimum value is first subtracted, thereby obtaining 101, 21, 31, 0, and then division by 101 is performed, so that the corresponding parameter values are converted into 1, 21/101, 31/101, 0. The normalized input data is taken as the normalized data.

[0109] Step S22: Obtain a pre-stored target model constructed on the basis of a BP neural network, and use the normalized data as an input vector of the target model to obtain an output vector.

[0110] The pre-stored target model constructed on the basis of the BP neural network is obtained, where a BP neural network model topological structure includes an input layer, a hidden layer, and an output layer. The concept of a BP neural network algorithm is: estimating an error of a direct permeable layer of the output layer by using an output error, that is, an actual output error, and an expected output error, then estimating an error of the previous layer by using this error, and so on, thereby obtaining error estimations of all other layers, where the BP neural network has a learning function, and the essence of learning is to perform dynamic adjustment on factor weights. The normalized data is taken as the input vector of the target model, the output vector is obtained on the basis of the input vector of

the target model, and whether the user data is a normal input operation is determined on the basis of the output vector.

- [0111] Step S23: When the output vector is located within a preset range, use the input data as the target input data.
- [0112] When the output vector is located within the preset range, the input data is taken as the target input data and used. When the output vector is not located within the preset range, the input data is discarded.
- [0113] In this embodiment, input data corresponding to a loan input operation is obtained, the input data is normalized, and the normalized input data is taken as normalized data; a pre-stored target model constructed on the basis of a BP neural network is obtained, and the normalized data is taken as an input vector of the target model to obtain an output vector; and when the output vector is located within a preset range, the input data is taken as target input data and used. The input data is further determined by means of the target model, so that the accuracy of human-machine input operation identification is improved.
- [0114] Further, this application provides a third embodiment of a human-machine input operation identification method. In the third embodiment, the input data includes a time attribute of the loan input operation; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:
- [0115] Step S24: Obtain a minimum time slot between different loan input operations on the basis of the time attributes of the different loan input operations.
- [0116] The different loan input operations are performed at different time points, so that the time attributes of the different loan input operations are different. The minimum time slot between the different loan input operations is obtained, for example, the minimum time slot may be 1 ms or 2 ms.
- [0117] Step S25: When the minimum time slot is greater than a first preset duration, obtain the input data corresponding to the loan input operations, and use the input data as the target input data.

- [0118] When the minimum time slot is greater than the first preset duration, where the first preset duration may be 0.5 ms, the input data is taken as the target input data and used. It should be noted that the time slot of machine input data is greater than the first preset duration.
- [0119] In this embodiment, a minimum time slot between different loan input operations is obtained on the basis of time attributes of the different loan input operations; and when the minimum time slot is greater than a first preset duration, the input data corresponding to the loan input operations is obtained, the input data is taken as the target input data and used. Further determination is performed by means of the minimum time slot, so that the accuracy of human-machine input operation identification is improved.
- [0120] Further, this application provides a fourth embodiment of a human-machine input operation identification method. In the fourth embodiment, after the step of obtaining a time slot between different loan input operations, the method includes:
- [0121] Step S26: When the minimum time slot is less than the first preset duration, obtain the number of loan input operations within a second preset duration, where the second preset duration is greater than the first preset duration.
- [0122] When the minimum time slot is less than the first preset duration, the number of loan input operations within the second preset duration is obtained, where the second preset duration may be 10 s, and is greater than the first preset duration.
- [0123] Step S27: When the number of loan input operations is greater than a preset number, discard the input data.
- [0124] When the number of loan input operations is greater than the preset number, the input data is discarded and not used. For example, when the number of loan input operations is greater than 20, the loan input operations are machine input by default, and the input data is discarded and not used.
- [0125] In this embodiment, when the minimum time slot is less than the first preset duration, the number of loan input operations within a second preset duration is obtained, where the second preset duration is greater than the first preset duration; and

- [0126] when the number of loan input operations is greater than a preset number, the input data is discarded and not used. This embodiment improves the accuracy of human-machine input operation identification.
- [0127] Further, on the basis of the first embodiment of the human-machine input operation identification method of this application, a fifth embodiment of the human-machine input operation identification method is provided. In the fifth embodiment, after the step of when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to a loan request as a machine operation behavior, the method includes:
- [0128] Step S40: Obtain a mobile terminal ID number corresponding to the machine operation behavior, and within a third preset duration, prohibit receiving the loan request sent by the mobile terminal corresponding to the ID number.
- [0129] In this embodiment, the mobile terminal ID number corresponding to the machine operation behavior is obtained, and within the third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number is prohibited, where the third preset duration may be one month, one year, or even more. When it is detected that the user data is abnormal input data, a terminal ID number corresponding to the abnormal input data is obtained, and an automatic alarming instruction is generated on the basis of the obtained terminal ID number, so as to implement automatic alarming processing.
- [0130] In this embodiment, a mobile terminal ID number corresponding to the machine operation behavior is obtained, and within a third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number is prohibited, so that a machine is prohibited from imitating a user operation behavior from an input source.
- [0131] Referring to FIG. 3, FIG. 3 is a schematic structural diagram of a device of a hardware running environment involved in a solution according to embodiments of this application.
- [0132] A human-machine input operation identification device in the embodiments of this application may be a PC, and may also be a terminal device such as an intelligent mobile

terminal, a tablet computer, an electronic book reader, an MP3 (Moving Picture Experts Group Audio Layer III) player, an MP4 (Moving Picture Experts Group Audio Layer IV) player, and a portable computer.

- [0133] As shown in FIG. 3, the human-machine input operation identification device may include: a processor 1001 such as a CPU, a memory 1005, and a communication bus 1002. The communication bus 1002 is configured to perform connection communication between the processor 1001 and the memory 1005. The memory 1005 may be a high-speed RAM memory, and may also be a non-volatile memory such as a magnetic-disk memory. Optionally, the memory 1005 may also be a storage device independent of the foregoing processor 1001.
- [0134] Optionally, the human-machine input operation identification device may also include a user interface, a network interface, a camera, a Radio Frequency (RF) circuit, a sensor, an audio circuit, a Wi-Fi module, etc. The user interface may include a display, and an input unit such as a keyboard. Optionally, the user interface may also include a standard wired or wireless interface. Optionally, the network interface may include a standard wired or wireless interface (such as a Wi-Fi interface).
- [0135] It can be understood by a person skilled in the art that the human-machine input operation identification device structure shown in FIG. 3 does not constitute any definition to the human-machine input operation identification device. More or less components than those shown in FIG. 3 can be included, or some component can be combined, or the components can be arranged in different manners.
- [0136] As shown in FIG. 3, the memory 1005 as a computer storage medium may include an operating system, a network communication module, and a human-machine input operation identification program. The operating system is a program for managing and controlling hardware and software resources of the human-machine input operation identification device, and supports running of the human-machine input operation identification program and other software and/or programs. The network communication module is configured to perform communication between different assemblies inside the

memory 1005, and communication between other hardware and software in the human-machine input operation identification device.

[0137] In the human-machine input operation identification device shown in FIG. 3, the processor 1001 is configured to execute the human-machine input operation identification program stored in the memory 1005, so as to perform the following steps:

[0138] when a loan input operation is detected on a mobile terminal, determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;

[0139] when the mobile terminal is located within the preset coordinate range, obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same; and

[0140] when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to a loan request as a machine operation behavior.

[0141] Further, the step of determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range includes:

[0142] recording rotation angles of the mobile terminal in different directions by using an angle array value, where the built-in coordinate system includes an X axis, a Y axis, and a Z axis, where pointing directions of the X axis, the Y axis, and the Z axis of the built-in coordinate system are fixed, a direction perpendicular to the ground is taken as a Z-axis direction of the mobile terminal, a rotation angle of the mobile terminal along the Z axis is used for describing a rotation direction of the device in a horizontal plane, in the case that the mobile terminal is placed on a table, the Z-axis direction points from the mobile terminal to the sky, an X-axis direction is from left to right along a horizontal direction of a screen of the mobile terminal, and a Y-axis direction points from the lower left corner of the screen to the top end of the screen along a vertical direction of the screen, and three variables, that is, a first angle value, a second angle value, and a third angle value, respectively represent the rotation angle of the mobile terminal around the Z axis, an

inclined angle of the mobile terminal around the X axis, and a roll angle of the mobile terminal around the Y axis; and

[0143] when a value range of the first angle value is 0° to 90° , a value range of the second angle value is -180° to 0° , and a value range of the third angle value is -45° to 45° , determining that the mobile terminal is located within the preset coordinate range.

[0144] Further, the input data includes a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:

[0145] obtaining the input data corresponding to the loan input operation, normalizing the input data, and taking the normalized input data as normalized data;

[0146] obtaining a pre-stored target model constructed on the basis of a BP neural network, and taking the normalized data as an input vector of the target model to obtain an output vector; and

[0147] when the output vector is located within a preset range, taking the input data as the target input data and using same.

[0148] Further, the step of obtaining the input data corresponding to the loan input operation, and normalizing the input data includes:

[0149] obtaining the input data corresponding to the loan input operation, and converting the input data into parameter values that can be identified by a computer; and

[0150] obtaining a maximum value and a minimum value in all the parameter values, subtracting the minimum value from each of the parameter values to obtain a positive parameter value, obtaining a difference between the maximum value and the minimum value, and dividing each positive parameter value by the difference to obtain a normalized positive parameter value.

- [0151] Further, the input data includes a time attribute of the loan input operation; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same includes:
- [0152] obtaining a minimum time slot between different loan input operations on the basis of the time attributes of the different loan input operations; and
- [0153] when the minimum time slot is greater than a first preset duration, obtaining the input data corresponding to the loan input operations, taking the input data as the target input data and using same.
- [0154] Further, after the step of obtaining a time slot between different loan input operations, the method includes:
- [0155] when the minimum time slot is less than the first preset duration, obtaining the number of loan input operations within a second preset duration, where the second preset duration is greater than the first preset duration; and
- [0156] when the number of loan input operations is greater than a preset number, discarding the input data and not using same.
- [0157] Further, after the step of when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to the loan request as a machine operation behavior, the method includes:
- [0158] obtaining a mobile terminal ID number corresponding to the machine operation behavior, and prohibiting, within a third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number.
- [0159] The specific implementation of the human-machine input operation identification device of this application is basically identical to the embodiments of the foregoing human-machine input operation identification method. Details are not described herein again.
- [0160] This application provides a readable storage medium, having one or more programs stored thereon, where the one or more programs can further be executed by one or more

processors to perform the steps of the human-machine input operation identification method as stated above.

[0161] The specific implementation of the readable storage medium of this application is basically identical to the embodiments of the foregoing human-machine input operation identification method. Details are not described herein again.

[0162] The foregoing descriptions are merely embodiments of this application, and the protection scope of this application is not limited thereto. All equivalent structure or equivalent procedure changes made by using the content of this specification and accompanying drawings in this application or by directly or indirectly applying this application in other related technical fields shall fall within the patent protection scope of this application.

CLAIMS

1. A human-machine input operation identification method, comprising:

when a loan input operation is detected on a mobile terminal, determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;

when the mobile terminal is located within the preset coordinate range, obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same; and

when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to a loan request as a machine operation behavior.

2. The human-machine input operation identification method according to claim 1, wherein the step of determining on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range comprises:

recording rotation angles of the mobile terminal in different directions by using an angle array value, wherein the built-in coordinate system comprises an X axis, a Y axis, and a Z axis, wherein pointing directions of the X axis, the Y axis, and the Z axis of the built-in coordinate system are fixed, a direction perpendicular to the ground is taken as a Z-axis direction of the mobile terminal, a rotation angle of the mobile terminal along the Z axis is used for describing a rotation direction of the device in a horizontal plane, in the case that the mobile terminal is placed on a table, the Z-axis direction points from the mobile terminal to the sky, an X-axis direction is from left to right along a horizontal direction of a screen of the mobile terminal, and a Y-axis direction points from the lower left corner of the screen to the top end of the screen along a vertical direction of the screen, and three variables, that is, a first angle value, a second angle value, and a third angle value, respectively represent the rotation angle of the mobile terminal around the Z axis, an inclined angle of the mobile terminal around the X axis, and a roll angle of the mobile terminal around the Y axis; and

when a value range of the first angle value is 0° to 90° , a value range of the second angle value is -180° to 0° , and a value range of the third angle value is -45° to 45° , determining that the mobile terminal is located within the preset coordinate range.

3. The human-machine input operation identification method according to claim 1, wherein the input data comprises a contact area between a finger and a touch screen of the mobile terminal, a contact profile between the finger and the touch screen of the mobile terminal, and an input pressure value during user input; and

the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same comprises:

obtaining the input data corresponding to the loan input operation, normalizing the input data, and taking the normalized input data as normalized data;

obtaining a pre-stored target model constructed on the basis of a BP neural network, and taking the normalized data as an input vector of the target model to obtain an output vector; and

when the output vector is located within a preset range, taking the input data as the target input data and using same.

4. The human-machine input operation identification method according to claim 3, wherein the step of obtaining the input data corresponding to the loan input operation, and normalizing the input data comprises: obtaining the input data corresponding to the loan input operation, and converting the input data into parameter values that can be identified by a computer; and

obtaining a maximum value and a minimum value in all the parameter values, subtracting the minimum value from each of the parameter values to obtain a positive parameter value, obtaining a difference between the maximum value and the minimum value, and dividing each positive parameter value by the difference to obtain a normalized positive parameter value.

5. The human-machine input operation identification method according to claim 1, wherein the input data comprises a time attribute of the loan input operation; and the step of obtaining input data corresponding to the loan input operation, taking the input data as target input data and using same comprises:

obtaining a minimum time slot between different loan input operations on the basis of the time attributes of the different loan input operations; and

when the minimum time slot is greater than a first preset duration, obtaining the input data corresponding to the loan input operations, taking the input data as the target input data and using same.

6. The human-machine input operation identification method according to claim 5, wherein after the step of obtaining a time slot between different loan input operations, the method comprises:

when the minimum time slot is less than the first preset duration, obtaining the number of loan input operations within a second preset duration, wherein the second preset duration is greater than the first preset duration; and

when the number of loan input operations is greater than a preset number, discarding the input data and not using same.

7. The human-machine input operation identification method according to claim 1, wherein after the step of when the mobile terminal is not located within the preset coordinate range, identifying the input operation corresponding to the loan request as a machine operation behavior, the method comprises:

obtaining a mobile terminal ID number corresponding to the machine operation behavior, and prohibiting, within a third preset duration, receiving the loan request sent by the mobile terminal corresponding to the ID number.

8. A human-machine input operation identification apparatus, comprising:

a determination module, configured to, when a loan input operation is detected on a mobile terminal, determine on the basis of a built-in coordinate system of the mobile terminal whether the mobile terminal is located within a preset coordinate range;

a first obtaining module, configured to, when the mobile terminal is located within the preset coordinate range, obtain input data corresponding to the loan input operation, take the input data as target input data and use same; and

an identification module, configured to, when the mobile terminal is not located within the preset coordinate range, identify the input operation corresponding to a loan request as a machine operation behavior.

9. A human-machine input operation identification device, comprising: a memory, a processor, a communication bus, and a human-machine input operation identification program stored on the memory, wherein

the communication bus is configured to implement communication connection between the processor and the memory; and

the processor is configured to execute the human-machine input operation identification program, so as to implement steps of the human-machine input operation identification method according to claim 1.

10. A human-machine input operation identification device, comprising: a memory, a processor, a communication bus, and a human-machine input operation identification program stored on the memory, wherein

the communication bus is configured to implement communication connection between the processor and the memory; and

the processor is configured to execute the human-machine input operation identification program, so as to implement steps of the human-machine input operation identification method according to claim 2.

11. A human-machine input operation identification device, comprising: a memory, a processor, a communication bus, and a human-machine input operation identification program stored on the memory, wherein

the communication bus is configured to implement communication connection between the processor and the memory; and

the processor is configured to execute the human-machine input operation identification program, so as to implement steps of the human-machine input operation identification method according to claim 3.

12. A human-machine input operation identification device, comprising: a memory, a processor, a communication bus, and a human-machine input operation identification program stored on the memory, wherein

the communication bus is configured to implement communication connection between the processor and the memory; and

the processor is configured to execute the human-machine input operation identification program, so as to implement steps of the human-machine input operation identification method according to claim 4.

13. A human-machine input operation identification device, comprising: a memory, a processor, a communication bus, and a human-machine input operation identification program stored on the memory, wherein

the communication bus is configured to implement communication connection between the processor and the memory; and

the processor is configured to execute the human-machine input operation identification program, so as to implement steps of the human-machine input operation identification method according to claim 5.

14. A readable storage medium, having a human-machine input operation identification program stored thereon, wherein when the human-machine input operation identification program is executed by a processor, steps of the human-machine input operation identification method according to claim 1 are performed.

15. A readable storage medium, having a human-machine input operation identification program stored thereon, wherein when the human-machine input operation identification program is executed by a processor, steps of the human-machine input operation identification method according to claim 2 are performed.

16. A readable storage medium, having a human-machine input operation identification program stored thereon, wherein when the human-machine input operation identification program is executed by a processor, steps of the human-machine input operation identification method according to claim 3 are performed.

17. A readable storage medium, having a human-machine input operation identification program stored thereon, wherein when the human-machine input operation identification program is executed by a processor, steps of the human-machine input operation identification method according to claim 4 are performed.

18. A readable storage medium, having a human-machine input operation identification program stored thereon, wherein when the human-machine input operation identification program is executed by a processor, steps of the human-machine input operation identification method according to claim 5 are performed.

19. A readable storage medium, having a human-machine input operation identification program stored thereon, wherein when the human-machine input operation identification program is executed by a processor, steps of the human-machine input operation identification method according to claim 6 are performed.