

ACTION EXECUTION METHOD AND DEVICE, STORAGE MEDIUM AND ELECTRONIC DEVICE

RELATED APPLICATION

[0001] The present disclosure claims priority to Chinese Patent Application No. 201910368919.9, entitled "METHOD AND APPARATUS FOR EXECUTING ACTION, STORAGE MEDIUM, AND ELECTRONIC DEVICE" and filed with China National Intellectual Property Administration on May 5, 2019, which is incorporated by reference in its entirety.

FIELD OF THE TECHNOLOGY

[0002] The present disclosure relates to the field of computers, and specifically, to action execution.

BACKGROUND OF THE DISCLOSURE

[0003] Currently, different racing tracks are usually designed for players in a game scene of a racing game application. The racing track includes turns of different angles. In order to shorten a time consumed by a target object passing a turn, the player usually controls the target object via a control key provided in a human-computer interaction interface, to perform drifting when the target object passes the turn.

[0004] A skill of performing the drifting manually varies a lot among different players who control the target object. Thereby, the target object is susceptible to a centrifugal force during the drifting, and thereby tends to slide toward a side of the turn or even crashes into a fence when losing control. As a result, it takes the target object more time to complete a racing task. That is, a method for executing an action in conventional technology requires a highly skilled player to control the target object to perform the drifting. Erroneous operations of players are highly probable, and an error rate of the executing such action is high.

[0005] No effective solution has been provided to address the above issue.

SUMMARY

[0006] A method and an apparatus for executing an action, a storage medium, and an electronic device are provided according to embodiments of the present disclosure, so as to address at least a technical issue of a high error rate of executing an action in conventional technology.

[0007] A method for executing an action is provided according to an aspect of embodiments of the present disclosure. The method is applied to a data processing device. The method includes: setting a first virtual key to be in a state allowing touch control, in response to a target object controlled by a client completing an action combination during a game, where the first virtual key is configured to trigger the target object to execute an acceleration operation; detecting whether a first touch operation on the first virtual key being in the state is performed; controlling the target object to execute the acceleration operation, and detecting within a target time period whether a second touch operation on a control key is performed, in response to detecting that the first touch operation is performed, where the control key is configured to control the target object to execute a target action, and the target time period is less than or equal to a first time threshold; and controlling the target object to execute the target action in a process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period.

[0008] An apparatus for executing an action is further provided according to another aspect of embodiments of the present disclosure. The apparatus including: a setting unit, configured to set a first virtual key to be in a state allowing touch control, in response to a target object controlled by a client completing an action combination once during a game, where the first virtual key is configured to trigger the target object to execute an acceleration operation; a first detecting unit, configured to detect whether a first touch operation on the first virtual key being in the state is performed; a second detecting unit, configured to control the target object to execute the acceleration operation, and detect within a target time period whether a second touch operation on a control key is performed, in response to detecting the first touch operation is performed, where the control key is configured to control the target object to execute a target action, and the target time period is less than or equal to a first time threshold; and a first execution unit, configured to control the target object to execute the target action in a process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period.

[0009] A storage medium is further provided according to another aspect of embodiments of the present disclosure. The storage medium stores a computer program, and the computer program when executed is configured to perform the foregoing method for executing the action.

[0010] An electronic device is further provided according to another aspect of embodiments of the present disclosure. The electronic device includes a memory, a processor, and a computer program that is stored in the memory and executable on the processor. The processor performs the foregoing method for executing the action through the computer program.

[0011] A computer program product including instructions is further provided according to an aspect of embodiments of the present disclosure. The computer program product when executed on a computer configures the computer to perform the foregoing method for executing the action.

[0012] In embodiments of the present disclosure, the target object is controlled during the game to execute the target action in the process of executing the operation, in the case that the first touch operation configured to trigger the target object to perform the acceleration operation is detected and the second touch operation performed on the control key configured to control the target object to execute the target action is detected within the target time period. Thereby, the target object adjusts a trajectory of the target object in the target action by utilizing a velocity generated in the acceleration operation. A quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. Addressed is the issue of the high error rate due to a manual operation skill of players in conventional technology.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The accompanying drawings described herein are used to provide a further understanding of the present disclosure, and constitutes part of the present disclosure. Exemplary embodiments of the present disclosure and descriptions thereof are intended to explain the present disclosure, and do not constitute any inappropriate limitation to the present disclosure. The drawings are as follows.

[0014] Figure 1 is a schematic diagram of a hardware environment of a method for executing an action according to an embodiment of the present disclosure;

[0015] Figure 2 is a flowchart of a method for executing an action according to an embodiment of the present disclosure;

[0016] Figure 3 is a schematic diagram of a turn according to an embodiment of the present disclosure;

[0017] Figure 4 is a schematic diagram of a status change of a first virtual key according to an embodiment of the present disclosure;

[0018] Figure 5 is a schematic diagram of a process of controlling a target object to execute a target action according to an embodiment of the present disclosure;

[0019] Figure 6 is a flowchart of another method for executing an action according to an embodiment of the present disclosure;

[0020] Figure 7 is a schematic diagram of forces on a target object when executing a target action according to an embodiment of the present disclosure;

[0021] Figure 8 is another schematic diagram of forces on a target object when executing a target action according to an embodiment of the present disclosure;

[0022] Figure 9 is a schematic diagram of forces on a target object when executing a target action in conventional technology;

[0023] Figure 10 is a schematic structural diagram of an apparatus for executing an action according to an embodiment of the present disclosure; and

[0024] Figure 11 is a schematic structural diagram of an electronic device according to an embodiment of the present disclosure.

DESCRIPTION OF EMBODIMENTS

[0025] In order to help those skilled in the art better understand solutions of the present disclosure, hereinafter technical solutions in embodiments of the present disclosure are described clearly and completely in conjunction with the drawings in embodiments of the present disclosure. Apparently, the described embodiments are only some rather than all of the embodiments of the present disclosure. Any other embodiments obtained based on the embodiments of the present disclosure by those skilled in the art without any creative effort fall within the scope of protection of the present disclosure.

[0026] In specification, claims, and drawings of the present disclosure, the terms "first", "second", and the like are intended to distinguish similar objects but do not necessarily indicate a specific order or sequence. It should be understood that data described in such manner is interchangeable where appropriate, so that embodiments of the present disclosure described herein may be implemented in an order other than that is illustrated or described herein. Moreover, the terms "include", "comprise", and any other variants thereof are intended to cover non-exclusive inclusion. For example, a process, a method, a system, a product, or a device that includes a list of steps or units is not necessarily limited to these expressly listed steps or units, but may include another step or another unit that is not expressly listed or that is inherent to such process, method, system, product, or device.

[0027] A method for executing an action is provided according to an embodiment of the present disclosure, in order to effectively address the technical issue as described in the background, i.e. a high error rate of executing an action in conventional technology.

[0028] In a specific embodiment, a method for executing an action according to embodiments of the present disclosure is as follows. First, a first virtual key is set to be in a state allowing touch control in response to a target object controlled by a client completing an action combination during a game. Then, it is detected whether a first touch operation on the first virtual key being in such state is performed. Thereby, in a case that the first touch operation is detected, the target object is controlled to execute an acceleration operation, and it is detected within a target time period whether a second touch operation is performed on a control key. The control key is configured to control the target object to execute a target action. Afterwards, in a case that the second touch operation is detected within the target time period, the target object is controlled to execute the target action in a process of executing an acceleration operation. The first virtual key is configured to trigger the target object to perform the acceleration operation. The target time period is less than or equal to a first time threshold.

[0029] Thus, in embodiments of the present disclosure, the target object is controlled during the game to execute the target action in the process of executing the operation, in the case that the first touch operation configured to trigger the target object to perform the acceleration operation is detected and the second touch operation performed on the control key configured to control the target object to execute the target action is detected within the target time period. Thereby, the target object adjusts a trajectory of the target object in the target action by utilizing a velocity generated in the acceleration operation. A quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. Addressed is the issue of the high error rate due to a manual operation skill of players in conventional technology.

[0030] The method for executing the action according to embodiments of the present disclosure is applicable to a data processing device, such as a terminal device or a server. In a specific embodiment, the terminal device may be a smartphone, a computer, a personal digital assistant (PDA), a tablet computer, or the like. In a specific embodiment, the server may be an application server or a Web server. In practical deployment, the server may be an independent server, a cluster server, or a cloud server.

[0031] In a case that the method according to embodiments of the present disclosure is performed by the terminal device, the terminal device obtains various touch operations (such as an action combination) performed by a user on a client, and performs the method. In a case that the method according to embodiments of the present disclosure is performed by the server, the server obtains various touch operations that are performed on a client by a user and uploaded by the terminal device, and performs the method.

[0032] The server performs controlling the target object to execute the target action in the process of executing the acceleration operation, of which a specific process may be as follows. The server controls the target object directly to execute the target action in the process of executing the acceleration operation. Alternatively, the server first generates a control instruction configured to control the target object to execute the target action in the process of executing the acceleration operation, and transmits the control instruction to the terminal device. Then, the terminal device controls the target object based on the control instruction to execute the target action in the process of executing the acceleration operation. Similarly, the server performs setting the first virtual key to be in the state allowing the touch control on the first virtual key, of which a specific process may be as follows. The server sets the first virtual key directly to be in the state allowing the touch control on the first virtual key. Alternatively, the server first generates a state-change instruction configured to set the first virtual key to be in the state allowing the touch control on the first virtual key, and transmits the state-change instruction to the terminal device. Then, the terminal device sets the first virtual key based on the state-change instruction to be in the state allowing the touch control on the first virtual key.

[0033] Hereinafter an application scenario applicable to the method according to embodiments of the present disclosure is illustrated with an example, to facilitate understanding of technical solutions according to embodiments of the present disclosure. In such example, the method for executing the action is applied to user equipment (that is, a terminal device) on which a client of a game application is installed, as shown in Figure 1.

[0034] In an optional implementation, the method may be applied, but is not limited, to a hardware environment as shown in Figure 1. It is assumed that the client of the game application (such as a client of a racing game application as shown in Figure 1) is installed on user equipment 102. The user equipment 102 includes a human-computer interaction screen 104, a processor 106, and a memory 108. The human-computer interaction screen 104 is configured to detect a human-computer interaction operation (such as a touch operation) via a human-computer interaction interface corresponding to the client. The processor 106 is configured to: generate a corresponding operation instruction according to the human-computer interaction operation, and control a target object controlled by the client to perform a corresponding action, in response to such operation instruction. The memory 108 is configured to store the operation instruction and attribute information related to the target object. For example, the attribute information may include, but is not limited to, state information of a virtual key configured to control a target virtual object in the human-computer interaction interface displayed by the client.

[0035] During running a game, the user equipment 102 sets a first virtual key 110, which is displayed on the human-computer interaction screen 104, to be in a state allowing touch control thereon, in response to a target object controlled by the client completing an action combination once. In step S102, the processor 106 detects whether a first touch operation on the first virtual key being in such state is performed. Then, in step S104, the target object is controlled to execute an acceleration operation, and it is detected within a target time period whether a second touch operation on a control key 112 is performed, in response to detecting that the first touch operation is performed. The control key 112 is configured to control the target object to execute a target action. In step S106, the target object is controlled to execute the target action in a process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period. In step S108, the target action executed by the target object is displayed on the human-computer interaction screen 104.

[0036] In this embodiment, in a case that the target object controlled by the client completes the action combination, the first virtual key configured to trigger the target object to execute the acceleration operation is set to be in the state allowing for touch control. Then, it is detected whether the first touch operation on the first virtual key is performed. In a case that the first touch operation is detected, the target object is controlled to execute the acceleration operation, and it is detected whether the second touch operation on the control key, which is configured to control the target object to execute the target action, is detected within a target time period. In a case that the second touch operation is detected within the target time period, the target object is controlled to execute the target action in the process of executing the acceleration operation. Thereby, the target object adjusts a trajectory of the target object in the target action by utilizing a velocity generated in the acceleration operation. A quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. Addressed is the issue of the high error rate due to a manual operation skill of players in conventional technology.

[0037] In an optional embodiment, the user equipment may be, but is not limited to, a terminal device that supports running of the clients of the application. The terminal device is, for example, a mobile phone, a tablet computer, a notebook computer, a PC, or the like. This embodiment is not limited to the foregoing embodiments.

[0038] In an optional embodiment, the method for executing an action includes following steps S202 to S208, as shown in Figure 2.

[0039] In step S202, a first virtual key is set to be in a state allowing touch control, in a case that a target object controlled by a client completes an action combination during a game. The first virtual key is configured to trigger the target object to execute an acceleration operation.

[0040] In step S204, it is detected whether a first touch operation on the first virtual key being in the state is performed.

[0041] In step S206, the target object is controlled to execute the acceleration operation, and it is detected within a target time period whether a second touch operation on a control key is performed, in a case that the first touch operation is detected. The control key is configured to control the target object to execute a target action. The target time period is less than or equal to a first time threshold.

[0042] In step S208, the target object is controlled to execute the target action in a process of executing the acceleration operation, in a case that the second touch operation is detected within the target time period.

[0043] In an optional embodiment, the method for executing the action may be applied, but is not limited, to a following process. During running of the game, the first virtual key configured to trigger the target object to perform the acceleration operation is set to be in the state allowing touch control, in the case that the target object controlled by the client completes the action combination once. Then, a trajectory of the target object executing the target action is automatically adjusted by utilizing a velocity generated when the target object performs the acceleration operation. Hence, a quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. For example, the game application is a racing game application. The target object that participates in the game may be, but is not limited to, a virtual object such as a virtual character, virtual equipment, or a virtual vehicle that is controlled in the racing game application. When the target object is controlled to perform a task in a racing track in the game, it may be detected that the target object performs the acceleration operation and is controlled within the target time period to execute a drifting action. In such case, the target object is controlled to execute the drifting action by utilizing an increased velocity due to the acceleration operation. Thereby, a trajectory formed when the target object executing the drifting action is more directed to a forward direction of the target object, and a quantity of collisions is reduced for the target object in the racing track. This embodiment is not limited thereto.

[0044] In this embodiment, the target object is controlled during the game to execute the target action in the process of executing the operation, in the case that the first touch operation

configured to trigger the target object to perform the acceleration operation is detected and the second touch operation performed on the control key configured to control the target object to execute the target action is detected within the target time period. Thereby, the target object adjusts a trajectory of the target object in the target action by utilizing a velocity generated in the acceleration operation. A quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. Addressed is the issue of the high error rate due to a manual operation skill of players in conventional technology.

[0045] In an optional embodiment, the action combination may include, but is not limited to, at least two actions executed by the target object that is passing a turn in a racing track. For example, the turn may include, but is not limited to, an S-shaped turn. Correspondingly, the action combination may include, but is not limited to, drifting actions in two directions. For example, in case of the S-shaped turn 302 configured in the racing track as shown in Figure 3, the action combination executed by the target object may include, but is not limited to, a leftward drifting action and a rightward drifting action. This embodiment is not limited to the foregoing example.

[0046] Further, the target action may include, but is not limited to, a drifting action executed by the target object that is passing the turn in the racing track. That is, the target action may include, but is not limited to, an action in the action combination, such as the leftward drifting action or the rightward drifting action. This embodiment is not limited to the foregoing example.

[0047] In an optional embodiment, the first virtual key may be configured, but is not limited to, trigger the target object to execute the acceleration operation. A state of the first virtual key may include, but is not limited to, a state allowing touch control and a state not allowing touch control. During running of the game, the state of the first virtual key that is displayed in the human-computer interaction interface is correspondingly adjusted in response to the target object completing the action combination. For example, the state of the first virtual key is adjusted from the state not allowing touch control to the state allowing touch control. For example, the first virtual key is an "acceleration key", as shown in Figure 4. The acceleration key 402 in the state of not allowing touch control is displayed as a hollow circle (as shown in subfigure (a) of Figure 4), and no touch-control operation can be performed on the acceleration key 402. The acceleration key 404 in the state allowing touch control is displayed with a corresponding icon (such as a flame as shown in subfigure (b) of Figure 4), a touch operation can be performed on the acceleration key 404.

[0048] In an optional embodiment, after detecting that the first touch operation on the first virtual key in the state allowing touch control is performed, the target object is controlled to execute

the acceleration operation in response to the first touch operation, and it is detected within the target time period whether the second touch operation is performed, so as to determine whether to control the target object to execute the target action in the process of executing the acceleration operation. That is, a velocity boost due to the acceleration operation may be utilized to interfere in the target action executed by the target object, so that a trajectory of the target object is more directed toward a forward direction rather than a sliding direction of the target object. Thereby, an impact of a centrifugal force on the target object is reduced in the process of executing the target action. A quantity of collisions due to sliding of the target object is reduced, and an error rate of the target object executing the target action is reduced.

[0049] The target time period is less than or equal to the first time threshold. The first time threshold may be set as, but is not limited to, different values based on various real-time requirements. In an embodiment, it is detected within the target time period whether the second touch operation is performed, in response to detecting that the first touch operation is performed. Thereby, a time difference between the two touch operations is ensured to be as small as possible, and the acceleration operation and the target action may be ensured to be as simultaneous as possible. This embodiment is not limited to the foregoing example.

[0050] Specifically illustration is made with reference to examples as shown in Figure 5 and Figure 6.

[0051] The racing game application is further taken as an example. During a game, the target object (a virtual object 502 as shown in Figure 5) controlled by the client execute the action combination. For example, the virtual object 502 executes first a rightward drifting action and then a leftward drifting action, as shown in subfigures (a) and (b) of Figure 5. In the foregoing process, a state of the first virtual key is the acceleration key 402 in the state not allowing touch control, as shown subfigures in (a) and (b) in Figure 5.

[0052] Reference is made to subfigure (c) in Figure 5. In a case that the action combination is completed, the first virtual key is set to be in the state allowing touch control, as the acceleration key 404 in the state allowing touch control shown in the figure. It may be detected that a first touch operation on the acceleration key 404 in the state allowing touch control is performed, and a second touch operation on a control key 504 is then performed within a target time period, as shown subfigure (d) of Figure 5. The control key 504 is configured to control the virtual object 502 to execute the leftward drifting action. In such case, the virtual object 502 is controlled to execute the leftward drifting action in a process of acceleration, so that a trajectory of the virtual object 502 can be adjusted toward a forward direction during the leftward drifting. An impact of a

centrifugal force is weakened, and the virtual object 502 is prevented from colliding with a border of the track, reducing an error rate.

[0053] Further, a logic process of executing the actions as shown in Figure 5 may include steps S602 to S612 as shown in Figure 6.

[0054] In step S602 and step S604, the target object (the virtual object 502 as shown in Figure 5) is controlled via the client to execute first a rightward drifting action and then a leftward drifting action. Step S606 is performed when the target object completes an action combination including the foregoing two drifting actions. In the step S606, a first virtual key (the acceleration key as shown in Figure 5) is adjusted from the acceleration key 402 in the state not allowing touch control to the acceleration key 404 in the state allowing touch control. Next, steps S608 to S612 are performed, which are specifically as follows. It is detected whether a first touch operation on the first virtual key is performed. In a case that the first touch operation is detected, the target object is controlled to execute an acceleration operation, and it is detected within a target time period whether a second touch operation on a control key is performed. In a case that the second touch operation is detected, the target object is controlled to execute a target action (such as the leftward drifting action or the rightward drifting action) in a process of executing the acceleration operation.

[0055] According to embodiments of the present disclosure, during running of the game, the state of the first virtual key configured to trigger the target object to execute the acceleration operation is set to be in the state allowing touch control, in a case that the target object controlled by the client completes the action combination. Then, it is detected whether the first touch operation on the first virtual key is performed. In a case that the first touch operation is detected, the target object is controlled to execute the acceleration operation, and it is detected within the target time period whether the second touch operation on the control key is performed. The control key is configured to control the target object to execute the target action. In a case that the second touch operation is detected within the target time period, the target object is controlled to execute the target action in the process of executing the acceleration operation. Thereby, a trajectory of the target object is adjusted in the target action by utilizing a velocity generated from the acceleration operation. A quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. Addressed is an issue of a high error rate due to a manual operation skill of players in conventional technology. Further, since the quantity of collisions is reduced, it takes the target object less time when competing in the game, and thereby a change of winning is improved for the target object.

[0056] In an optional and specific embodiment, the step of controlling the target object to execute the target action in the process of executing the acceleration operation in response to detecting the second touch operation within the target time period may include steps S1 to S3.

[0057] In step S1, a driving force applied on the target object due to executing the acceleration operation is determined to be an action force in a process of executing the target action.

[0058] In step S2, an actual velocity vector of the target object executing the target action is determined based on the action force.

[0059] In step S3, a trajectory of the target object executing the target action is determined based on the actual velocity vector. A quantity of collisions of the target object due to executing the target action along the trajectory is less than a target threshold.

[0060] In this embodiment, during the game, the target object is subject to at least the following two forces: a driving force that drives the target object forward, and a friction between the target object and a surface of the track. For example, the target action is a drifting action. When the target object executes the drifting action and the acceleration operation simultaneously, the driving force generated from the acceleration operation is configured to drive the target object forward, and serves as the action force of the target object. The friction generated from the target object executing the target action makes the target object slide sideward in the track.

[0061] Specific illustration is made with reference to an example as shown in Figure 7. It is assumed that a racing game application is taken as an example, and the target object is a virtual vehicle competing in a racing game. The virtual vehicle may execute a rightward drifting action in a process of executing an acceleration operation. In such case, a driving force on the virtual vehicle due to the acceleration operation may be as shown in Figure 7, and serves as a drifting driving force 702 during executing the rightward drifting action. The friction may be a friction 704 as shown in Figure 7, and generates a centrifugal velocity vector that make the virtual vehicle slide leftward in the track. The forgoing case is merely an example, and this embodiment is not limited thereto.

[0062] In an optional and specific embodiment, the step S2 may include steps S21 and S22.

[0063] In step S21, a forward velocity vector of the target object executing the target action is determined based on the action force. Magnitude of the forward velocity vector of the target object is increasing in the process of executing the target action.

[0064] In step S22, the actual velocity vector of the target object executing the target action is determined based on the forward velocity vector of the target object executing the target action

and a centrifugal velocity vector on the target object due to executing the target action. An included angle between a direction of the actual velocity vector and a direction of the forward velocity vector, of the target object executing the target action, is less than a first angle threshold.

[0065] The first angle threshold may be set as, but is not limited to, different values according to a specific scenario. For example, the first angle threshold may be, but is not limited to, an included angle between an actual velocity vector and a forward velocity vector, of the target object when executing the target action directly before executing the acceleration operation. The foregoing is merely an example, and this embodiment is not limited thereto.

[0066] Specific description is made with reference to an example as shown in Figure 8. It is assumed that the racing game application is further taken as an example, and the target object is a virtual vehicle competing in a racing game. The virtual vehicle executes a rightward drifting action in a process of executing an acceleration operation. A driving force on the virtual vehicle during the acceleration operation serves as the action force (such as a rightward-drifting driving force). The driving force is used to determine the forward velocity vector (such as a forward velocity vector 802 as shown in Figure 8) of the virtual vehicle during the rightward drifting. A friction on the virtual vehicle during the driving is used to determine the centrifugal velocity vector (such as a centrifugal velocity vector 804 as shown in Figure 8) of the virtual vehicle.

[0067] Reference is further made to Figure 8. Vector calculation is performed on the forward velocity vector 802 and the centrifugal velocity vector 804, to obtain the actual velocity vector (such as an actual velocity vector 806 as shown in Figure 8) of the virtual vehicle. The included angle α between the actual velocity vector 806 and the forward velocity vector 802 is less than the first angle threshold.

[0068] In addition, it is assumed that the target object performs the target action directly without performing the acceleration operation, as shown in Figure 9. In such case, the vector calculation is performed on a forward velocity vector 902 and a centrifugal velocity vector 904, to determine an actual velocity vector 906. An included angle between the actual velocity vector 906 and the forward velocity vector 902 is β . Due to interference of the acceleration operation, the forward velocity vector 802 as shown in Figure 8 is greater than the forward velocity vector 902 as shown in Figure 9. Correspondingly, the angle α is less than the angle β , which can be learned by comparing Figure 8 with Figure 9. It may be assumed that the first angle threshold is equal to the angle β . The present disclosure is not limited thereto.

[0069] In embodiments of the present disclosure, the driving force on the target object executing the acceleration operation serves as the action force of the target object executing the

target action. Hence, a trajectory of the target object executing the target action is adjusted by utilizing the action force, which optimizes control on the trajectory of the target object and reduces a quantity of collisions due to the friction. Thereby, an error rate of the target object executing the target action is reduced.

[0070] In an optional and specific embodiment, the step of controlling the target object to execute the acceleration operation in response to detecting the first touch operation is performed may include steps S31 to S33.

[0071] In step S31, a quantity of touch-control operations that have been performed on the first virtual key in the game is determined, in response to detecting that the first touch operation is performed.

[0072] In step S32, target acceleration matching with the quantity is obtained. The larger the quantity is, the larger the target acceleration is.

[0073] In step S33, the target object is controlled to execute the acceleration operation based on the target acceleration.

[0074] In an optional embodiment, the quantity of touch-control operations performed on the first virtual key in the game may be greater than 1, but is not limited thereto. In this embodiment, as the quantity of touch-control operations performed on the first virtual key increases, the target acceleration corresponding to the acceleration operation may be adjusted to a higher level accordingly, but is not limited thereto. A larger quantity touch-control operations performed on the first virtual key corresponds to larger target acceleration. The target acceleration may be adjusted based on a ratio determined by the quantity, but is not limited thereto.

[0075] In an optional and specific embodiment, the step S32 may include steps S41 to S43.

[0076] In step S41, a target proportion matching with the quantity is obtained.

[0077] In step S42, forward acceleration of the target object is increased based on the target proportion, to obtain updated forward acceleration.

[0078] In step S43, the updated traveling acceleration serves as the target acceleration.

[0079] In an optional embodiment, the step of obtaining the target proportion matching with the quantity may include, but is not limited to, one of the following steps.

[0080] (1) A pre-established mapping relationship is searched for the target proportion configured for the current quantity. The target proportions corresponding to different quantities may not associate with each other, but is not limited thereto. For example, the corresponding

target proportion is determined as $r_m = 10\%$ in a case that the current quantity is m , determined as $r_{m+1} = 12\%$ in a case that the current quantity is $m+1$, and determined as $r_m = 15\%$ in a case that the current quantity is $m+2$. m is a positive integer.

[0081] (2) The corresponding target proportion is calculated based on the current quantity. The target proportions corresponding to different quantities may associate with each other, but is not limited thereto. For example, it is assumed that an increment of the target proportion is 5% when the quantity increases by 1. The corresponding target proportion is $r_m = 10\%$ in a case that the current quantity is m , $r_m = 15\%$ in a case that the current quantity is $m+1$, and $r_m = 20\%$ in a case that the current quantity is $m+2$.

[0082] The foregoing is merely an example. When the first virtual key is subject successive touch-control operations in the game, the target proportion matching with the quantity may be alternatively set according another manner. This embodiment is not limited thereto.

[0083] According to embodiments of the present disclosure, as the quantity of touch-control operations performed on the first virtual key increases, an acceleration effect of the acceleration operation is correspondingly adjusted. Thereby, the target object may complete the game faster and more effectively. It takes the target object less time to compete in the game, and a chance of winning is improved for the target object.

[0084] In an optional embodiment, the control key (that is, the control key configured to control the target object to execute the target action) includes a first control key and a second control key. The first control key is configured to adjust a forward direction of the target object, and the second control key is configured to trigger the target object to execute the target action. Moreover, before the step of setting the first virtual key to be in the state allowing touch control, the method for executing the action according to the embodiments of the present disclosure further includes steps S210 and S212.

[0085] In step S210, an operation instruction is obtained. The operation instruction is generated by performing a long-press operation on the first control key and the second control key in a human-computer interaction interface displayed in the client.

[0086] In step S212, the target object is controlled to execute the action combination in response to the operation instruction. The action combination includes a first action and a second action. The target object takes a first direction as a forward direction when being controlled to execute the first action, and takes a second direction as the forward direction when being controlled to execute the second action.

[0087] In an optional embodiment, the first control key may be, but is not limited to, an arrow key including a left arrow key and a right arrow key. The second control key may be, but is not limited to, a drifting key for triggering a drifting action. The operation instruction is generated when a long-press operation is performed on both the first control key and the second control key. The operation instruction is configured to instruct the target object to execute the action combination. The action combination includes the first action and the second action. The target object takes a first direction as a forward direction when being controlled to execute the first action, such as a leftward drifting action. The target object takes a second direction as the forward direction when being controlled to execute the second action, such as a rightward drifting action.

[0088] According to embodiments of the present disclosure, before the first virtual key is set to be in the state allowing touch control, it is first detected whether the target object has completed the execution of the action combination. Adjustment on a state of the first virtual key is determined in a case that the action combination is completed, so as to facilitate the acceleration operation triggered by the first virtual key interfering with the target action executed by the target object. Thereby, a trajectory of the target object executing the target action is optimized, competition in the game consumes less time, and a change of winning the game is improved for the target object.

[0089] In an optional embodiment, the step of setting the first virtual key to be in the state allowing touch control may specifically include steps S51 and S52.

[0090] In step S51, a target angle generated in a process of the target object switching from the first action to the second action is detected. The target angle is an included angle between the forward direction of the target object and a sliding direction of the target object.

[0091] In step S52, the first virtual key is determined to be adjusted from a state not allowing touch control to the state allowing touch control, in response to the target angle being less than or equal to a second angle threshold.

[0092] Specific illustration is made with reference to Figure 5. It is assumed that the racing game application is further taken as an example, and it is detected that the target object (the virtual object 502 as shown in the figure) controlled by the client is performing the action combination during the game. A drifting angle generated when the virtual object 502 performing the first action (such as the rightward drifting action) is positive. For example, the included angle from the forward direction (such as a direction of the forward velocity vector of the virtual vehicle) to the sliding direction (such as a direction of an actual velocity vector of the virtual vehicle) of the target object is equal to $+\gamma$. A drifting angle generated when the target object executes the second

action (such as the leftward drifting action) is negative. For example, the included angle from the forward direction (such as a direction of the forward velocity vector of the virtual vehicle) and a sliding direction (such as a direction of an actual velocity vector of the virtual vehicle) of the target object is equal to $-\theta$. γ and θ may be any angles, and may be identical or different.

[0093] Further, it may be currently detected that the virtual object 502 has completed the first action (such as the rightward drifting action), and obtains an action instruction for executing the second action (such as the leftward drifting action). In such case, the target angle (which may be called the drifting angle) generated in a process of switching from the rightward drifting action to the leftward drifting action is detected. The target angle would gradually decrease from a positive angle to 0, and then decrease from 0 to a negative angle. It is assumed that the preset second angle threshold is 40° . When the decreasing target angle is detected to reach 40° , the first virtual key is determined to be switched from the state not allowing touch control to the state allowing touch control. Correspondingly, the human-computer interaction interface displayed in the client may be as shown in subfigures (b) and (c) of Figure 5. The acceleration key 402 in the state not allowing touch control (displayed as a hollow circle) is correspondingly adjusted to the acceleration key 404 in the state allowing touch control (displayed as a corresponding icon, such as the flame shown in the figure).

[0094] According to embodiments of the present disclosure, the target angle is detected to control and trigger automatic adjustment of a state of the first virtual key, so as to simplify an operation of adjusting the state of the keys and improve operation efficiency. Thereby, execution of the actions is simplified and more efficient.

[0095] The foregoing method embodiments are described as a combination of a series of operations, for concise and brief description. Those skilled in the art shall appreciate that the present disclosure is not limited to the order of describing these operations, because some steps may be performed simultaneously or in another order according to embodiments of the present disclosure. In addition, those skilled in the art shall further appreciate that all embodiments described in this specification are exemplary embodiments, and some actions and modules that are involved are not necessary to the present disclosure.

[0096] An apparatus for executing an action is further provided according to another aspect of embodiments of the present disclosure. The apparatus is configured to implement the foregoing method for executing the action. The apparatus according to embodiments of the present disclosure corresponds to the foregoing method. For conciseness, technical details of the apparatus are not repeated herein, and may refer to the related content in description of the foregoing method.

[0097] As shown in Figure 10, an apparatus for executing an action includes a setting unit 1002, a first detecting unit 1004, a second detecting unit 1006, and a first execution unit 1008.

[0098] The setting unit 1002 is configured to set a first virtual key to be in a state allowing touch control, in response to a target object controlled by a client completing an action combination once during a game. The first virtual key is configured to trigger the target object to execute an acceleration operation.

[0099] The first detecting unit 1004 is configured to detect whether a first touch operation on the first virtual key being in the state is performed.

[0100] The second detecting unit 1006 is configured to control the target object to execute the acceleration operation, and detect within a target time period whether a second touch operation on a control key is performed, in response to detecting the first touch operation is performed. The control key is configured to control the target object to execute a target action. The target time period is less than or equal to a first time threshold.

[0101] The first execution unit 1008 is configured to control the target object to execute the target action in a process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period.

[0102] According to embodiments of the present disclosure, during running of the game, the state of the first virtual key configured to trigger the target object to execute the acceleration operation is set to be in the state allowing touch control, in a case that the target object controlled by the client completes the action combination. Then, it is detected whether the first touch operation on the first virtual key is performed. In a case that the first touch operation is detected, the target object is controlled to execute the acceleration operation, and it is detected within the target time period whether the second touch operation on the control key is performed. The control key is configured to control the target object to execute the target action. In a case that the second touch operation is detected within the target time period, the target object is controlled to execute the target action in the process of executing the acceleration operation. Thereby, a trajectory of the target object is adjusted in the target action by utilizing a velocity generated from the acceleration operation. A quantity of collisions of the target object is reduced in the game, and a reduced error rate of executing the action is achieved. Addressed is an issue of a high error rate due to a manual operation skill of players in conventional technology. Further, since the quantity of collisions is reduced, it takes the target object less time when competing in the game, and thereby a change of winning is improved for the target object.

[0103] In an optional and specific embodiment, the first execution unit 1008 may include a first determining module, a second determining module, and a third determining module.

[0104] The first determining module is configured to determine a driving force applied on the target object due to executing the acceleration operation is determined to be an action force in a process of executing the target action.

[0105] The second determining module is configured to determine, based on the action force, an actual velocity vector of the target object executing the target action.

[0106] The third determining module is configured to determine, based on the actual velocity vector, a trajectory of the target object executing the target action. A quantity of collisions of the target object due to executing the target action along the trajectory is less than a target threshold.

[0107] In an optional and specific embodiment, the second determining module may include a first determining sub-module and a second determining sub-module.

[0108] The first determining sub-module is configured to determine, based on the action force, a forward velocity vector of the target object executing the target action. Magnitude of the forward velocity vector of the target object is increasing in the process of executing the target action.

[0109] The second determining sub-module is configured to determine the actual velocity vector of the target object executing the target action, based on the forward velocity vector of the target object executing the target action and a centrifugal velocity vector on the target object due to executing the target action. An included angle between a direction of the actual velocity vector and a direction of the forward velocity vector, of the target object executing the target action, is less than a first angle threshold.

[0110] In embodiments of the present disclosure, the driving force on the target object executing the acceleration operation serves as the action force of the target object executing the target action. Hence, a trajectory of the target object executing the target action is adjusted by utilizing the action force, which optimizes control on the trajectory of the target object and reduces a quantity of collisions due to the friction. Thereby, an error rate of the target object executing the target action is reduced.

[0111] In an optional and specific embodiment, the second detecting unit 1006 may include a fourth determining module, an obtaining module, and a control module.

[0112] The fourth determining module is configured to determine a quantity of touch-control operations that have been performed on the first virtual key in the game, in response to detecting that the first touch operation is performed.

[0113] The obtaining module is configured to obtain target acceleration matching with the quantity. The larger the quantity is, the larger the target acceleration is.

[0114] The control module is configured to control the target object to execute the acceleration operation based on the target acceleration.

[0115] In an optional embodiment, the quantity of touch-control operations performed on the first virtual key in the game may be greater than 1, but is not limited thereto. In this embodiment, as the quantity of touch-control operations performed on the first virtual key increases, the target acceleration corresponding to the acceleration operation may be adjusted to a higher level accordingly, but is not limited thereto. A larger quantity touch-control operations performed on the first virtual key corresponds to larger target acceleration. The target acceleration may be adjusted based on a ratio determined by the quantity, but is not limited thereto.

[0116] In an optional and specific embodiment, the obtaining module may include an obtaining sub-module, an adjustment sub-module, and a third determining sub-module.

[0117] The obtaining sub-module is configured to obtain a target proportion matching with the quantity.

[0118] The adjustment sub-module is configured to increase forward acceleration of the target object based on the target proportion, to obtain updated forward acceleration.

[0119] The third determining sub-module is configured to determine the updated traveling acceleration as the target acceleration.

[0120] In an optional and specific embodiment, the obtaining sub-module may be configured to search a pre-established mapping relationship for the target proportion configured for the current quantity. The target proportions corresponding to different quantities may not associate with each other, but is not limited thereto.

[0121] In an optional and specific embodiment, the obtaining sub-module may be configured to calculate the corresponding target proportion based on the current quantity. The target proportions corresponding to different quantities may associate with each other, but is not limited thereto.

[0122] The foregoing is merely an example. When the first virtual key is subject successive touch-control operations in the game, the target proportion matching with the quantity may be alternatively set according another manner. This embodiment is not limited thereto.

[0123] According to embodiments of the present disclosure, as the quantity of touch-control operations performed on the first virtual key increases, an acceleration effect of the acceleration operation is correspondingly adjusted. Thereby, the target object may complete the game faster and more effectively. It takes the target object less time to compete in the game, and a chance of winning is improved for the target object.

[0124] In an optional solution, the control key includes a first control key and a second control key. The first control key is configured to adjust a forward direction of the target object, and the second control key is configured to trigger the target object to execute the target action. The apparatus for executing the action further includes an obtaining unit and a second execution unit.

[0125] The obtaining unit is configured to obtain an operation instruction, before the first virtual key is set to be in the state allowing touch control. The operation instruction is generated by performing a long-press operation on the first control key and the second control key in a human-computer interaction interface displayed in the client. The first control key is configured to adjust a forward direction of the target object, and the second control key is configured to trigger the target object to execute the target action. The apparatus for executing the action further includes an obtaining unit and a second execution unit. The control key includes the first control key and the second control key.

[0126] The second execution unit is configured to control the target object to execute the action combination in response to the operation instruction. The action combination includes a first action and a second action. The target object takes a first direction as a forward direction when being controlled to execute the first action, and takes a second direction as the forward direction when being controlled to execute the second action.

[0127] According to embodiments of the present disclosure, before the first virtual key is set to be in the state allowing touch control, it is first detected whether the target object has completed the execution of the action combination. Adjustment on a state of the first virtual key is determined in a case that the action combination is completed, so as to facilitate the acceleration operation triggered by the first virtual key interfering with the target action executed by the target object. Thereby, a trajectory of the target object executing the target action is optimized,

competition in the game consumes less time, and a change of winning the game is improved for the target object.

[0128] In an optional and specific embodiment, the setting unit 1002 may include a detection module and a setting module.

[0129] The detection module is configured to detect a target angle generated in a process of the target object switching from the first action to the second action. The target angle is an included angle between the forward direction of the target object and a sliding direction of the target object.

[0130] The setting module is configured to determine to adjust the first virtual key from a state not allowing touch control to the state allowing touch control, in response to the target angle being less than or equal to a second angle threshold.

[0131] According to embodiments of the present disclosure, the target angle is detected to control and trigger automatic adjustment of a state of the first virtual key, so as to simplify an operation of adjusting the state of the keys and improve operation efficiency. Thereby, execution of the actions is simplified and more efficient.

[0132] An electronic device configured to implement the foregoing method is further provided according to another aspect of embodiments of the present disclosure. As shown in Figure 11, the electronic device includes a memory 1102 and a processor 1104. The memory 1102 stores a computer program. The processor 1104 is configured to perform the steps in any foregoing method embodiments through the computer program.

[0133] In an optional embodiment, the electronic device may be located in at least one of multiple network devices in a computer network.

[0134] In an optional embodiment, the processor may be configured to perform following steps through the computer program.

[0135] A first virtual key is set to be in a state allowing touch control, in a case that a target object controlled by a client completes an action combination during a game. The first virtual key is configured to trigger the target object to execute an acceleration operation.

[0136] It is detected whether a first touch operation on the first virtual key being in the state allowing touch control is performed.

[0137] The target object is controlled to execute the acceleration operation, and it is detected within a target time period whether a second touch operation on a control key is performed, in a

case that the first touch operation is detected. The control key is configured to control the target object to execute a target action. The target time period is less than or equal to a first time threshold.

[0138] The target object is controlled to execute the target action in a process of executing the acceleration operation, in a case that the second touch operation is detected within the target time period.

[0139] Those skilled in the art can understand that the structure as shown in Figure 11 is only illustrative. The electronic device may be alternatively a terminal device such as a smartphone (for example, an Android mobile phone or an iOS mobile phone), a tablet computer, a palmtop computer, a mobile Internet device (MID), or a PAD. Figure 11 does not limit the structure of the electronic device. For example, the electronic device may further include more or fewer components (such as a network interface) than those as shown in Figure 11, or have a configuration different from that as shown in Figure 11.

[0140] The memory 1102 may be configured to store a software program and a module, for example, a program instruction/module corresponding to the method and apparatus for executing the action according to embodiments of the present disclosure. The processor 1104 performs various functional applications and data processing, that is, implements the foregoing action execution method, by running a software program and a module stored in the memory 1102. The memory 1102 may include a high-speed random memory, and may include a non-volatile memory, for example, one or more magnetic storage apparatuses, a flash memory, or another nonvolatile solid-state memory. In some embodiments, the memory 1102 may further include memories disposed remotely relative to the processor 1104, and the remote memories may be connected to a terminal via a network. Examples of the network include, but are not limited to, the Internet, an intranet, a local area network, a mobile communication network, or a combination thereof. In a specific embodiment, the memory 1102 may be configured, but is not limited, to store information such as related control information or operation instructions for the target object. In an example as shown in Figure 11, the memory 1102 may include, but is not limited to, the setting unit 1002, the first detecting unit 1004, the second detecting unit 1006, and the first execution unit 1008 in the foregoing apparatus for executing the action. In addition, the memory may further include, but is not limited to, other modules and units in the foregoing apparatus for executing the action. Details are not described again herein.

[0141] In an optional embodiment, a transmission apparatus 1106 is configured to receive or transmit data via a network. Specific examples of the network may include a wired network and a

wireless network. As an example, the transmission device 1106 includes a network interface controller (NIC). The NIC may be connected to another network device and a router via a network cable, to communicate with the Internet or a local area network. As an example, the transmission device 1106 is a radio frequency (RF) module which communicates with the Internet wirelessly.

[0142] In addition, the electronic device further includes a display 1108 and a connection bus 1110. The display 1108 is configured to display the target object and a target action executed by the target object. The connection bus 1110 is configured to connect various modular components in the foregoing electronic device.

[0143] A storage medium is further provided according to another aspect of embodiments of the present disclosure. The storage medium stores a computer program. The computer program when executed is configured to perform steps in any foregoing method embodiments.

[0144] In an optional embodiment, the storage medium may be configured to store the computer program for executing following steps.

[0145] A first virtual key is set to be in a state allowing touch control, in a case that a target object controlled by a client completes an action combination during a game. The first virtual key is configured to trigger the target object to execute an acceleration operation.

[0146] It is detected whether a first touch operation on the first virtual key being in the state allowing touch control is performed.

[0147] The target object is controlled to execute the acceleration operation, and it is detected within a target time period whether a second touch operation on a control key is performed, in a case that the first touch operation is detected. The control key is configured to control the target object to execute a target action. The target time period is less than or equal to a first time threshold.

[0148] The target object is controlled to execute the target action in a process of executing the acceleration operation, in a case that the second touch operation is detected within the target time period.

[0149] Those skilled in the art can understand that all or some of the steps of the methods in the foregoing embodiments may be implemented by a program instructing relevant hardware of a terminal device. The program may be stored in a computer-readable storage medium. The storage medium may include a flash disk, a read-only memory (ROM), a random access memory (RAM), a magnetic disk, an optical disc, or the like.

[0150] A computer program product including instructions is further provided according to an aspect of embodiments of the present disclosure. The computer program product, when executed on a computer, configures the computer to perform the steps in any foregoing method embodiments.

[0151] Sequence numbers in the foregoing embodiments of the present disclosure are merely for description purpose but do not imply preferences among the embodiments.

[0152] When the integrated unit in the foregoing embodiments is implemented in a form of a software functional unit and sold or used as an independent product, the integrated unit may be stored in the foregoing computer-readable storage medium. Based on such an understanding, an essence, a part contributing to the related art, or all or a part of the technical solutions of the present disclosure may be implemented in a form of a software product. The computer software product is stored in a storage medium and includes several instructions for instructing one or more computer devices (which may be a PC, a server, a network device, or the like) to perform all or some of steps of the methods in embodiments of the present disclosure.

[0153] In the foregoing embodiments of the present disclosure, the descriptions of the embodiments focus on different aspects. A part that is not described in detail in an embodiment may refer to related description in other embodiments.

[0154] In the several embodiments of the present disclosure, it should be understood that the disclosed client may be implemented in another manner. The apparatus embodiments described above are merely exemplary. For example, a division of the units is merely a division of logic functions, and other division manners may be adopted during actual implementations. For example, multiple units or components may be combined, or may be integrated into another system. Some features may be omitted or not performed. In addition, the coupling, or direct coupling, or communication connection among the displayed or discussed components may be indirect coupling or communication connection via some interfaces, units, or modules, and may be electrical or in other forms.

[0155] The units described as separate components may or may not be physically separated, and the components displayed as units may or may not be physical units. They may be located in one place or may be distributed among multiple network units. Some or all of the units may be selected according to actual needs to achieve the objectives of the solutions of the embodiments.

[0156] In addition, functional units in the embodiments of the present disclosure may be integrated into one processing unit, or each of the units may be physically separated, or two or more

units may be integrated into one unit. The integrated unit may be implemented in a form of hardware, or may be implemented in a form of a software functional unit.

[0157] The foregoing descriptions are merely exemplary implementations of the present disclosure. Those in the art may further make several improvements and modifications without departing from the principle of the present disclosure, and the improvements and modifications fall within the protection scope of the present disclosure.

CLAIMS

What is claimed is:

1. A method for executing an action, applied to a data processing device, wherein the method comprises:

setting a first virtual key to be in a state allowing touch control, in response to a target object controlled by a client completing an action combination during a game, wherein the first virtual key is configured to trigger the target object to execute an acceleration operation;

detecting whether a first touch operation on the first virtual key being in the state is performed;

controlling the target object to execute the acceleration operation, and detecting within a target time period whether a second touch operation on a control key is performed, in response to detecting that the first touch operation is performed, wherein the control key is configured to control the target object to execute a target action, and the target time period is less than or equal to a first time threshold; and

controlling the target object to execute the target action in a process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period.

2. The method according to claim 1, wherein controlling the target object to execute the target action in the process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period comprises:

determining a driving force applied on the target object due to executing the acceleration operation is determined to be an action force in a process of executing the target action;

determining, based on the action force, an actual velocity vector of the target object executing the target action; and

determining, based on the actual velocity vector, a trajectory of the target object executing the target action, wherein a quantity of collisions of the target object due to executing the target action along the trajectory is less than a target threshold.

3. The method according to claim 2, wherein determining, based on the action force, the actual velocity vector of the target object executing the target action comprises:

determining, based on the action force, a forward velocity vector of the target object executing the target action; and

determining the actual velocity vector of the target object executing the target action, based on the forward velocity vector of the target object executing the target action and a centrifugal velocity vector on the target object due to executing the target action, wherein an included angle between a direction of the actual velocity vector and a direction of the forward velocity vector, of the target object executing the target action, is less than a first angle threshold.

4. The method according to claim 1, wherein controlling the target object to execute the acceleration operation in response to detecting that the first touch operation is performed comprises:

determining a quantity of touch-control operations that have been performed on the first virtual key in the game, in response to detecting that the first touch operation is performed;

obtaining target acceleration matching with the quantity, wherein the larger the quantity is, the larger the target acceleration is; and

controlling the target object to execute the acceleration operation based on the target acceleration.

5. The method according to claim 4, wherein obtaining target acceleration matching with the quantity comprises:

obtaining a target proportion matching with the quantity;

increasing forward acceleration of the target object based on the target proportion, to obtain updated forward acceleration; and

determining the updated traveling acceleration as the target acceleration.

6. The method according to any one of claims 1 to 5, wherein the control key comprises a first control key and a second control key, the first control key is configured to adjust a forward direction of the target object, and the second control key is configured to trigger the target object to perform the target action; and

wherein before setting the first virtual key to be in the state allowing touch control, the method further comprises:

obtaining an operation instruction that is generated by performing a long-press operation on the first control key and the second control key in a human-computer interaction interface displayed in the client; and

controlling the target object to execute the action combination in response to the operation instruction, wherein the action combination comprises a first action and a second action, the target object takes a first direction as a forward direction when being controlled to execute the first action,

and the target object takes a second direction as the forward direction when being controlled to execute the second action.

7. The method according to claim 6, wherein setting the first virtual key to the state allowing touch control comprises:

detecting a target angle generated in a process of the target object switching from the first action to the second action, wherein the target angle is an included angle between the forward direction of the target object and a sliding direction of the target object; and

determining to adjust the first virtual key from a state not allowing touch control to the state allowing touch control, in response to the target angle being less than or equal to a second angle threshold.

8. An apparatus for executing an action, comprising:

a setting unit, configured to set a first virtual key to be in a state allowing touch control, in response to a target object controlled by a client completing an action combination once during a game, wherein the first virtual key is configured to trigger the target object to execute an acceleration operation;

a first detecting unit, configured to detect whether a first touch operation on the first virtual key being in the state is performed;

a second detecting unit, configured to control the target object to execute the acceleration operation, and detect within a target time period whether a second touch operation on a control key is performed, in response to detecting the first touch operation is performed, wherein the control key is configured to control the target object to execute a target action, and the target time period is less than or equal to a first time threshold; and

a first execution unit, configured to control the target object to execute the target action in a process of executing the acceleration operation, in response to detecting that the second touch operation is performed within the target time period.

9. The apparatus according to claim 8, wherein the first execution unit comprises:

a first determining module, configured to determine a driving force applied on the target object due to executing the acceleration operation is determined to be an action force in a process of executing the target action;

a second determining module, configured to determine, based on the action force, an actual velocity vector of the target object executing the target action; and

a third determining module, configured to determine, based on the actual velocity vector, a trajectory of the target object executing the target action, wherein a quantity of collisions of the target object due to executing the target action along the trajectory is less than a target threshold.

10. The apparatus according to claim 9, wherein the second determining module comprises:

a first determining sub-module, configured to determine, based on the action force, a forward velocity vector of the target object executing the target action; and

a second determining sub-module, configured to determine the actual velocity vector of the target object executing the target action, based on the forward velocity vector of the target object executing the target action and a centrifugal velocity vector on the target object due to executing the target action, wherein an included angle between a direction of the actual velocity vector and a direction of the forward velocity vector, of the target object executing the target action, is less than a first angle threshold.

11. The apparatus according to claim 8, wherein the second detecting unit comprises:

a fourth determining module, configured to determine a quantity of touch-control operations that have been performed on the first virtual key in the game, in response to detecting that the first touch operation is performed;

an obtaining module, configured to obtain target acceleration matching with the quantity, wherein the larger the quantity is, the larger the target acceleration is; and

a control module, configured to control the target object to execute the acceleration operation based on the target acceleration.

12. The apparatus according to claim 11, wherein the obtaining module comprises:

an obtaining sub-module, configured to obtain a target proportion matching with the quantity;

an adjustment sub-module, configured to increase forward acceleration of the target object based on the target proportion, to obtain updated forward acceleration; and

a third determining sub-module, configured to determine the updated traveling acceleration as the target acceleration.

13. The apparatus according to any one of claims 8 to 12, wherein the control key comprises a first control key and a second control key, the first control key is configured to adjust a forward direction of the target object, and the second control key is configured to trigger the target object to perform the target action; and

the apparatus further comprises:

an obtaining unit, configured to obtain an operation instruction, before the first virtual key is set to be in the state allowing touch control, wherein the operation instruction is generated by performing a long-press operation on the first control key and the second control key in a human-computer interaction interface displayed in the client; and

a second execution unit, configured to control the target object to execute the action combination in response to the operation instruction, wherein the action combination comprises a first action and a second action, the target object takes a first direction as a forward direction when being controlled to execute the first action, and the target objects takes a second direction as the forward direction when being controlled to execute the second action.

14. The apparatus according to claim 13, wherein the setting unit comprises:

a detection module, configured to detect a target angle generated in a process of the target object switching from the first action to the second action, wherein the target angle is an included angle between the forward direction of the target object and a sliding direction of the target object; and

a setting module, configured to determine to adjust the first virtual key from a state not allowing touch control to the state allowing touch control, in response to the target angle being less than or equal to a second angle threshold.

15. A storage medium, storing a program, wherein:

the program when being executed performs the method according to any one of claims 1 to 7.

16. An electronic device, comprising a memory and a processor, wherein:

the memory stores a computer program, and

the processor is configured to perform the method according to any one of claims 1 to 7 through the computer program.

17. A computer program product, comprising instructions, wherein:

the computer program product when executed on a computer configures the computer to perform the method according to any one of claims 1 to 7.