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(54) GAME PROGRAM, GAME MACHINE, AND GAME CONTROL METHOD

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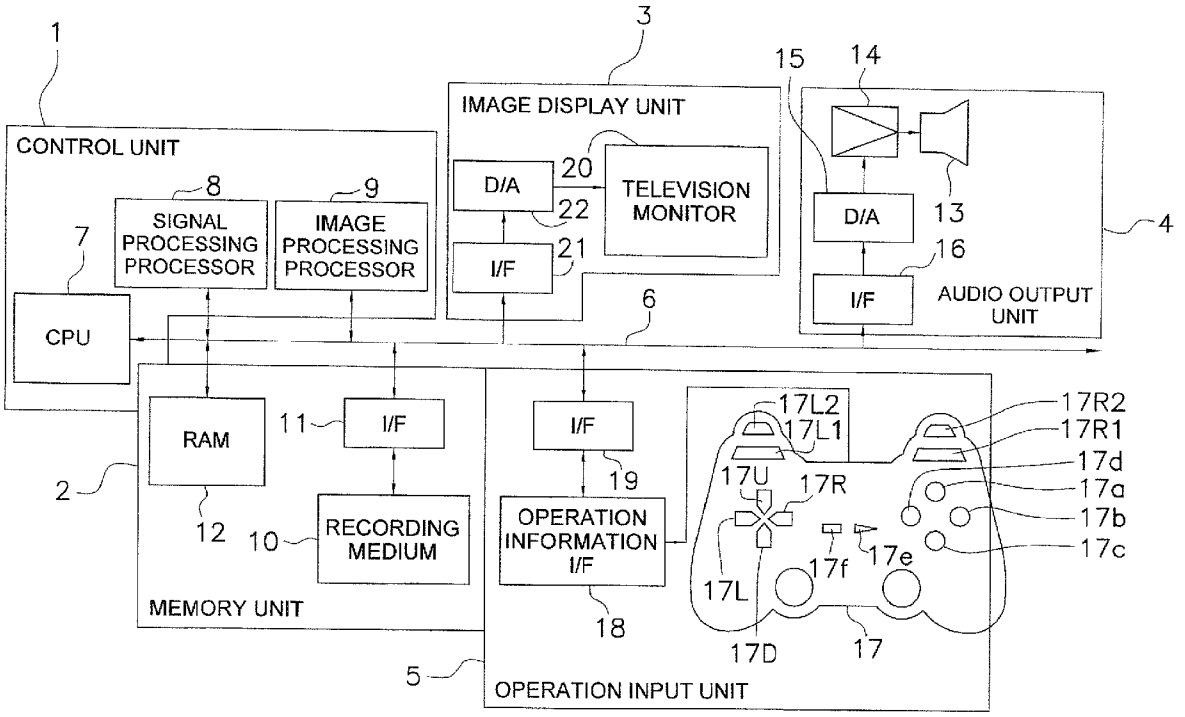
(57) **ABSTRACT**

A game character releasing a moving object is displayed on an image display device. In a game program, correspondence between releasing form data and third image data that are for a process of releasing the moving object are recognized by a control unit. One of a plurality of the releasing form data is recognized as the property data of the character by the control unit. Further, forth image data corresponding to the property data are recognized by the control unit. The first, second, and fourth image data are recognized by the control unit. First through fourth intermediate image data are recognized as intermediate image data by the control unit. In addition, the releasing operations corresponding to the property data are displayed on the image display device by using second basic image data and the intermediate image data.



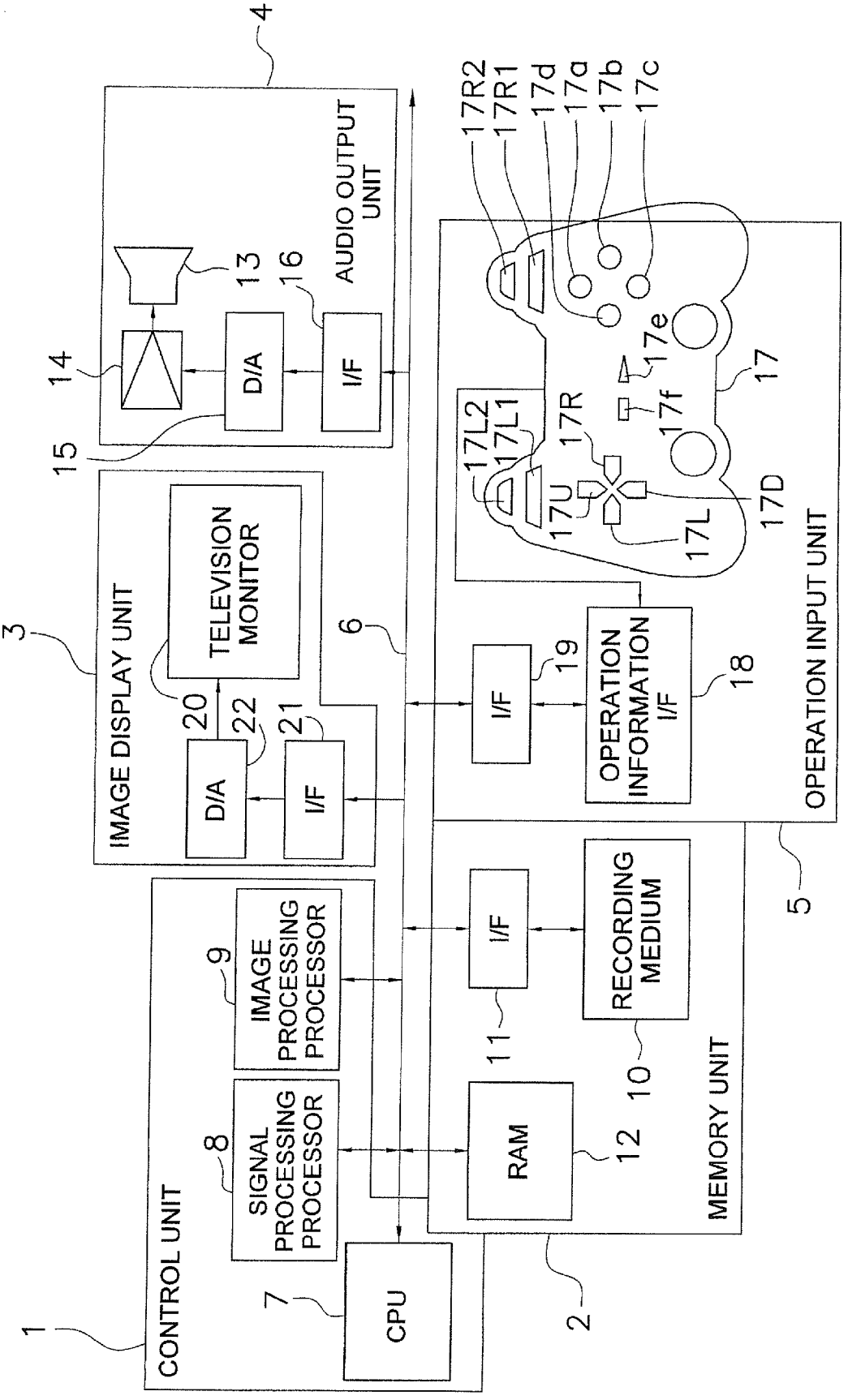

CONTROL UNIT
1
CPU
7
SIGNAL PROCESSING PROCESSOR
8
IMAGE PROCESSING PROCESSOR
9
MEMORY UNIT
2
RAM
12
I/F
11
RECORDING MEDIUM
10
IMAGE DISPLAY UNIT
3
D/A
22
I/F
21
TELEVISION MONITOR
20
AUDIO OUTPUT UNIT
4
D/A
14
I/F
16
13
15
OPERATION INPUT UNIT
5
I/F
19
OPERATION INFORMATION I/F
18
6
17
17R2
17R1
17d
17a
17b
17c
17e
17f
17L2
17L1
17R
17U
17L
17D

Fig. 1

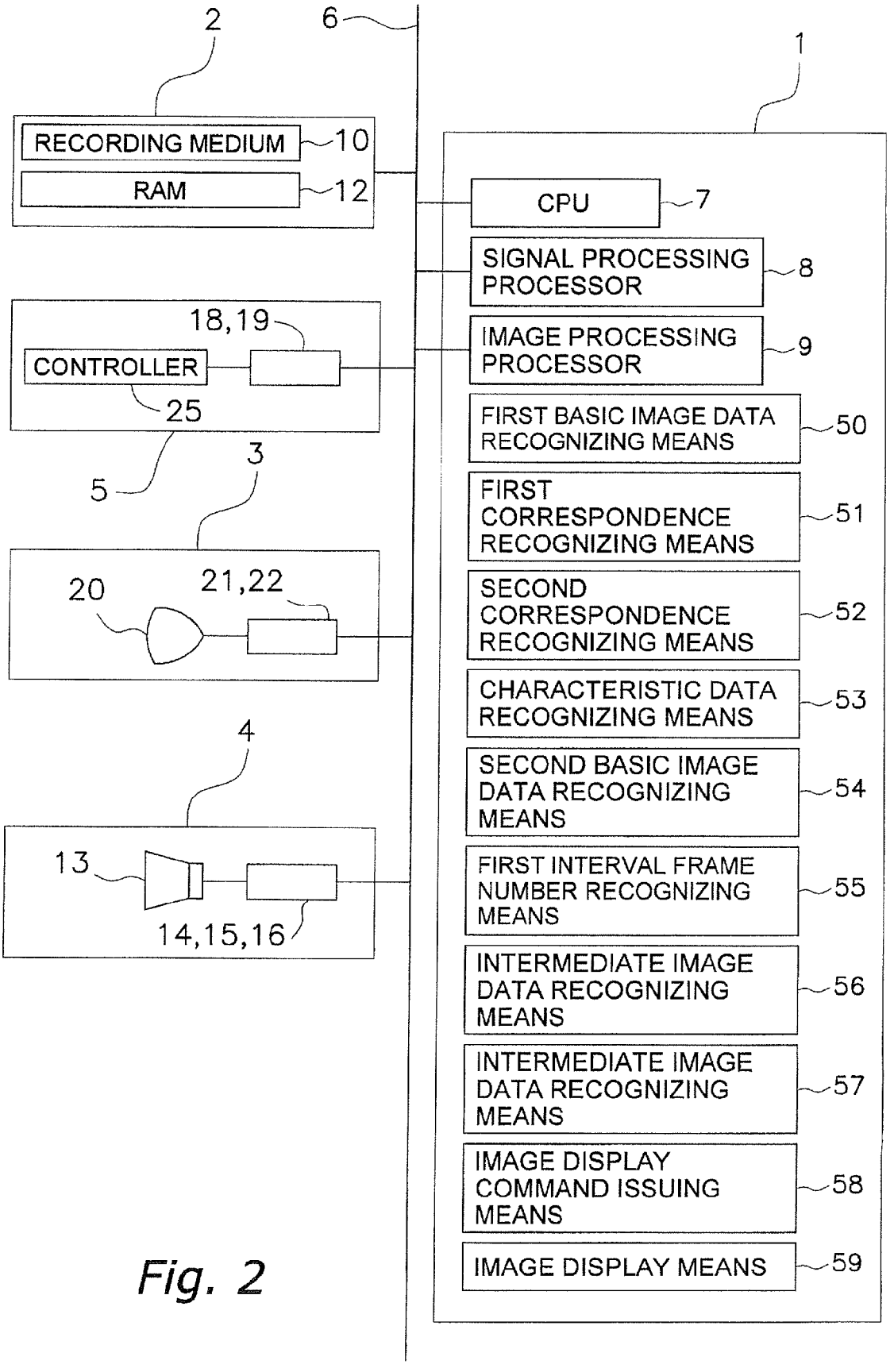

2
6
1
RECORDING MEDIUM
10
RAM
12
CPU
7
SIGNAL PROCESSING PROCESSOR
8
18,19
CONTROLLER
25
IMAGE PROCESSING PROCESSOR
9
FIRST BASIC IMAGE DATA RECOGNIZING MEANS
50
5
3
FIRST CORRESPONDENCE RECOGNIZING MEANS
51
20
21,22
SECOND CORRESPONDENCE RECOGNIZING MEANS
52
CHARACTERISTIC DATA RECOGNIZING MEANS
53
4
SECOND BASIC IMAGE DATA RECOGNIZING MEANS
54
13
FIRST INTERVAL FRAME NUMBER RECOGNIZING MEANS
55
14,15,16
INTERMEDIATE IMAGE DATA RECOGNIZING MEANS
56
INTERMEDIATE IMAGE DATA RECOGNIZING MEANS
57
IMAGE DISPLAY COMMAND ISSUING MEANS
58
IMAGE DISPLAY MEANS
59

Fig. 2

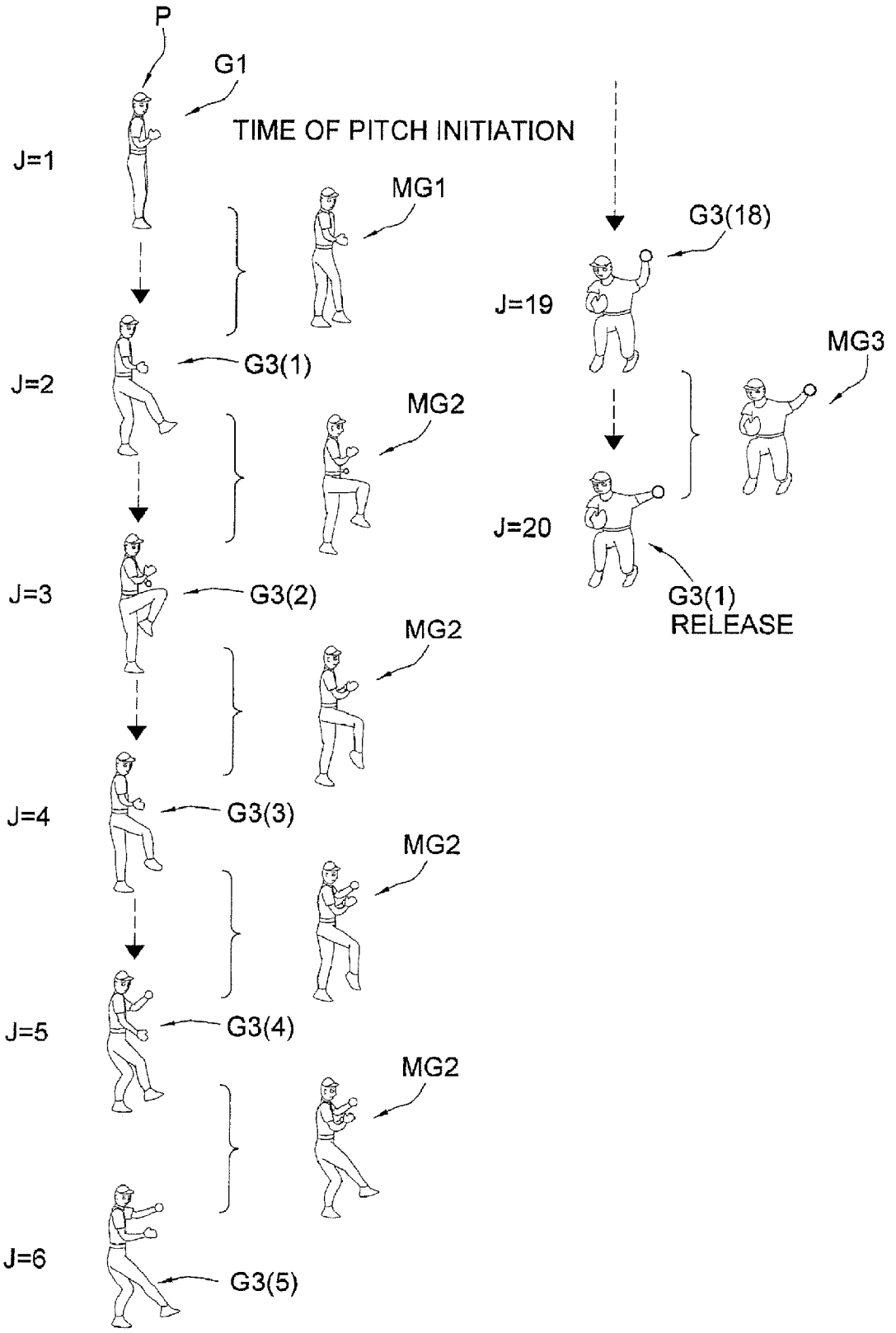

P
G1
TIME OF PITCH INITIATION
J=1
MG1
G3(18)
J=19
MG3
J=2
G3(1)
MG2
J=20
G3(1)
RELEASE
J=3
G3(2)
MG2
J=4
G3(3)
MG2
J=5
G3(4)
MG2
J=6
G3(5)

Fig. 3

PITCHER CHARACTER P	PITCH FORM DATA T	THIRD IMAGE DATA G3 (G4)
P0	0	G3(1)～G3(18)
P1	1	G3(1),G3(3)～G3(18)
P2	2	G3(1),G3(4)～G3(18)
P3	3	G3(1),G3(5)～G3(18)

Fig. 4

PITCHER CHARACTER P	PITCH FORM DATA T	TOTAL FRAME NUMBER F
P0	0	96
P1	1	91
P2	2	86
P3	3	81

Fig. 5

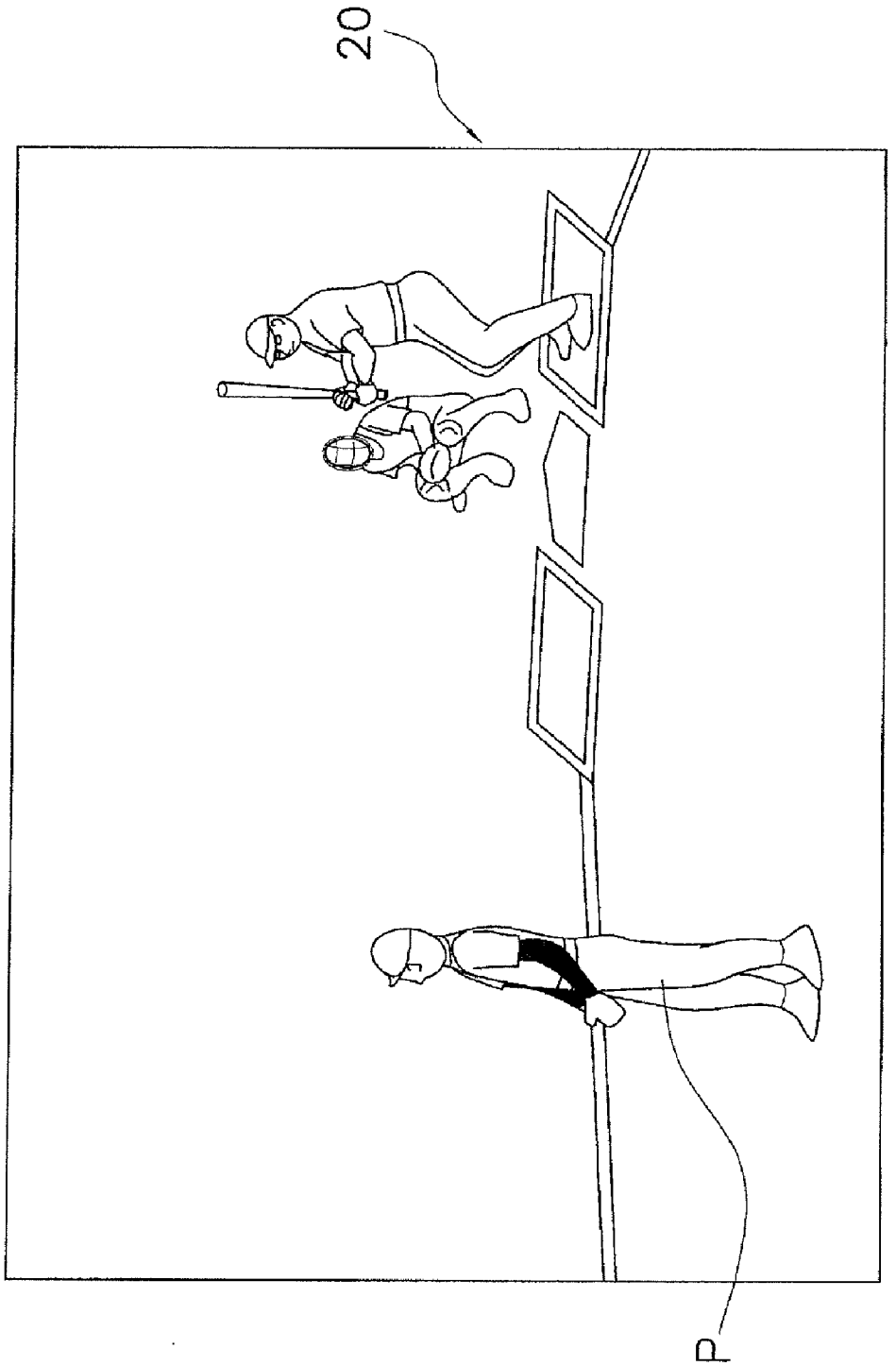


Fig. 6

CHARACTERISTIC DATA TD	SECOND BASIC IMAGE DATA GD2
0	G1,G3(1)～G3(18),G2
1	G1,G3(1),G3(3)～G3(18),G2
2	G1,G3(1),G3(4)～G3(18),G2
3	G1,G3(1),G3(5)～G3(18),G2

Fig. 7

CHARACTERISTIC DATA TD	SECOND BASIC IMAGE DATA GD2	INTERVAL FRAME NUMBER KF	TOTAL NUMBER OF INTERVAL FRAMES
0	G1～G3(1) G3(1)～G3(18) G3(18)～G2	4 4 4	76
1	G1～G3(1) G3(1)～G3(3) G3(3)～G3(18) G3(18)～G2	4 4 4 4	72
2	G1～G3(1) G3(1)～G3(4) G3(4)～G3(18) G3(18)～G2	4 4 4 4	68
3	G1～G3(1) G3(1)～G3(5) G3(5)～G3(18) G3(18)～G2	4 4 4 4	64

Fig. 8

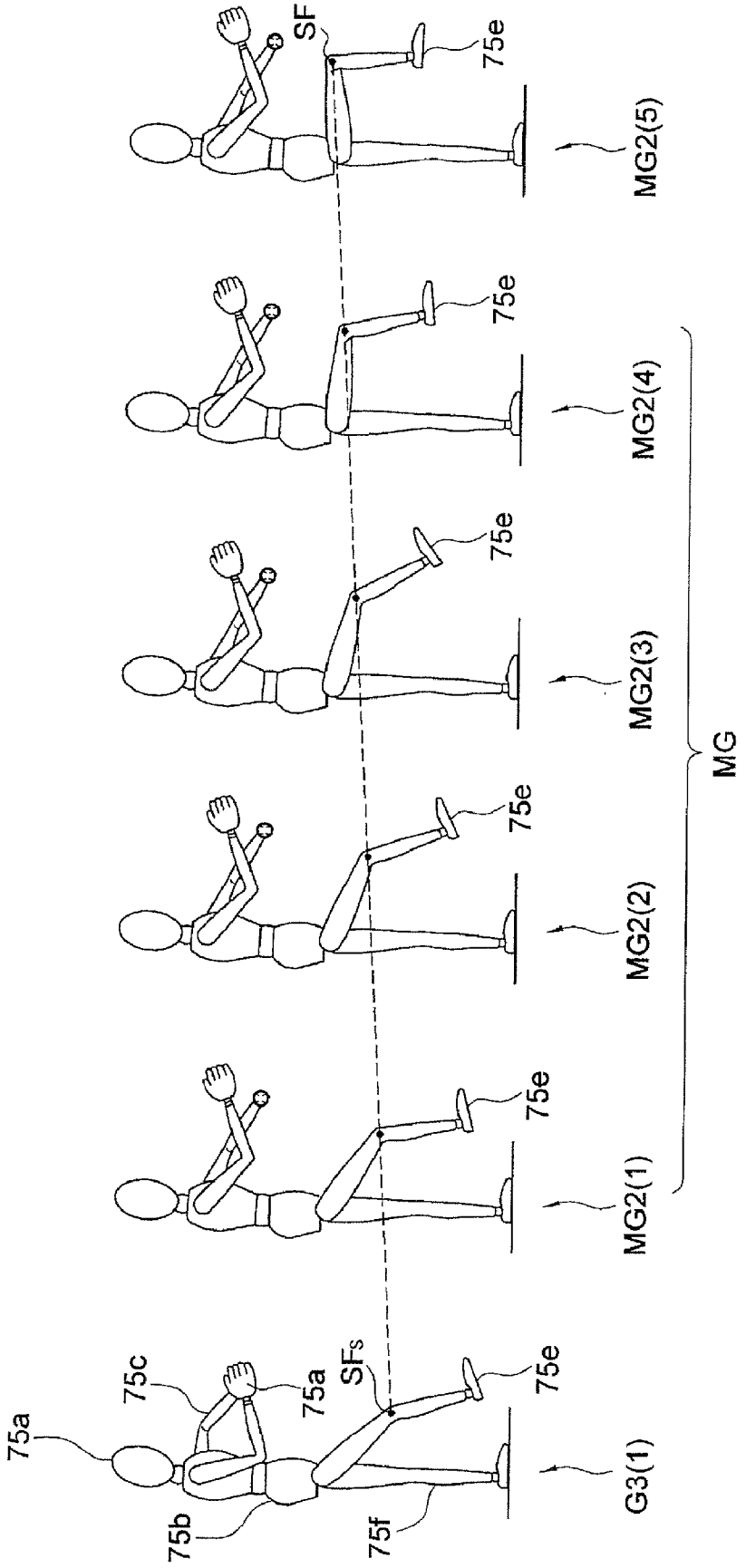

SF
75e
MG2(5)
75e
MG2(4)
75e
MG2(3)
75e
MG2(2)
75e
MG2(1)
MG
75e
G3(1)
75a
75c
75a
SFs
75b
75f

Fig. 9

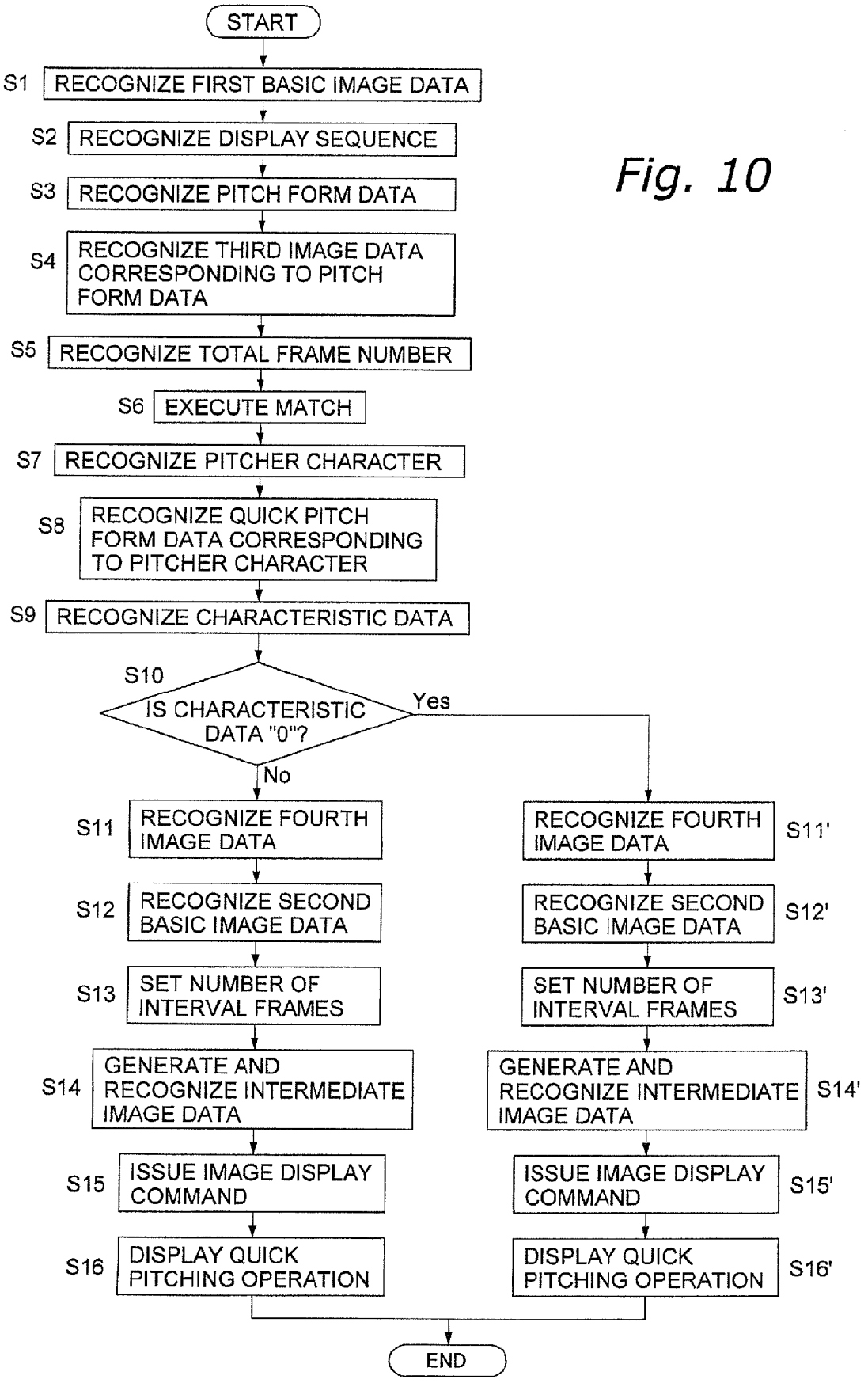

START
S1
RECOGNIZE FIRST BASIC IMAGE DATA
S2
RECOGNIZE DISPLAY SEQUENCE
S3
RECOGNIZE PITCH FORM DATA
S4
RECOGNIZE THIRD IMAGE DATA CORRESPONDING TO PITCH FORM DATA
S5
RECOGNIZE TOTAL FRAME NUMBER
S6
EXECUTE MATCH
S7
RECOGNIZE PITCHER CHARACTER
S8
RECOGNIZE QUICK PITCH FORM DATA CORRESPONDING TO PITCHER CHARACTER
S9
RECOGNIZE CHARACTERISTIC DATA
S10
IS CHARACTERISTIC DATA "0"?
Yes
No
S11
RECOGNIZE FOURTH IMAGE DATA
S12
RECOGNIZE SECOND BASIC IMAGE DATA
S13
SET NUMBER OF INTERVAL FRAMES
S14
GENERATE AND RECOGNIZE INTERMEDIATE IMAGE DATA
S15
ISSUE IMAGE DISPLAY COMMAND
S16
DISPLAY QUICK PITCHING OPERATION
S11'
RECOGNIZE FOURTH IMAGE DATA
S12'
RECOGNIZE SECOND BASIC IMAGE DATA
S13'
SET NUMBER OF INTERVAL FRAMES
S14'
GENERATE AND RECOGNIZE INTERMEDIATE IMAGE DATA
S15'
ISSUE IMAGE DISPLAY COMMAND
S16'
DISPLAY QUICK PITCHING OPERATION
END

Fig. 10

GAME PROGRAM, GAME MACHINE, AND GAME CONTROL METHOD

CROSS-REFERENCE TO THE RELATED APPLICATIONS

[0001] This application claims priority to Japanese Patent Application No. 2006-042447 and International Patent Application No. PCT/JP2006/323578. The entire disclosure of Japanese Patent Application No. 2006-042447 and International Patent Application No. PCT/JP2006/323578 is hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a game program, and particularly to a game program whereby a game that displays a send-out operation of a character that sends out a moving object on an image display unit is implemented in a computer. The present invention also relates to a video game machine capable of executing the game implemented by the game program, and to a came control method capable of controlling the game implemented by the game program through the use of a computer.

[0004] 2. Description of the Related Art

[0005] Various video games have been proposed in the past. These video games are executed in a game machine. For example, a common game machine has a monitor, a game console that is separate from the monitor, and an input unit, e.g., a controller, that is separate from the game console. An input unit, e.g., a plurality of input keys, is provided to the controller. In such a game machine, a character displayed on the monitor can be manipulated by operating an input key.

[0006] In such a game machine, it is possible to execute a contest game, e.g., a baseball game. Through operation of the controller in this baseball game, the monitor displays a state in which a pitcher character throws a pitch. For example, when a runner character is on base, a state in which the pitcher character throws a pitch from the set position is displayed on the monitor as a close-up shot. When the runner character is running to a base, the base running of the runner character is displayed on the monitor in a long-screen state.

[0007] In such a baseball game, a special ability parameter referred to as quickness is assigned to a pitcher character who is skilled at quick motion. In the case of a pitcher character to whom this special ability parameter is assigned, when the screen switches from a close-up view to a long-shot view as the runner character runs to a base, the position of the runner character starting the run is displayed in a position near the base. In the case of a pitcher character to whom the special ability parameter is not assigned, when the screen switches from a close-up view to a long-shot view as the runner character runs to a base, the position of the runner character starting the run is displayed in a position distant from the base. The pitching of the pitcher character by a quick motion is thus adjusted according to the position of the runner character at the time the screen switches from a close-up view to a long-shot view. Specifically, the runner character is displayed in a different position at the time the screen switches from a close-up view to a long-shot view according to whether or not the pitcher character pitches by a quick motion.

[0008] In this baseball game, however, even when the special ability parameter of quickness is assigned to the pitcher character, the pitcher character throws a pitch without performing a quick motion from the set position.

[0009] Non-patent Document 1: Pro Baseball Spirits 2, Konami, Apr. 7, 2005, PlayStation 2 Edition

SUMMARY OF THE INVENTION

[0010] In the conventional baseball game, the effects of the quick motion are adjusted by adopting the configuration in which the runner character is displayed in a different position at the time the screen switches from a close-up view to a long-shot view according to whether or not the pitcher character pitches by a quick motion. Specifically, in the case of a pitcher character who pitches by a quick motion, the runner character is displayed in a position nearer to first base than in the case of a pitcher who does not pitch by a quick motion.

[0011] The reason for adopting the configuration in which the display position of the runner character is varied according to whether or not the pitcher character pitches by a quick motion is that the special ability parameter of quickness has no effect on the pitching of the pitcher character even when the special ability parameter of quickness is assigned to the pitcher character. Specifically, even when the special ability parameter of quickness is assigned to the pitcher character, it is impossible to cause the pitcher character to pitch by a quick motion.

[0012] An object of the present invention is to make it possible to display a send-out (releasing) operation performed by a character to send out (release) a moving object on an image display unit on the basis of characteristic data of the character. Specifically, an object of the present invention is to make it possible to display a quick pitching operation of a pitcher character on an image display unit on the basis of characteristic data of the pitcher character.

[0013] The game program according to a first aspect implements the following functions in a computer that is capable of implementing a game in which a send-out operation performed by a character to send out a moving object is displayed on an image display unit:

[0014] (1) a first basic image data recognizing function whereby first image data of a time at which the character initiates a send-out operation, second image data of a time at which the moving object is sent out by the character who performs the send-out operation, and a plurality of third image data of a period from the initiation of the send-out operation by the character to the sending out of the moving object by the character are recognized as first basic image data by a control unit;

[0015] (2) a first correspondence recognizing function whereby a correspondence between each of a plurality of send-out mode data for specifying a mode of the send-out operation and an amount of third image data that is less than the plurality of third image data is recognized by the control unit;

[0016] (3) a characteristic data recognizing function whereby any one set of the plurality of send-out mode data is recognized as characteristic data of the character by the control unit;

[0017] (4) a second basic image data recognizing function whereby the amount of third image data that is less than the plurality of third image data corresponding to the characteristic data are recognized as fourth image data by the control unit, and the first image data, the second image data, and the plurality of fourth image data are recognized as second basic image data by the control unit;

[0018] (5) an intermediate image data generating function whereby the control unit performs a process to generate at least one first intermediate image data between the first image data and the fourth image data, at least one second intermediate image data between each of the plurality of fourth image data corresponding to the characteristic data, and at least one third intermediate image data between the fourth image data and the second image data;

[0019] (6) an intermediate image data recognizing function whereby the at least one first intermediate image data, the at least one second intermediate image data, and the at least one third intermediate image data are recognized as intermediate image data by the control unit;

[0020] (7) an image display command issuing function whereby the control unit is caused to issue an image display command for displaying the send-out operation that corresponds to the characteristic data on the image display unit; and

[0021] (8) an image display function whereby the send-out operation that corresponds to the characteristic data is displayed on the image display unit by using the second basic image data and the intermediate image data when the image display command is issued from the control unit.

[0022] The game program is capable of implementing a game in which a send-out operation performed by a character to send out a moving object is displayed on an image display unit. In the first basic image data recognizing function, first image data of a time at which the character initiates a send-out operation, second image data of a time at which the moving object is sent out by the character who performs the send-out operation, and a plurality of third image data of a period from the initiation of the send-out operation by the character to the sending out of the moving object by the character are recognized as first basic image data by a control unit. In the first correspondence recognizing function, a correspondence between each of a plurality of send-out mode data for specifying a mode of the send-out operation and an amount of third image data that is less than the plurality of third image data is recognized by the control unit. In the characteristic data recognizing function, any one set of the plurality of send-out mode data is recognized as characteristic data of the character by the control unit. In the second basic image data recognizing function, the amount of third image data that is less than the plurality of third image data corresponding to the characteristic data are recognized as fourth image data by the control unit. The first image data, the second image data, and the plurality of fourth image data are also recognized as second basic image data by the control unit. In the intermediate image data generating function, the control unit performs a process to generate at least one first intermediate image data between the first image data and the fourth image data, at least one second intermediate image data between each of the plurality of fourth image data corresponding to the characteristic data, and at least one third intermediate image data between the fourth image data and the second image data. In the intermediate image data recognizing function, the at least one first intermediate image data, the at least one second intermediate image data, and the at least one third intermediate image data are recognized as intermediate image data by the control unit. In the image display command issuing function, the control unit is caused to issue an image display command for displaying the send-out operation that corresponds to the characteristic data on the image display unit. In the image display function, the send-out operation that corresponds to the characteristic data is displayed on the image display unit by using the second basic image data and the intermediate image data when the image display command is issued from the control unit.

[0023] In a game program for implementing a baseball game, for example, a game can be implemented in which a quick pitching operation of a pitcher character that sends out a ball is displayed on the image display unit. In this game program, first image data of a time at which a quick pitching operation is initiated by the pitcher character, second image data of a time at which the ball is sent out by the pitcher character who performs the quick pitching operation, and a plurality of third image data of a time between initiation of the quick pitching operation of the pitcher character and pitching of the ball by the pitcher character are recognized as first basic image data by a control unit. A correspondence between each of a plurality of quick pitch form data for specifying a mode of the quick pitching operation of the pitcher character and an amount of third image data that is less than the plurality of third image data is then recognized by the control unit. Any one set of the plurality of quick pitch form data is then recognized as characteristic data of the pitcher character by the control unit. The amount of third image data that is less than the plurality of third image data corresponding to the characteristic data of the pitcher character are then recognized as a plurality of fourth image data by the control unit. The first image data, the second image data, and the plurality of fourth image data are also recognized as second basic image data by the control unit. The control unit then performs a process to generate at least one first intermediate image data between the first image data and the fourth image data, at least one second intermediate image data between each of the plurality of fourth image data corresponding to the characteristic data, and at least one third intermediate image data between the fourth image data and the second image data. The at least one first intermediate image data, the at least one second intermediate image data, and the at least one third intermediate image data are then recognized as intermediate image data by the control unit. An image display command for displaying the quick pitching operation that corresponds to the characteristic data on the image display unit is then issued to the control unit. The quick pitching operation that corresponds to the characteristic data is then displayed on the image display unit by using the second basic image data and the intermediate image data when the image display command is issued from the control unit.

[0024] In the game program, the pitching operation of the pitcher character can be displayed on the image display unit by using the intermediate image data and the second basic image data that include the plurality of fourth image data corresponding to the characteristic data of the pitcher character. Specifically, the send-out operation of the character to send out the moving object can be displayed on the image display unit on the basis of the characteristic data of the character.

[0025] In the game program according to a second aspect, the following functions are further implemented in the computer by the game program according to the first aspect:

[0026] (9) a second correspondence recognizing function whereby the control unit recognizes a correspondence between each of the plurality of send-out mode data and a total number of frames when an operation from initiation of

the send-out operation by the character to the sending-out of the moving object by the character is displayed on the image display unit; and

[0027] (10) a first interval frame number recognizing function whereby the control unit is caused to set a number of frames between each image data unit of the second basic image data, and the number of frames between each image data unit set by the control unit is recognized as an interval frame number by the control unit so that a total number of frames between each image data unit of the second basic image data is a number of frames obtained by subtracting a number of sets of the second basic image data from the total number of frames corresponding to the characteristic data recognized by the control unit.

[0028] In the second correspondence recognizing function in this game program, the control unit recognizes a correspondence between each of the plurality of send-out mode data and a total number of frames when an operation from initiation of the send-out operation by the character to the sending-out of the moving object by the character is displayed on the image display unit. In the characteristic data recognizing function, any one set of the plurality of send-out mode data is recognized as characteristic data of the character by the control unit. In the first interval frame number recognizing function, the control unit is caused to set a number of frames between each image data unit of the second basic image data, and the number of frames between each image data unit set by the control unit is recognized as an interval frame number by the control unit so that a total number of frames between each image data unit of the second basic image data is a number of frames obtained by subtracting a number of sets of the second basic image data from the total number of frames corresponding to the characteristic data recognized by the control unit. In the intermediate image data generating function, the control unit performs a process to generate a number of sets of first intermediate image data commensurate with the number of interval frames between the first image data and the fourth image data, a number of sets of second intermediate image data commensurate with the number of interval frames between each of the plurality of fourth image data corresponding to the characteristic data, and a number of sets of third intermediate image data commensurate with the number of interval frames between the fourth image data and the second image data. In the intermediate image data recognizing function, the control unit recognizes the first intermediate image data commensurate with the number of interval frames, the second intermediate image data commensurate with the number of interval frames, and the third intermediate image data commensurate with the number of interval frames as intermediate image data.

[0029] In a game program for implementing a baseball game, for example, the control unit recognizes a correspondence between each of the plurality of quick pitch form data and a total number of frames when an operation from initiation of the quick pitching operation of the pitcher character to sending-out of the ball from the pitcher character is displayed on the image display unit. Any one set of the plurality of quick pitch form data is then recognized as characteristic data of the character by the control unit. A number of frames between each image data unit of the second basic image data is then set by the control unit, and the number of frames between each image data unit set by the control unit is recognized as an interval frame number by the control unit so that a total number of frames between each image data unit of the second basic image data is a number of frames obtained by subtracting a number of sets of the second basic image data from the total number of frames corresponding to the characteristic data recognized by the control unit. The control unit then performs a process to generate a number of sets of first intermediate image data commensurate with the number of interval frames between the first image data and the fourth image data, a number of sets of second intermediate image data commensurate with the number of interval frames between each of the plurality of fourth image data corresponding to the characteristic data, and a number of sets of third intermediate image data commensurate with the number of interval frames between the fourth image data and the second image data. The control unit then recognizes the first intermediate image data commensurate with the number of interval frames, the second intermediate image data commensurate with the number of interval frames, and the third intermediate image data commensurate with the number of interval frames as intermediate image data.

[0030] In this game program, the quick pitching operation of the pitcher character can be displayed on the image display unit in a prescribed number of frames (total number of frames) corresponding to any one set of the characteristic data, i.e., the plurality of quick pitch form data, recognized by the control unit. Specifically, the send-out operation of the character to send out the moving object can be displayed on the image display unit in a prescribed number of frames on the basis of the characteristic data of the character.

[0031] In the game program according to a third aspect, the first basic image data recognizing function causes the control unit to recognize the image data in the sequence of the first image data, the plurality of third image data, and the second image data in the game program according to the first or second aspect. The first correspondence recognizing function causes the control unit to recognize a correspondence between each of the plurality of send-out mode data and the plurality of third image data with the exclusion of at least one unit of the third image data that is closer to the first image data.

[0032] In a game program for implementing a baseball game, for example, when the first image data are image data of the time at which the send-out operation of the pitcher character is initiated, the quick pitching operation of the pitcher character can be displayed on the image display unit by excluding at least one third image data, e.g., image data of a state in which the pitcher character bends his legs at a right angle, that is closer to the first image data. Specifically, the send-out operation of the character to send out the moving object can be appropriately displayed on the image display unit on the basis of the characteristic data of the character.

[0033] In the game program according to a fourth aspect, the first intermediate image data in the game program according to any of the first through third aspects are generated by causing the control unit to execute interpolation calculation using the first image data and the fourth image data as initial image data. The second intermediate image data are generated by causing the control unit to execute interpolation calculation using two units of image data among the plurality of fourth image data corresponding to the characteristic data as initial image data. The third intermediate image data are generated by causing the control unit to execute interpolation calculation using the fourth image data and the second image data as initial image data in the intermediate image data

generating function. These functions are implemented in the intermediate image data generating function.

[0034] In this game program, since the intermediate image data are generated by interpolation calculation using two sets of image data that specify the intervals as the initial data, the quick pitching operation of the pitcher character can be smoothly displayed by using the intermediate image data to connect the two sets of image data that specify the intervals. Specifically, the send-out operation of the character to send out the moving object can be displayed on the image display unit on the basis of the characteristic data of the character.

[0035] The game machine according to a fifth aspect is a game machine that is capable of implementing a game that displays a send-out operation performed by a character to send out a moving object on an image display unit. The game machine includes first basic image data recognizing means whereby first image data of a time at which the character initiates a send-out operation, second image data of a time at which the moving object is sent out by the character who performs the send-out operation, and a plurality of third image data of a period from the initiation of the send-out operation by the character to the sending out of the moving object by the character are recognized as first basic image data by a control unit; first correspondence recognizing means whereby a correspondence between each of a plurality of send-out mode data for specifying a mode of the send-out operation and an amount of third image data that is less than the plurality of third image data is recognized by the control unit; characteristic data recognizing means whereby any one set of the plurality of send-out mode data is recognized as characteristic data of the character by the control unit; second basic image data recognizing means whereby the amount of third image data that is less than the plurality of third image data corresponding to the characteristic data are recognized as fourth image data by the control unit, and the first image data, the second image data, and the plurality of fourth image data are recognized as second basic image data by the control unit; intermediate image data generating means whereby the control unit performs a process to generate at least one first intermediate image data between the first image data and the fourth image data, at least one second intermediate image data between each of the plurality of fourth image data corresponding to the characteristic data, and at least one third intermediate image data between the fourth image data and the second image data; intermediate image data recognizing means whereby the at least one first intermediate image data, the at least one second intermediate image data, and the at least one third intermediate image data are recognized as intermediate image data by the control unit; image display command issuing means whereby the control unit is caused to issue an image display command for displaying the send-out operation that corresponds to the characteristic data on the image display unit; and image display means whereby the send-out operation that corresponds to the characteristic data is displayed on the image display unit by using the second basic image data and the intermediate image data when the image display command is issued from the control unit.

[0036] The game control method according to a sixth aspect is a game control method for enabling a computer to control a game that displays a send-out operation performed by a character to send out a moving object on an image display unit. The game control method includes a first basic image data recognizing step whereby first image data of a time at which the character initiates a send-out operation, second image data of a time at which the moving object is sent out by the character who performs the send-out operation, and a plurality of third image data of a period from the initiation of the send-out operation by the character to the sending out of the moving object by the character are recognized as first basic image data by a control unit; a first correspondence recognizing step whereby a correspondence between each of a plurality of send-out mode data for specifying a mode of the send-out operation and an amount of third image data that is less than the plurality of third image data is recognized by the control unit; a characteristic data recognizing step whereby any one set of the plurality of send-out mode data is recognized as characteristic data of the character by the control unit; a second basic image data recognizing step whereby the amount of third image data that is less than the plurality of third image data corresponding to the characteristic data are recognized as fourth image data by the control unit, and the first image data, the second image data, and the plurality of fourth image data are recognized as second basic image data by the control unit; an intermediate image data generating step whereby the control unit performs a process to generate at least one first intermediate image data between the first image data and the fourth image data, at least one second intermediate image data between each of the plurality of fourth image data corresponding to the characteristic data, and at least one third intermediate image data between the fourth image data and the second image data; an intermediate image data recognizing step whereby the at least one first intermediate image data, the at least one second intermediate image data, and the at least one third intermediate image data are recognized as intermediate image data by the control unit; an image display command issuing step whereby the control unit is caused to issue an image display command for displaying the send-out operation that corresponds to the characteristic data on the image display unit; and an image display step whereby the send-out operation that corresponds to the characteristic data is displayed on the image display unit by using the second basic image data and the intermediate image data when the image display command is issued from the control unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] Referring now to the attached drawings which form a part of this original disclosure:

[0038] FIG. **1** is a basic structural diagram of a video game machine according to an embodiment of the present invention;

[0039] FIG. **2** is a functional block diagram showing the means provided to the video game machine;

[0040] FIG. **3** is a diagram showing the image data that correspond to the pitcher character;

[0041] FIG. **4** is a diagram showing the correspondence between the quick pitch form data and the third image data;

[0042] FIG. **5** is a diagram showing the correspondence between the quick pitch form data and the total number of frames;

[0043] FIG. **6** is a diagram showing the pitcher character displayed on the monitor;

[0044] FIG. **7** is a diagram showing the correspondence between the characteristic data and the second basic image data;

[0045] FIG. **8** is a diagram showing the correspondence between the second basic image data and the interval frame number;

[0046] FIG. **9** is a diagram showing the method for generating the intermediate image data; and

[0047] FIG. **10** is a flowchart showing the pitching operation display system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0048] Selected embodiments of the present invention will now be explained with reference to the drawings. It will be apparent to those skilled in the art from this disclosure that the following descriptions of the embodiments of the present invention are provided for illustration only and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

Configuration and Operation of the Game Machine

[0049] FIG. **1** shows the basic structure of the game machine according to an embodiment of the present invention. A home video game machine is described below as an example of the video game machine. The home video game machine is provided with a home game machine main unit and a home television. A recording medium **10** can be mounted in the home game machine main unit, and game data is read as needed from the recording medium **10** and the game is executed. In this manner, the executed game content is displayed on the home television.

[0050] A game system of a home video game machine is composed of a control unit **1**, a memory unit **2**, an image display unit **3**, an audio output unit **4**, and an operation input unit **5**, and these are connected via a bus **6**. The bus **6** includes an address bus, a data bus, a control bus, and the like. In this case, the control unit **1**, memory unit **2**, audio output unit **4**, and operation input unit **5** are housed in the home game machine main unit of the home video game machine, and the image display unit **3** is housed in the home television.

[0051] The control unit **1** is provided primarily for controlling the progress of the game as a whole on the basis of a game program. The control unit I is composed, for example, of a CPU (Central Processing Unit) **7**, a signal processing processor **8**, and an image processing processor **9**. The CPU **7**, the signal processing processor **8**, and the image processing processor **9** are connected to each other via the bus **6**. The CPU **7** interprets commands from the game program and performs various types of data processing or control. For example, the CPU **7** issues a command to the signal processing processor **8** to feed image data to the image processing processor. The signal processing processor **8** primarily performs calculations in three-dimensional space, positional conversion calculations from three-dimensional space to pseudo-three-dimensional space, light source calculation processing, and processing for generating and processing images and audio data based on the results of calculations executed in three-dimensional space or pseudo-three-dimensional space. The image processing processor **9** primarily performs processing for writing image data to be drawn into RAM **12** on the basis of the calculation results and processing results of the signal processing processor **8**. The CPU **7** issues commands to the signal processing processor **8** to process various types of data. The signal processing processor **8** primarily performs calculations corresponding to various types of data in three-dimensional space, and position conversion calculations from three-dimensional space to pseudo-three-dimensional space.

[0052] The memory unit **2** is provided primarily for storing program data or various types of data and the like used by the program data. The memory unit **2** is composed, for example, of a recording medium **10**, an interface circuit **11**, and RAM (Random Access Memory) **12**. The interface circuit **11** is connected to the recording medium **10**. The interface circuit **11** and the RAM **12** are connected via the bus **6**. The recording medium **10** is provided for storing program data of the operation system or for storing game data and the like composed of image data, audio data, and various types of program data. The recording medium **10** is a ROM (Read Only Memory) cassette, an optical disk, a flexible disk, or the like, for example, and stores operating system program data, game data, or the like. Card-type memory is also included in the recording medium **10**, and the card-type memory is used primarily for storing various types of game parameters at the time of interruption when a game is interrupted. The RAM **12** temporarily stores various types of data that are read from the recording medium **10**, and is used for such purposes as temporarily storing processing results from the control unit **1**. Various types of data, and address data for indicating the storage position of the various types of data are stored in the RAM **12**, and an arbitrary address can be specified for reading and writing.

[0053] The image display unit **3** is provided primarily for outputting an image of image data that are written in the RAM **12** by the image processing processor **9**, image data that are read from the recording medium **10**, and the like. The image display unit **3** is composed of a television monitor **20**, an interface circuit **21**, and a D/A converter (Digital-to-Analog converter) **22**, for example. The D/A converter **22** is connected to the television monitor **20**, and the interface circuit **21** is connected to the D/A converter **22**. The bus **6** is connected to the interface circuit **21**. In this arrangement, the image data are fed to the D/A converter **22** via the interface circuit **21** and converted to analog image signals. The analog image signals are outputted as an image to the television monitor **20**.

[0054] In this case, the image data include polygon data, texture data, and the like, for example. Polygon data are coordinate data of the vertexes that constitute a polygon. Texture data are data for setting textures on the polygons, and are composed of texture instruction data and texture color data. The texture instruction data are data for correlating a polygon with a texture, and the texture color data are data for specifying the color of a texture. In this arrangement, polygon address data and texture address data that indicate the storage positions of the data are correlated with each other in the polygon data and the texture data, respectively. In such image data, the signal processing processor **8** performs coordinate conversion and perspective projection conversion of polygon data in three-dimensional space (three-dimensional polygon data) indicated by the polygon address data, and the data are replaced with polygon data in two-dimensional space (two-dimensional polygon data). The external shape of a polygon is formed by a plurality of items of two-dimensional polygon data, and the texture data indicated by the texture address data are written in the internal region of the polygon. Objects in which textures are affixed to polygons, i.e., various types of characters, can thus be displayed.

[0055] The audio output unit **4** is provided primarily for outputting sound from audio data that are read from the recording medium **10**. The audio output unit **4** is composed of a speaker **13**, an amplification circuit **14**, a D/A converter **15**,

and an interface circuit **16**, for example. The amplification circuit **14** is connected to the speaker **13**, the D/A converter **15** is connected to the amplification circuit **14**, and the interface circuit **16** is connected to the D/A converter **15**. The bus **6** is connected to the interface circuit **16**. In this arrangement, the audio data are fed to the D/A converter **15** via the interface circuit **16** and converted to analog audio signals. The analog audio signals are amplified by the amplification circuit **14** and outputted as sound from the speaker **13**. The audio data include ADPCM (Adaptive Differential Pulse Code Modulation) data, PCM (Pulse Code Modulation) data, or the like, for example. In the case of ADPCM data, sound can be outputted from the speaker **13** by the same processing method described above. In the case of PCM data, sound can be outputted from the speaker **13** by the same processing method described above by first converting the PCM data to ADPCM data in the RAM **12**.

[0056] The operation input unit **5** is primarily composed of a controller **17**, an operation information interface circuit **18**, and an interface circuit **19**. The operation information interface circuit **18** is connected to the controller **17**, and the interface circuit **19** is connected to the operation information interface circuit **18**. The bus **6** is connected to the interface circuit **19**.

[0057] The controller **17** is an operation device that is used by the player to input various operating commands, and operating signals that correspond to the operations of the player are transmitted to the CPU **7**. The controller **17** is provided with a first button **17***a*, a second button **17***b*, a third button **17***c*, a fourth button **17***d*, an up key **17**U, a down key **17**D, a left key **17**L, a right key **17**R, an L1 button **17**L**1**, an L2 button **17**L**2**, an R1 button **17**R**1**, an R2 button **17**R**2**, a start button **17***e*, a select button **17***f*, a left stick **17**SL, and a right stick **17**SR.

[0058] The up key **17**U, the down key **17**D, the left key **17**L, and the right key **17**R are used, for example, to present commands to the CPU **7** to move a character or cursor up, down, left, or right on the screen of the television monitor **20**.

[0059] The start button **17***e* is used to instruct the CPU **7** to load the game program from the recording medium **10**.

[0060] The select button **17***f* is used to specify various selections to the CPU **7** for the game program that is loaded from the recording medium **10**.

[0061] The left stick **17**SL and the right stick **17**SR are stick-type controllers having substantially the same structure as a so-called joystick. The stick-type controllers have an upright stick. The stick is configured so as to be capable of tilting from the upright position through 360° of directions that include forward, backward, left, and right with respect to a center support point. The left stick **17**SL and the right stick **17**SR transmit the values of an x coordinate and a y coordinate as an operation signal using the upright position as the origin according to the tilt direction and tilt angle of the sticks to the CPU **7** via the operation information interface circuit **18** and the interface circuit **19**.

[0062] Various types of functions are assigned to the first button **17***a*, the second button **17***b*, the third button **17***c*, the fourth button **17***d*, the L1 button **17**L**1**, the L2 button **17**L**2**, the R1 button **17**R**1**, and the R2 button **17**R**2** according to the game program that is loaded from the recording medium **10**.

[0063] The buttons and keys of the controller **17** other than the left stick **17**SL and the right stick **17**SR are on/off switches that are switched on by being pushed from the center position by outside pressure and switched off by returning to the center position when pressure is withdrawn.

[0064] The overall operation of the home video game machine configured as described above will next be described. When the power supply switch (not shown) is turned on to supply electrical power to the game system **1**, the CPU **7** reads image data, audio data, and program data from the recording medium **10** on the basis of the operating system stored in the recording medium **10**. Some or all of the image data, audio data, and program data thus read is stored in the RAM **12**. The CPU **7** then issues a command for the image data or audio data stored in the RAM **12** on the basis of the program data that are stored in the RAM **12**.

[0065] In the case of image data, the signal processing processor **8** first performs position calculations, light source calculations, and the like of a character in three-dimensional space on the basis of the command from the CPU **7**. The image processing processor **9** then performs write processing and the like of image data to be drawn into the RAM **12** on the basis of the calculation results of the signal processing processor **8**. The image data written in the RAM **12** are then fed to the D/A converter **15** via the interface circuit **16**. The image data are converted to analog video signals by the D/A converter **15**. The image data are fed to the television monitor **20** and displayed as an image.

[0066] In the case of audio data, the signal processing processor **8** first performs processing for generating and processing audio data on the basis of a command from the CPU **7**. In this case the audio data are processed to convert pitches, add noise, set envelopes, set levels, add reverb, and perform other processing, for example. The audio data are then outputted from the signal processing processor **8** and fed to the D/A converter **15** via the interface circuit **16**. The audio data are converted to analog audio signals. The audio data are then outputted from the speaker **13** via the amplification circuit **14** as sound.

Overview of Various Routines in the Game Machine

[0067] The game implemented in the game machine **1** is a baseball game, for example. The game machine **1** is capable of implementing a game in which a quick pitching operation or a non-quick pitching operation of a pitcher character that pitches (releases) a ball is displayed on the image display unit **3**, e.g., the television monitor **20**. FIG. **2** is a functional block diagram showing the functions that have important roles in the present invention.

[0068] The first basic image data recognizing means (unit) is provided with a function for causing the control unit **1**, e.g., the CPU **7**, to recognize first image data of a time at which a pitching operation is initiated by the pitcher character, second image data of a time at which the ball is pitched by the pitcher character who performs the pitching operation, and a plurality of third image data of a time between initiation of the pitching operation of the pitcher character and pitching of the ball by the pitcher character as first basic image data. The first basic image data recognizing means is also provided with a function for causing the CPU **7** to recognize the image data in the sequence of the first image data, the plurality of third image data, and the second image data.

[0069] In this means, first image data of a time at which a pitching operation is initiated by the pitcher character, second image data of a time at which the ball is pitched by the pitcher character who performs the pitching operation, and a plurality of third image data of a time between initiation of the pitching operation of the pitcher character and pitching of the ball by the pitcher character are recognized as first basic image data

by the CPU **7**. Specifically, the first through third image data are loaded from the recording medium **10** to the RAM **12** during loading of the game program. The first through third image data loaded in the RAM **12** are then recognized by the CPU **7**. At this time, the first through third image data are recognized as first basic image data by the CPU **7**. A display sequence for displaying the sets of image data of the first basic image data on the television monitor **20** in the sequence of the first image data, the plurality of third image data, and the second image data is the recognized by the CPU **7**.

[0070] The first correspondence recognizing means (unit) is provided with a function for causing the CPU **7** to recognize a correspondence between each of a plurality of pitch form data for specifying a mode of the pitching operation, and an amount of third image data that is less than the plurality of third image data. Specifically, the first correspondence recognizing means causes the CPU **7** to recognize a correspondence between each of the plurality of pitch form data and the plurality of third image data with the exclusion of at least one unit of the third image data that is closer to the first image data.

[0071] In this means, the CPU **7** recognizes a correspondence between each of a plurality of pitch form data for specifying a mode of the pitching operation and the amount of third image data that is less than the plurality of third image data. Specifically, in this means, the CPU **7** recognizes a correspondence between each of the plurality of pitch form data and the plurality of third image data with the exclusion of at least one unit of the third image data that is closer to the first image data. Specifically, the plurality of pitch form data is loaded from the recording medium **10** to the RAM **12** during loading of the game program. The plurality of pitch form data loaded in the RAM **12** is then recognized by the CPU **7**. The CPU **7** also recognizes a plurality of third image data with the exclusion of at least one set of third image data that is closer to the first image data corresponding to each of the plurality of pitch form data. The CPU **7** thus recognizes the correspondence between each of the plurality of pitch form data and the plurality of third image data with the exclusion of at least one set of third image data that is closer to the first image data.

[0072] The second correspondence recognizing means is provided with a function for causing the CPU **7** to recognize a correspondence between each of the plurality of pitch form data and a total number of frames when an operation from initiation of the pitching operation of the pitcher character from the character is displayed on the television monitor **20**.

[0073] In this means, the CPU **7** recognizes a correspondence between each of the plurality of pitch form data and a total number of frames when an operation from initiation of the pitching operation of the pitcher character from the character is displayed on the television monitor **20**. Specifically, the total number of frames corresponding to each of the plurality of pitch form data is loaded from the recording medium **10** to the RAM **12** during loading of the game program. The total number of frames loaded in the RAM **12** is recognized by the CPU **7**.

[0074] The characteristic data recognizing means (unit) is provided with a function for causing the CPU **7** to recognize any one set of the plurality of pitch form data as characteristic data of the pitcher character.

[0075] In this means, the CPU **7** recognizes any one set of the plurality of pitch form data as characteristic data of the pitcher character. Specifically, when an input signal from the operation input unit **5**, e.g., the controller **17**, for selecting a starting pitcher character or a relief pitcher character is recognized by the CPU **7**, the pitch form data corresponding to the selected pitcher character are recognized by the CPU **7** as characteristic data of the pitcher character.

[0076] The second basic image data recognizing means (unit) is provided with a function for causing the CPU **7** to recognize an amount of third image data that is less than the plurality of third image data corresponding to the characteristic data as fourth image data, and for causing the CPU **7** to recognize the first image data, the second image data, and the plurality of fourth image data as second basic image data.

[0077] In this means, the amount of third image data that is less than the plurality of third image data corresponding to the characteristic data are recognized by the CPU **7** as fourth image data. The first image data, the second image data, and the plurality of fourth image data are also recognized by the CPU **7** as second basic image data.

[0078] The first interval frame number recognizing means is provided with a function whereby a number of frames between each image data unit of the second basic image data is set by the CPU **7**, and the number of frames between each image data unit set by the CPU **7** is recognized as an interval frame number by the CPU **7** so that a total number of frames between each image data unit of the second basic image data is a number of frames obtained by subtracting a number of sets of the second basic image data from the total number of frames corresponding to the characteristic data recognized by the CPU **7**.

[0079] In this means, a number of frames between each image data unit of the second basic image data is set by the CPU **7** so that a total number of frames between each image data unit of the second basic image data is a number of frames obtained by subtracting a number of sets of the second basic image data from the total number of frames corresponding to the characteristic data recognized by the CPU **7**. The number of frames between each image data unit set by the CPU **7** is also recognized as an interval frame number by the CPU **7**. Specifically, a prescribed number of frames between each unit of image data of the second basic image data are allocated by the CPU **7**. The total of the prescribed number of frames between each unit of image data of the second basic image data is the number of frames obtained by subtracting the number of sets of second basic image data from the total number frames that corresponds to the characteristic data recognized by the CPU **7**. When such a number of frames between each unit of image data of the second basic image data is set by the CPU **7**, the number of frames between each unit of image data set by the CPU **7** is recognized by the CPU **7** as the interval frame number.

[0080] The intermediate image data generating means is provided with a function for causing the CPU **7** to execute processing for generating at least one first intermediate image data between the first image data and the fourth image data, at least one second intermediate image data between each of the plurality of fourth image data corresponding to the characteristic data, and at least one third intermediate image data between the fourth image data and the second image data. Specifically, the intermediate image data generating means is provided with a function for causing the CPU **7** to execute processing for generating a number of sets of first intermediate image data commensurate with the number of interval frames between the first image data and the fourth image data, a number of sets of second intermediate image data commensurate with the number of interval frames between each of the

plurality of fourth image data corresponding to the characteristic data, and a number of sets of third intermediate image data commensurate with the number of interval frames between the fourth image data and the second image data.

[0081] In this means, the CPU **7** performs a process to generate a number of sets of first intermediate image data commensurate with the number of interval frames between the first image data and the fourth image data, a number of sets of second intermediate image data commensurate with the number of interval frames between each of the plurality of fourth image data corresponding to the characteristic data, and a number of sets of third intermediate image data commensurate with the number of interval frames between the fourth image data and the second image data. Specifically, the number of sets of first intermediate image data commensurate with the number of interval frames are generated by causing the CPU **7** to execute interpolation calculation using the first image data and the fourth image data earliest in the display sequence as initial image data. The second intermediate image data are generated by causing the CPU **7** to execute interpolation calculation using two units of image data that are adjacent to each other in the display sequence among the plurality of fourth image data corresponding to the characteristic data as initial image data. The third intermediate image data are generated by causing the CPU **7** to execute interpolation calculation using the fourth image data latest in the display sequence and the second image data as initial image data. An example of a case in which linear interpolation is used as the interpolation method when the intermediate image data are generated will be described hereinafter, but curvilinear interpolation using a multidimensional curve may also be used. When curvilinear interpolation is used, the pitching operation of the pitcher character is displayed on the television monitor **20** more smoothly than when linear interpolation is used. An example will be described in which all of the intermediate image data are generated by linear interpolation, but a configuration may be adopted in which only intermediate image data of a prescribed interval, e.g., the intermediate image data between the image data G**3**(**1**) described hereinafter and the image data G**3** displayed subsequent to the image data G**3**(**1**), are generated by linear interpolation, and intermediate image data of another interval are generated using another interpolation method.

[0082] The intermediate image data recognizing means (unit) is provided with a function for causing the CPU **7** to recognize the at least one first intermediate image data, the at least one second intermediate image data, and the at least one third intermediate image data as intermediate image data. Specifically, the intermediate image data recognizing means is provided with a function for causing the CPU **7** to recognize the first intermediate image data commensurate with the number of interval frames, the second intermediate image data commensurate with the number of interval frames, and the third intermediate image data commensurate with the number of interval frames as intermediate image data.

[0083] In this means, the CPU **7** recognizes the first intermediate image data commensurate with the number of interval frames, the second intermediate image data commensurate with the number of interval frames, and the third intermediate image data commensurate with the number of interval frames as intermediate image data.

[0084] The image display instruction issuing means is provided with a function for causing the CPU **7** to issue an image display command for displaying the quick pitching operation or non-quick pitching operation that corresponds to the characteristic data on the television monitor **20**.

[0085] In this means, an image display command for displaying the quick pitching operation or non-quick pitching operation that corresponds to the characteristic data on the television monitor **20** is issued from the CPU **7**. Specifically, when an input signal from the controller **17** for initiating a pitching operation of the pitcher character is recognized by the CPU **7**, an image display command for displaying the quick pitching operation or non-quick pitching operation that corresponds to the characteristic data on the television monitor **20** is issued from the CPU **7**.

[0086] The image display means (unit) is provided with a function whereby the quick pitching operation or non-quick pitching operation that corresponds to the characteristic data is displayed on the television monitor **20** using the second basic image data and the intermediate image data when the image display command is issued from the CPU **7**.

[0087] In this means, the quick pitching operation or non-quick pitching operation that corresponds to the characteristic data is displayed on the television monitor **20** using the second basic image data and the intermediate image data when the image display command is issued from the CPU **7**. Specifically, when the image display command is issued from the CPU **7**, the second basic image data and the intermediate image data that correspond to the characteristic data are fed to the D/A converter **15** via the interface circuit **16**. The image data are converted to analog video signals by the D/A converter **15**. The image data are fed to the television monitor **20** and displayed as an image.

Processing Flow and Description of the Quick Pitching Operation Display System in the Baseball Game.

[0088] The specific details of the quick pitching operation display system in the baseball game will next be described. The flow of processing in the quick pitching operation display system shown in FIG. **10** will also be described at the same time.

[0089] When the baseball game program is loaded in the game machine, the first image data G**1** of the initiation time of the quick pitching operation of the pitcher character, the second image data G**2** of the time when the ball is pitched from the pitcher character by the quick pitching operation of the pitcher character, and the plurality of third image data G**3** of the time between initiation of the quick pitching operation by the pitcher character and pitching of the ball by the pitcher character are loaded from the recording medium **10** to the RAM **12**, as shown in FIG. **3**. The first through third image data G**1**, G**2**, G**3** loaded in the RAM **12** are then recognized by the CPU **7**. At this time, the first through third image data G**1**, G**2**, G**3** are recognized by the CPU **7** as first basic image data GD**1** (S**1**). The CPU **7** then recognizes a display sequence J for displaying the image data G**1**, G**2**, G**3** of the first basic image data GD**1** in the sequence of the first image data G**1**, the plurality of third image data G**3**, and the second image data G**2** on the television monitor **20** (S**2**). For example, eighteen types of different image data G**3**(**1**) through G**3**(**18**) are prepared as the plurality of third image data G**3**, and the plurality of third image data G**3**(**1**) through G**3**(**18**) is recognized by the CPU **7**. The display sequence J in this case is the following sequence: image data G**1**, G**3**(**1**) through G**3**(**18**), G**2**.

[0090] The plurality of quick pitch form data T is also loaded from the recording medium **10** to the RAM **12**. The values, e.g., numerical values "0," "1," "2," and "3" of the

plurality of quick pitch form data T loaded in the RAM **12** are recognized by the CPU **7** (S**3**). At this time, the plurality of third image data G**3** corresponding to each of the plurality of quick pitch form data T is recognized by the CPU **7** (S**4**). For example, the plurality of third image data G**3** (G**3**(**1**) through G**3**(**18**)) corresponding to the numerical value "0" of the quick pitch form data T is recognized by the CPU **7**, as shown in FIG. **4**. The plurality of third image data G**3**' (G**3**(**1**), G**3**(**3**) through G**3**(**18**)) corresponding to the numerical value "1" of the quick pitch form data T is also recognized by the CPU **7**. The plurality of third image data G**3**' (G**3**(**1**), G**3**(**4**) through G**3**(**18**)) corresponding to the numerical value "2" of the quick pitch form data T is also recognized by the CPU **7**. Furthermore, the plurality of third image data G**3**' (G**3**(**1**), G**3**(**5**) through G**3**(**18**)) corresponding to the numerical value "3" of the quick pitch form data T is recognized by the CPU **7**. In this instance, the plurality of third image data G**3** corresponding to the numerical values "1," "2," and "3" of the quick pitch form data T is a plurality of third image data G**3** not including at least one unit of the third image data G**3** that is closer to the first image data G**1** corresponding to the quick pitch form data T. The correspondence between each of the plurality of quick pitch form data T and the plurality of third image data G**3** is defined in advance in the game program.

[0091] Furthermore, the total frame number F corresponding to each of the plurality of quick pitch form data T is loaded from the recording medium **10** to the RAM **12**. The total frame number F loaded in the RAM **12** is then recognized by the CPU **7** (S**5**). For example, the total frame number F corresponding to the numerical value "0" of the quick pitch form data T is 96 frames, the total frame number F corresponding to the numerical value "1" of the quick pitch form data T is 91 frames, the total frame number F corresponding to the numerical value "2" of the quick pitch form data T is 86 frames, and the total frame number F corresponding to the numerical value "3" of the quick pitch form data T is 81 frames, and these values of the plurality of quick pitch form data T are recognized by the CPU **7**, as shown in FIG. **5**. The correspondence between the total frame number F and the value of the quick pitch form data T is defined in advance in the game program.

[0092] When a command for executing a baseball game match is issued from the CPU **7**, and an input signal from the operation input unit **5**, e.g., the controller **17**, for selecting a starting pitcher character or a relief pitcher character is recognized by the CPU **7**, any one pitcher character P among a plurality of pitcher characters P**0**, P**1**, P**2**, P**3** corresponding to the input signal is recognized by the CPU **7** (S**7**). At this time, the pitcher character P recognized by the CPU **7** is displayed on the television monitor **20**, as shown in FIG. **6**. The quick pitch form data T that correspond to the pitcher character P are then recognized by the CPU **7** (S**8**). The correspondence between the pitcher character P and the quick pitch form data T is defined in advance in the game program, and when the desired pitcher character P is selected through operation of the controller **17**, the quick pitch form data T that correspond to the desired pitcher character P are recognized by the CPU **7**. In this instance, when the pitcher character P**0** is selected by the controller **17** and recognized by the CPU **7**, the quick pitch form data T having the numerical value "0" are recognized by the CPU **7**. The quick pitch form data T having the numerical value "0" are then recognized by the CPU **7** as the characteristic data TD of the pitcher character P**0** (S**9**). In the same manner, when any of the pitcher characters P**1**, P**2**, P**3** is selected by the controller **17** and recognized by the CPU **7**, the quick pitch form data T having any one of the numerical values "1," "2," and "3" is recognized by the CPU **7**. The quick pitch form data T having any one of the numerical values "1," "2," and "3" is then recognized by the CPU **7** as the characteristic data TD of the pitcher character P**1**, P**2**, or P**3** (see FIGS. **4** and **5**). As described hereinafter, when the value of the characteristic data TD is "0," the television monitor **20** displays a state in which the pitcher character P**4** pitches by a non-quick operation.

[0093] The CPU **7** then determines whether the value of the characteristic data TD of the pitcher character P is "0" (S**10**). When the CPU **7** determines that the numerical value of the characteristic data TD of the pitcher character P is not "0" (S**10**: NO), an amount of third image data G**3**' less than the plurality of third image data G**3** that correspond to the characteristic data TD of the pitcher character are recognized by the CPU **7** as the plurality of fourth image data G**4** (S**11**; see FIG. **4**). The first image data G**1**, the plurality of fourth image data G**4**, and the second image data G**2** are then recognized by the CPU **7** as second basic image data GD**2** (S**12**). For example, when the characteristic data TD of the pitcher character is "l," the plurality of image data G**1**, G**3**(**1**), G**3**(**3**) through G**3**(**18**), and G**2** are recognized by the CPU **7** as second basic image data GD**2**, as shown in FIG. **7**. When the characteristic data TD of the pitcher character is "2," the plurality of image data G**1**, G**3**(**1**), G**3**(**4**) through G**3**(**18**), and G**2** are recognized by the CPU **7** as the second basic image data GD**2**. Furthermore, when the characteristic data TD of the pitcher character is "3," the plurality of image data G**1**, G**3**(**1**), G**3**(**5**) through G**3**(**18**), and G**2** are recognized by the CPU **7** as the second basic image data GD**2**.

[0094] The number of frames between the sets of image data G**1**, G**3**, G**3** of the second basic image data GD**2** composed of the first image data G**1**, the plurality of fourth image data G**4**, and the second image data G**2** is set to a prescribed number of frames by the CPU **7**. The total of the prescribed number of frames between the sets of image data G**1**, G**2**, G**3** of the second basic image data GD**2** is the number of frames obtained by subtracting the number of sets of second basic image data GD**2** from the total frame number F that corresponds to the characteristic data TD recognized by the CPU **7**. When such a number of frames between the sets of image data G**1**, G**2**, G**3** of the second basic image data GD**2** is set by the CPU **7** to the prescribed number of frames, this number of frames between the sets of image data G**1**, G**2**, G**3** set by the CPU **7** is recognized by the CPU **7** as an interval frame number KF (S**13**).

[0095] For example, as shown in FIG. **8**, when the characteristic data TD is "1," the interval frame number KF between the image data G**1** and the image data G**3**(**1**), the interval frame number KF between the image data G**3**(**1**) and the image data G**3**(**3**), the interval frame number KF between each set of image data from the image data G**3**(**3**) to the image data G**3**(**18**), and the interval frame number KF between the image data G**3**(**18**) and the image data G**2** are each set to four frames. In this case, since the total of the interval frame numbers KF is 72 frames, and the number of sets of second basic image data GD**2** is 19, the total frame number F is 91 frames. When the characteristic data TD is "2," the interval frame number KF between the image data G**1** and the image data G**3**(**1**), the interval frame number KF between the image data G**3**(**1**) and the image data G**3**(**4**), the interval frame number KF between each set of image data from the image

data G3(4) to the image data G3(18), and the interval frame number KF between the image data G3(18) and the image data G2 are each set to four frames. In this case, since the total of the interval frame numbers KF is 68 frames, and the number of sets of second basic image data GD2 is 18, the total frame number F is 86 frames. Furthermore, when the characteristic data TD is "3," the interval frame number KF between the image data G1 and the image data G3(1), the interval frame number KF between the image data G3(1) and the image data G3(5), the interval frame number KF between each set of image data from the image data G3(5) to the image data G3(18), and the interval frame number KF between the image data G3(18) and the image data G2 are each set to four frames. In this case, since the total of the interval frame numbers KF is 64 frames, and the number of sets of second basic image data GD2 is 17, the total frame number F is 81 frames.

[0096] The number of sets of first intermediate image data MG1 commensurate with the interval frame number KF is generated by causing the CPU 7 to execute linear interpolation calculation using as initial image data the first image data G1 and the fourth image data G4 for which the value of the display sequence J is smallest. The number of sets of second intermediate image data MG2 commensurate with the interval frame number KF is generated by causing the CPU 7 to execute linear interpolation calculation using as initial image data the two sets of image data for which the values of the display sequence J are adjacent in the plurality of fourth image data G4 corresponding to the characteristic data TD. Furthermore, the number of sets of third intermediate image data MG3 commensurate with the interval frame number KF is generated by causing the CPU 7 to execute linear interpolation calculation using as initial image data the second image data G2 and the fourth image data G4 for which the value of the display sequence J is greatest. At this time, the amount of first intermediate image data MG1 commensurate with the interval frame number KF, the amount of second intermediate image data MG2 commensurate with the interval frame number KF, and the amount of third intermediate image data MG3 commensurate with the interval frame number KF are recognized by the CPU 7 as intermediate image data MG (S14).

[0097] For example, when the characteristic data TD is "1," the sets of first intermediate image data MG1 are generated in sequence using the first image data G1 and the third image data G3(1) as initial image data, as shown in FIG. 3. The sets of second intermediate image data MG2 are generated in sequence using two sets of image data other than the third image data G3(2) from the third image data G3(1) to the third image data G3(18) as initial image data. The sets of third intermediate image data MG3 are generated in sequence using the third image data G3(18) and the second image data G2 as initial image data. In the same manner, when the characteristic data TD is "2," the sets of first intermediate image data MG1 are generated in sequence using the first image data G1 and the third image data G3(1) as initial image data. The sets of second intermediate image data MG2 are generated in sequence using two sets of image data other than the third image data G3(2) and the third image data G3(3) from the third image data G3(1) to the third image data G3(18) as initial image data. The sets of third intermediate image data MG3 are generated in sequence using the third image data G3(18) and the second image data G2 as initial image data. In the same manner, when the characteristic data TD is "3," the sets of first intermediate image data MG1 are generated in sequence using the first image data G1 and the third image data G3(1) as initial image data. The sets of second intermediate image data MG2 are generated in sequence using two sets of image data other than the third image data G3(2), the third image data G3(3), and the third image data G3(4) from the third image data G3(1) to the third image data G3(18) as initial image data. The sets of third intermediate image data MG3 are generated in sequence using the third image data G3(18) and the second image data G2 as initial image data. When the plurality of first through third intermediate image data MG1, MG2, MG3 corresponding to each characteristic data TD are thus generated, the first through third intermediate image data MG1, MG2, MG3 are recognized by the CPU 7 as intermediate image data MG. The first intermediate image data MG1, the second intermediate image data MG2, and the third intermediate image data MG3 shown in FIG. 3 are typical image data between sets of initial image data.

[0098] When an input signal from the controller 17 for causing the desired pitcher character to initiate a quick pitching operation is recognized by the CPU 7, an image display command is issued from the CPU 7 to display the quick pitching operation that corresponds to the characteristic data TD on the television monitor 20 (S15). When the image display command is issued from the CPU 7, the quick pitching operation that corresponds to the characteristic data TD is displayed on the television monitor 20 using the second basic image data GD2 and the intermediate image data MG (S16). Specifically, when the image display command is issued from the CPU 7, the second basic image data GD2 and the intermediate image data MG that correspond to the characteristic data TD are fed to the D/A converter 15 via the interface circuit 16. The image data GD2, MG are converted to analog video signals by the D/A converter 15. The second basic image data GD2 and the intermediate image data MG are fed to the television monitor 20 and displayed as an image. The term "quick pitching operation" refers to an operation in which the pitcher character throws a pitch from a set position while performing a quick motion.

[0099] When the CPU 7 determines that the numerical value of the characteristic data of the pitcher character P1 is "0" (S10: YES), the plurality of third image data G3 (G3(1) through G3(18)) shown in FIG. 4 that corresponds to the characteristic data TD, e.g., numerical value of "0," of the pitcher character is recognized by the CPU 7 as the plurality of fourth image data GD4. The first image data G1, the plurality of fourth image data G4, and the second image data G2 are then recognized by the CPU 7 as second basic image data GD2 (S12'). The same routines as S13 through S16 described above are then executed by the CPU 7 on the basis of the correspondence relationships shown in FIGS. 4, 5, 7, and 8 (S13', S14').

[0100] When an input signal from the controller 17 for causing the pitcher character P1 to initiate a pitching operation is recognized by the CPU 7, an image display command is issued from the CPU 7 to display a non-quick pitching operation that corresponds to the characteristic data TD on the television monitor 20 (S15'). When the image display command is thus issued from the CPU 7, the non-quick pitching operation that corresponds to the characteristic data TD is displayed on the television monitor 20 using the second basic image data GD2 and the intermediate image data MG (S16'). Specifically, when the image display command is issued from the CPU 7, the second basic image data GD2 and the intermediate image data MG that correspond to the characteristic

data TD are fed to the D/A converter **15** via the interface circuit **16**. The image data GD**2**, MG are converted to analog video signals by the D/A converter **15**. The second basic image data GD**2** and the intermediate image data MG are fed to the television monitor **20** and displayed as an image. The term "non-quick pitching operation" refers to an operation in which the pitcher character throws a pitch from a set position without performing a quick motion.

[0101] Lastly, the method for generating the intermediate image data MG will be described with reference to FIG. **9**. The method for generating the intermediate image data MG, i.e., the second intermediate image data MG**2** (MG**2**(**1**) through MG**2**(**4**)), will be described using an example in which the characteristic data TD is "3," and the initial image data are the image data G**3**(**1**) and the image data G**3**(**5**) among the plurality of third image data G**3** other than the third image data G**3**(**2**), the third image data G**3**(**3**) and the third image data G**3**(**4**).

[0102] The third image data G**3**(**1**) and the third image data G**3**(**5**) each have a plurality of sets of location image data **75** that constitutes the pitcher character P**3**. As shown in FIG. **9**, head object data **75***a*, torso object data **75***b*, left and right arm object data **75***c*, **75***d*, and left and right leg object data **75***e*, **75***f*, for example, correspond to the plurality of sets of part image data **75**. The third image data G**3**(**1**) and the third image data G**3**(**5**) each have base coordinate data S for specifying the positions of each part of the pitcher character P**3**. The momentary pitching body orientations in the process of the pitching operation of the pitcher character P**3** are specified by arranging the part image data **75** in the positions specified by the base coordinate data S. The part image data **75** of each moment are formed by arranging texture data in the internal region of a polygon.

[0103] For example, the CPU **7** executes a calculation for subtracting the right-leg base coordinate data SFs(xs, ys, zs) of the third image data G**3**(**1**) from the right-leg base coordinate data SFe(xe, ye, ze) of the third image data G**3**(**1**). The CPU **7** then executes a calculation ((dx, dy, dz)=(xe−xs)/(KF+1), (ye−ys)/(KF+1), (ze−zs)/(KF+1)) for dividing the right-leg differential coordinate data (xe−xs, ye−ys, ze−zs) computed by the aforementioned subtraction by the value obtained by adding 1 to the interval frame number KF, e.g., 5 (4+1).

[0104] The CPU **7** then executes a calculation ((xs**1**, ys**1**, zs**1**; ts**1**)=(xs+dx, ys+dy, zs+dz)) for adding the right-leg change coordinate data (dx, dy, dz) computed by the aforementioned division to the right-leg base coordinate data SFs (xs, ys, zs; ts) of the third image data G**3**(**1**). The right-leg coordinate data SF**1**(xs**1**, ys**1**, zs**1**; ts**1**) of the subsequent frame are then computed by the CPU **7**. The coordinate data S**1** of the other objects of the subsequent frame are computed by performing such processing for the base coordinate data S of objects other than the arm objects. The pitching body orientation of the subsequent frame is specified in the image data by arranging the corresponding object data **75***a*, **75***b*, **75***c*, **75***d*, **75***e*, **75***f* in the positions specified by the coordinate data S**1** of each object in the subsequent frame.

[0105] The CPU **7** then executes a calculation for adding the right-leg change coordinate data (dx, dy, dz) to the above-mentioned right-leg coordinate data SF**1** of the subsequent frame. The right-leg coordinate data SF**2** of each subsequent frame are then computed by the CPU **7**. The coordinate data S**2** of the other objects in each subsequent frame are computed by performing such processing for the coordinate data S**1** of the objects other than the right-leg object. The pitching body orientations of each subsequent frame are specified in the image data by arranging the corresponding object data **75***a*, **75***b*, **75***c*, **75***d*, **75***e*, **75***f* in the positions specified by the coordinate data S**2** of the objects in each subsequent frame. The intermediate image data MG between the third image data G**3**(**1**) and the third image data G**3**(**5**), i.e., the second intermediate image data MG**2** (MG**2**(**1**) through MG**2**(**4**)), are generated by causing the CPU **7** to repeatedly execute such processing as described above a number of times equal to the interval frame number KF. The intermediate image data MG in all of the intervals are generated by performing such processing as that described above in each interval.

[0106] An example was described in which the intermediate image data MG was computed by linear interpolation based on the base coordinate data SFs of the third image data G**3**(**1**) and the base coordinate data SFe of the third image data G**3**(**5**), but computation of the coordinate data between the base coordinate data SFs of the third image data G**3**(**1**) and the base coordinate data SFe of the third image data G**3**(**5**) is not limited to the method described above, and any other method may be used. For example, it is also possible to use curvilinear interpolation that uses a multidimensional curvilinear relationship to link the base coordinate data SFs of the third image data G**3**(**1**) with the base coordinate data SFe of the third image data G**3**(**5**). In this case, the CPU **7** is used to recognize the multidimensional curvilinear relationship that links the base coordinate data SFs of the third image data G**3**(**1**) with the base coordinate data SFe of the third image data G**3**(**5**), and the CPU **7** is used to generate coordinate data of objects such that move on the multidimensional curve. The quick pitching operation of the pitcher character can thereby be displayed on the television monitor **20** more smoothly than through the use of linear interpolation.

Other Embodiments

[0107] (a) In the aforementioned embodiment, a home video game machine was used as an example of a computer to which the game program can be applied, but the game machine is not limited to the embodiment described above. The present invention can also be applied in the same manner to a game machine in which the monitor is provided separately, a game machine in which the monitor is integrated, a personal computer or workstation for functioning as the game machine by executing the game program, or the like. The game machine is also not limited to the aforementioned embodiment, and the present invention can also be applied in the same manner to a mobile computer, a mobile game machine, or the like.

[0108] (b) The present invention also includes a program for executing a game such as the one described above, and a computer-readable recording medium in which the program is stored. Examples of the recording medium other than a cartridge include computer-readable flexible disks, semiconductor memory, CD-ROM, DVD, MO, ROM cassettes and other media.

[0109] According to the present invention, a pitching operation of a pitcher character can be displayed on an image display unit by using intermediate image data and second basic image data that include a plurality of sets of fourth image data that corresponds to characteristic data of the pitcher character. Specifically, a send-out (releasing) operation of the character to send out (release) a moving object can be displayed on the image display unit on the basis of the

characteristic data of the character. In the present invention, a quick pitching operation of the pitcher character can be displayed on the image display unit in a prescribed number of frames (total number of frames) corresponding to any one set of the characteristic data, i.e., the plurality of quick pitch form data, recognized by the control unit. Specifically, the send-out operation of the character to send out the moving object can be displayed on the image display unit in a prescribed number of frames on the basis of the characteristic data of the character. In the present invention, when the first image data are image data of the time at which the send-out operation of the pitcher character is initiated, the quick pitching operation of the pitcher character can be displayed on the image display unit by excluding at least one third image data, e.g., image data of a state in which the pitcher character bends his legs at a right angle, that is closer to the first image data. Specifically, the send-out operation of the character to send out the moving object can be appropriately displayed on the image display unit on the basis of the characteristic data of the character. Furthermore, in the present invention, since the intermediate image data are generated by interpolation calculation using two sets of image data that specify the intervals as the initial data, the quick pitching operation of the pitcher character can be smoothly displayed by using the intermediate image data to connect the two sets of image data that specify the intervals. Specifically, the send-out operation of the character to send out the moving object can be smoothly displayed on the image display unit on the basis of the characteristic data of the character.

[0110] The terms of degree such as "substantially", "about" and "approximately" as used herein mean a reasonable amount of deviation of the modified term such that the end result is not significantly changed. These terms should be construed as including a deviation of at least ±5% of the modified term if this deviation would not negate the meaning of the word it modifies.

[0111] While only selected embodiments have been chosen to illustrate the present invention, it will be apparent to those skilled in the art from this disclosure that various changes and modifications can be made herein without departing from the scope of the invention as defined in the appended claims. Furthermore, the foregoing descriptions of the embodiments according to the present invention are provided for illustration only, and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

What is claimed is:

1. A computer readable medium storing a computer program for a video game, the computer program comprising:

code for recognizing first image data for a game character before releasing a moving object, second image data for the game character at a point of releasing the moving object, and third image data for the game character in a process of releasing the moving object, first basic image data including the first, second, and third image data;

code for recognizing releasing mode data representing ability of the game character with regards to how the game character releases the moving object;

code for computing the third image data by reducing or increasing amount of the third image data on the basis of the releasing mode data, and recognizing the third image data after computing as fourth image data, second basic image data including the first, second, and fourth image data;

code for recognizing first intermediate image data between the first image data and the fourth image data, second intermediate image data in the fourth image data, and third intermediate image data between the fourth image data and the second image data;

code for displaying the game character releasing the moving object on an image display unit.

2. The computer readable medium according to claim **1**, the computer program further comprising

code for recognizing relationship between the releasing mode data and a total number of frames of the game character from before releasing the moving object to the point of releasing the moving object; and

code for recognizing interval frame number being sum of the number of frames between the first and fourth image data, the number of frames between the second and fourth image data, and the number of frames between the plurality of the fourth image data; wherein

the interval frame number equals to the number of frames obtained by subtracting the number of frames in the first, second, and fourth image data from the total number of frames.

3. The computer readable medium according to claim **2**, the computer program further comprising

code for generating the first intermediate image data with the number of frames between the first and fourth image data, the second intermediate image data with the number of frames between the plurality of the fourth image data, and the third intermediate image data with the number of frames between the second and fourth image data, and

code for recognizing intermediate image data including the first, second, and third intermediate image data.

4. The computer readable medium according to claim **1**, wherein

in the first basic image data, the first image data, the third image data, and the second image data are recognized in order, and

the relationship between the releasing mode data and the third image data after the amount of the third image data is reduced in a side of the first image data is recognized.

5. The computer readable medium according to claim **1**, wherein

the first intermediate image data are generated by interpolation calculation using the first image data and the fourth image data as initial image data,

the second intermediate image data are generated by interpolation calculation using two units of image data of the fourth image data, and

the third intermediate image data are generated by interpolation calculation using the fourth image data and the second image data.

6. A video game apparatus comprising:

a first basic image data recognizing unit configured to recognize first image data for a game character before releasing a moving object, second image data for the game character at a point of releasing the moving object, and third image data for the game character in a process of releasing the moving object, first basic image data including the first, second, and third image data;

a characteristic data recognizing unit configured to recognize releasing mode data representing ability of the game character with regards to how the game character releases the moving object;

a first correspondence recognizing unit configured to compute the third image data by reducing or increasing amount of the third image data on the basis of the releasing mode data;

a second basic image data recognizing unit configured to recognize the third image data after computing as fourth image data, second basic image data including the first, second, and fourth image data;

an intermediate image data recognizing unit configured to recognize first intermediate image data between the first image data and the fourth image data, second intermediate image data in the fourth image data, and third intermediate image data between the fourth image data and the second image data; and

an image display unit configured to display the game character releasing the moving object on an image display unit.

7. A method for controlling a video game, the method comprising:

recognizing first image data for a game character before releasing a moving object, second image data for the game character at a point of releasing the moving object, and third image data for the game character in a process of releasing the moving object, first basic image data including the first, second, and third image data;

recognizing releasing mode data representing ability of the game character with regards to how the game character releases the moving object;

computing the third image data by reducing or increasing amount of the third image data on the basis of the releasing mode data, and recognizing the third image data after computing as fourth image data, second basic image data including the first, second, and fourth image data;

recognizing first intermediate image data between the first image data and the fourth image data, second intermediate image data in the fourth image data, and third intermediate image data between the fourth image data and the second image data;

displaying the game character releasing the moving object on an image display unit.

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