

Specification

TITLE OF THE INVENTION

IMAGE DISPLAY DEVICE AND OPERATION CONTROL METHOD
THEREOF

BACKGROUND ART

[0001] The present invention relates to an image display device and an operation control method thereof, and more particularly a game device for displaying a game image and a method for controlling an operation thereof.

BACKGROUND ART

[0002] Techniques for adjusting brightness of a part of a displayed image are known in order to reduce power consumption when displaying the image on a display. For example, in a portable terminal device for scrolling a content image by a flick operation, when an image other than the image displayed on the display is scrolled after the flick operation, known is a technique for reducing the power consumption by reducing luminance of the image (Patent Document 1).

[0003] Further, in order to improve visibility of a display image regardless of the brightness around the display, a technique for adjusting the brightness of the display image is known depending on the brightness around the display. For example, in a liquid crystal television device provided with a light receiving element on a front side of a liquid crystal display element plate, known is a technique for changing a voltage to be applied to a liquid crystal layer of a liquid crystal display element and changing the brightness of the entire display image, depending on ambient brightness detected by the light receiving element (Patent Document 2).

[0004] In recent years, there is a demand for further diversification of an image display method. Thus, an image display device has been developed, in which a plurality of areas capable of independently displaying the image are provided in an image display area of the display. In this image display device, a method for improving the visibility of the display image in each area is required. However, in the conventional image display technologies, it is difficult to sufficiently improve the visibility of the display image in each area.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0005] Patent document 1: JP 2014-091675 A
Patent document 2: JP S62-235883 A

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0006] It is an object of the present invention to provide an image display device capable of displaying an image with excellent visibility depending on various image display forms. Further, it is another object of the present invention to provide a method for controlling an operation of the image display device.

MEANS FOR SOLVING THE PROBLEMS

[0007] Such objects are achieved by the present inventions (1) to (14) described below.

(1) An image display device configured to be capable of adjusting a predetermined parameter of a part of an image displayed on a display unit depending on an illuminance around the display unit, comprising:

the display unit having a display area for displaying the image; and

a parameter adjustment means for adjusting the

predetermined parameter of the part of the image in the display area depending on the illuminance around the display unit.

[0008] (2) In the image display device described in the above-mentioned invention (1), the display area of the display unit includes a first area, a second area different from the first area, and a third area for displaying the part of the image,

the first area and the second area are partitioned through the third area.

[0009] (3) In the image display device described in the above-mentioned invention (1) or (2), the display unit further has a frame body provided along an outer edge of the display area,

the parameter adjustment means adjusts the predetermined parameter of the part of the image so that the frame body is seen integrally with the part of the image depending on the illuminance around the display unit.

[0010] (4) In the image display device described in any one of the above-mentioned inventions (1) to (3), the image display device further comprising:

an illuminance detection unit for detecting the illuminance around the display unit; and

a parameter determination means for determining the predetermined parameter of the part of the image to be adjusted, depending on the illuminance detected by the illuminance detection unit,

wherein the parameter adjustment means adjusts the predetermined parameter of the part of the image in the display area based on the predetermined parameter determined by the parameter determination means.

[0011] (5) In the image display device described in the above-mentioned invention (4), the image display device further comprising a storage unit for storing a parameter of the frame body,

wherein the parameter determination means determines the predetermined parameter so that the predetermined parameter corresponds to the parameter stored in the storage unit.

[0012] (6) In the image display device described in the above-mentioned invention (5), the predetermined parameter is the same as the parameter.

[0013] (7) In the image display device described in any one of the above-mentioned inventions (4) to (6), the parameter adjustment means adjusts the predetermined parameter when the predetermined parameter determined by the parameter determination means exceeds a predetermined threshold.

[0014] (8) In the image display device described in any one of the above-mentioned inventions (1) to (7), the predetermined parameter is at least one of hue, brightness and saturation.

[0015] (9) In the image display device described in any one of the above-mentioned inventions (1) to (8), the image display device is a game device.

[0016] (10) A method for controlling an operation of an image display device configured to be capable of adjusting a predetermined parameter of a part of an image displayed on a display unit depending on an illuminance around the display unit, the method comprising:

displaying the image on the display unit; and
adjusting the predetermined parameter of the part

of the image depending on the illuminance around the display unit.

[0017] (11) In the method for controlling the operation of the image display device described in the above-mentioned invention (10), the method further comprising:

detecting the illuminance around the display unit;
and

determining the predetermined parameter of the part of the image to be adjusted depending on the detected illuminance;

wherein the adjusting the predetermined parameter of the part of the image is performed based on the determined predetermined parameter.

[0018] (12) A method for controlling an operation of an image display device configured to be capable of adjusting a predetermined parameter of a part of an image displayed on a display unit depending on an illuminance around the display unit, the method comprising:

displaying the image on the display unit in a state that the predetermined parameter of the part of the image is adjusted depending on the illuminance around the display unit.

[0019] (13) In the method for controlling the operation of the image display device described in the above-mentioned invention (12), the method further comprising:

detecting the illuminance around the display unit;
and

determining the predetermined parameter of the part of the image to be adjusted depending on the detected illuminance;

wherein the displaying the image on the display

unit is performed based on the determined predetermined parameter in a state that the predetermined parameter of the part of the image is adjusted.

[0020] (14) In the method for controlling the operation of the image display device described in any one of the above-mentioned inventions (10) to (13), the predetermined parameter is at least one of hue, brightness and saturation.

EFFECT OF THE INVENTION

[0021] According to the present invention, for example, in the image display device in which two areas capable of independently displaying the image are provided in the display area of the display unit, it is possible to improve visibility of the image displayed in each area by adjusting the predetermined parameter of the part of the image displayed between the areas. Further, since it is possible to adjust the predetermined parameter depending on illuminance around the display unit, it is possible to display the image always with excellent visibility regardless of the illuminance in a use environment of the image display device. Further, it is possible to view a part of the image and a part (for example, a frame part) other than the display area of the display unit integrally by adjusting the predetermined parameter of the part of the image. Thus, it is also possible to improve the visibility of the image displayed in a predetermined area of the display area. This makes it possible to provide the image display device capable of displaying the image with the excellent visibility depending on the various image display forms. Further, it is also possible to provide the method of controlling the operation of the image display device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] FIG. 1 is a perspective view schematically showing a game device according to a first embodiment of the present invention.

FIG. 2 is a view showing a recording medium to be used in the game device according to the first embodiment of the present invention.

FIG. 3 is a block diagram showing a configuration of the game device according to the first embodiment of the present invention.

FIG. 4 is an enlarged view showing a configuration of a display unit of the game device according to the first embodiment of the present invention.

FIG. 5 is an enlarged view showing the configuration of the display unit of the game device according to the first embodiment of the present invention.

FIG. 6 is an enlarged view showing the configuration of the display unit of the game device according to the first embodiment of the present invention.

FIG. 7 is a data table for adjusting a parameter recorded in a storage unit of the game device according to the first embodiment of the present invention.

FIG. 8 is an event table recorded in the storage unit of the game device according to the first embodiment of the present invention.

FIG. 9 is a flowchart showing a game processing of

the game device according to the first embodiment of the present invention.

FIG. 10(A) and 10(B) are flowcharts showing a processing for adjusting a parameter of a partition image in the game processing shown in FIG. 9. FIG. 10(A) is the flowchart showing the processing of adjusting the parameter after displaying a game image on the display unit. FIG. 10(B) is the flowchart showing the processing of adjusting the parameter before displaying the game image on the display unit.

FIG. 11 is a plan view schematically showing an image display device according to a second embodiment of the present invention.

FIG. 12 is a front view, a plan view and a bottom view schematically showing the game device according to the first embodiment of the present invention.

FIG. 13 is a back view and a left side view schematically showing the game device according to the first embodiment of the present invention.

FIG. 14 is a perspective view schematically showing the game device according to the first embodiment of the present invention.

FIG. 15 is a perspective view schematically showing a game device according to a third embodiment of the present invention.

FIG. 16 is an enlarged view schematically showing a configuration of the display unit of the game device according to the third embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

[0023] Hereinafter, description will be made on an image display device of the present invention and an operation control method thereof in detail.

[0024] <<First Embodiment>>

A. Image Display Device

The image display device of the present invention is not particularly limited as long as an image can be displayed. Examples of such an image display device includes a desktop personal computer, a laptop, a cellular phone, a smartphone, a television, a game device, a liquid crystal display, and the like.

[0025] In the following description, for the convenience of explanation, a case where the image display device is the game device will be described in detail based on preferred embodiments shown in the accompanying drawings. For purposes of explanation, the upper side in each figure will be referred to as "upper", the lower side thereof will be referred to as "lower", the left side thereof will be referred to as "left", the right side thereof will be referred to as "right", the near side of the page will be referred to as "front" and the back side of the page will be referred to as "back".

[0026] FIG. 1 is a perspective view schematically showing a game device according to a first embodiment of the present invention. FIG. 2 is a view showing a recording medium to be used in the game device according to the first embodiment of the present invention. FIG. 3 is a block diagram showing a configuration of the game device according to the first embodiment of the present invention. FIGS. 4 to 6 are an enlarged view showing a configuration of a display unit of the game device

according to the first embodiment of the present invention. FIG. 7 is a data table for adjusting a parameter recorded in a storage unit of the game device according to the first embodiment of the present invention. FIG. 8 is an event table recorded in the storage unit of the game device according to the first embodiment of the present invention. FIG. 14 is a perspective view schematically showing the game device according to the first embodiment of the present invention.

[0027] 1. Summary of Game

First, description will be made on a game executed by the game device 1 of the present embodiment. The game device 1 can execute, for example, a player versus player game, a player versus environment game, a role-playing game or the like using a recording medium 11. Specifically, the game device 1 acquires information of a character (hereinafter, referred to as "character information") recorded on the recording medium 11 by scanning the recording medium 11. Thereafter, the game device 1 displays an image of the character on a display unit 6. Thus, the game device 1 can execute the player versus player game and the player versus environment game in which the character and an enemy (opponent) character battle. After the game is ended, a new recording medium 11 is dispensed from the game device 1. It is to be noted that the game executed by the game device 1 is not limited to the above-mentioned game.

[0028] 2. Recording Medium

The recording medium 11 to be used for the game device 1 of this embodiment is not particularly limited as long as the character information can be recorded. Such a recording medium 11 is formed into a card shape, for example, as shown in FIG. 2. The recording medium

11 has a two-dimensional code 111 on a surface thereof. The character information, item information, and the like are recorded in the two-dimensional code 111. Examples of the two-dimensional code 111 includes QR code (registered trademark), Z code (registered trademark) and the like. In the case of the Z code, the information is recorded so that it is capable of identifying under invisible light (infrared light). The recording medium 11 may be an IC card for the game, in which player information and the character information are recorded. Further, the recording medium 11 may be formed into an oval shape, a circular shape, a square shape, or the like.

[0029] 3. Game Device

Next, description will be made on the game device. As shown in FIG. 1, the game device 1 of the present embodiment includes two game devices (a first sub game device 1A and a second sub game device 1B) provided adjacent to each other. The game device 1 has one display unit 6 and is controlled by one control unit 8. Therefore, it is possible to downsize an overall size of the game device 1. This makes it possible to reduce the cost required for the entire game device 1. The game device 1 of the present embodiment is not limited to a configuration (two in one configuration) that two game devices are provided adjacent to each other, and may be a configuration that three or more game devices are provided adjacent to each other.

[0030] In the game device 1 of the present embodiment, the two game devices appear to be placed adjacent to each other at a glance. However, the two game devices are connected, and thus the game device 1 constitutes one game device 1. Therefore, each player (user) can play in each sub game device and can play one

game in cooperation with each other. As shown in FIGs. 1 and 3, such a game device 1 includes a housing 2, an operation unit 3, a reading unit 4, a speaker 5, the display unit 6, an illuminance detection unit 7, a storage unit 8, the control unit 9, and a communication unit 10. Hereinafter, description will be made on a configuration of each part.

[0031] In this regard, the housing 2, the operation unit 3, the reading unit 4, and the speaker 5 of the game device 1 are the same as a sub housing 2A, a first sub operation unit 3A, a sub reading unit 4A and a sub speaker 5 for the first sub game device 1A and a sub housing 2B, a second sub operation unit 3B, a sub reading unit 4B and a sub speaker 5B for the second sub game device 1B. Therefore, hereinafter, the description will be made on only each part of the game device 1.

[0032] <Housing>

The housing 2 has a function of installing or accommodating each part of the game device 1. As shown in FIG. 1, the housing 2 is formed into a substantially rectangular parallelepiped shape, but is not limited thereto. The housing 2 may be constituted from one housing (a twin housing) or by connecting the sub housings for the sub game devices to each other. In the case of the twin housing, the housing 2 is formed symmetrically, and a central portion (especially a front surface) of the housing 2 may be recessed inwardly. This makes it possible to show existence of two game devices at a glance to the player.

[0033] The housing 2 has a maintenance door 21 from which a game administrator maintains and manages an availability ratio of the game device 1 and a dispensing ratio of the recording medium 11. The door 21 is

provided on the front surface of the housing 2. The door 21 has a function of accessing a maintenance panel 22 accommodated in the housing 2. As shown in FIG. 14, the maintenance panel (electronic device) 22 is placed on a back surface of the door 21. The maintenance panel 22 is constituted from buttons for the game administrator to test and manage the game device 1. With this configuration, for example, when the game of the first sub game device 1A is desired to be reset, it is possible to manage the game of the first sub game device 1A independently without interrupting the play in the second sub game device 1B. In this regard, the door 21 is not an essential element for the game device 1.

[0034] <Operation Unit>

The operation unit 3 has a function of receiving an operation input to execute the game by a player. The operation unit 3 is constituted from four push buttons 31 and two rectangular operation fields 32. The push buttons 31 are provided symmetrically on a front side of an upper surface of the housing 2. The operation fields 32 are provided on a back side to the push buttons 31 on the upper surface of the housing 2. The shape and the position of each of the operation fields 32 are not particularly limited and may be a rod-like shape or a circular shape and a position between the push buttons 31 or a position in front of the push buttons 31, respectively. Such operation fields 32 are a field on which the player can put and move the recording medium 11. The operation fields 32 are configured so that the reading unit 4 described later can read the recording medium 11.

[0035] The operation unit 3 includes a first sub operation unit (first operation unit) 3A for the first sub game device 1A and a second sub operation unit

(second operation unit) 3B for the second sub game device 1B. The first sub operation unit 3A and the second sub operation unit 3B are operable independently and can receive different operation inputs at the same time. Thus, it is possible to execute separate operations in the first sub game device 1A and the second sub game device 1B.

[0036] <Reading Unit>

The reading unit 4 has a function of reading the information of the recording medium 11 put on each operation field 32. The reading unit 4 is provided inside the housing 2 and below the operation field 32. Such a reading unit 4 is constituted from, for example, an imaging device (camera) and an infrared light source. The infrared light source of the reading unit 4 irradiates the two-dimensional code 111 of the recording medium 11 with an infrared ray from a lower side of the operation field 32. In this state, the imaging device images the two-dimensional code 111 of the recording medium 11. By doing so, it is possible to read the information recorded in the two-dimensional code 111 of the recording medium 11. The reading unit 4 may be placed anywhere in the housing 2 so long as the imaging device can image the operation field 32. Further, the reading unit 4 may be constituted from only the imaging device.

[0037] <Speaker>

The speaker 5 has a function of outputting various sounds. The speaker 5 is provided under the display unit 6 at the back side on the upper surface of the housing 2. The number of speaker 5 is not particularly limited and may be one or two or more. In this embodiment, the two speakers 5 are provided on both sides at the back side on the upper surface of the housing 2

corresponding to each sub game device. The sounds output by the speaker 5 include music, sound effects, and the like stored in the storage unit 7.

[0038] <Display Unit>

The display unit 6 has a function of displaying the game image (a predetermined image). As shown in FIG. 1, the display unit 6 is provided on the speaker 5 on the upper surface of the housing 2. The display unit 6 is constituted from one display panel, but may be a touch panel. Further, as shown in FIG. 1, the display unit 6 is formed into a square shape. However, the display unit 6 is not limited thereto and may be formed into a circular shape or a triangular shape.

[0039] The display unit 6 has a full screen area 61 for displaying the game image and a frame body 62 provided along an outer edge of the full screen area 61. The full screen area 61 includes an individual area 611 and a partition area 612. As shown in FIG. 5, the full screen area 61 has a function of displaying the game image on the entire display unit 6. When the player of the first sub game device 1A and the player of the second sub game device 1B play the cooperative game or the player versus player game, the game image is displayed in the full screen area 61.

[0040] The individual area 611 includes an area (first area) 611A for displaying the game image for the first sub game device 1A and an area (second area) 611B for displaying the game image for the second sub game device 1B. As shown in FIGs. 4 and 6, these areas 611A and 611B are constituted of the same area as each other through the partition area 612. This makes it possible to show the existence of the two game devices to the player at a glance. However, an area of any one of these

areas may be smaller than the area of the other area. For example, when the player versus player game is played between the first sub game device 1A and the second sub game device 1B, if the area of the area 611A for the first sub game device 1A is larger, the game image for the first sub game device 1A is displayed largely. In such a case, it is possible to give an impression that the player of the first sub game device 1A has the upper hand to the player.

[0041] The first area 611A is provided to correspond to the first sub operation unit 3A of the first sub game device 1A. The first area 611A is formed into a rectangular shape, but is not limited thereto. The second area 611B is provided to correspond to the second sub operation unit 3B of the second sub game device 1B. The second area 611B is formed into the rectangular shape, but is not limited thereto. The first area 611A may display the same image as the image displayed in the second area 611B and different image from that. Further, the first area 611A and the second area 611B can display the image independently.

[0042] The partition area (third area) 612 has a function of partitioning the first area 611A and the second area 611B. Therefore, the partition area 612 is provided between the first area 611A and the second area 611B. The shape of the partition area 612 is not particularly limited and may be an elongated shape (FIG. 4), a rectangular shape, a substantially trapezoidal shape (FIG. 6) or the like. An area of the partition area 612 is not particularly limited and may be larger or smaller than the areas of the first area 611A and the second area 611B. The partition area 612 may be further divided into a plurality of areas.

[0043] For example, as shown in FIG. 4, the partition area 612 may have two partition areas divided along a transverse direction thereof. That is, the partition area 612 may have a first partition area 612A for the first area 611A and a second partition area 612B for the second area 611B. Further, as shown in FIG. 6, the partition area 612 may have two partition areas divided along a longitudinal direction thereof. That is, the partition area 612 may have a third partition area 612C for the game image and a fourth partition area 612D for a character (letter) image. In this way, it is possible to display a plurality of images and images different from each other in the partition area 612.

[0044] The frame body 62 is provided on the speaker 5 or the housing 2. The frame body 62 is formed into the rectangular shape, but is not limited thereto. For example, the frame body 62 may be formed into any shape such as a circular shape or an elliptical shape. The frame body 62 has a joint portion 621 formed in the center of the long side thereof so as to be recessed inwardly. The frame body is formed symmetrically by the joint portion 621. Accordingly, it is possible to show the display unit 6 to two display units such as the sub display unit 62A for the first sub game device 1A and the sub display unit 62B for the second sub game device 1B.

[0045] The frame body 62 may include a first frame member 62A for the first sub game device 1A and a second frame member 62B for the second sub game device 1B. As shown in FIGs. 4 to 6, the first frame member 62A and the second frame member 62B are formed into a substantially "C" shape. One end and the other end of the first frame member 62A are brought into contact with one end and the other end of the second frame member 62B

respectively to form the joint portion 621. With this configuration, the first frame member 62A and the second frame member 62B are placed symmetrically with respect to the joint portion 621. Therefore, it is possible to show the display unit 6 to the two display units.

[0046] As shown in FIG. 4, the one end and the other end of the first frame member 62A are provided so as to face each other. Therefore, it is possible to display the same image (partition image) as the appearance of the short side of the frame body 62 in the first partition area 612A from the one end to the other end thereof. Thus, the first frame member 62A and the partition image are connected to form an annular frame member (first frame member 62A). In other words, the partition image appears to be integrally formed with the first frame member 62A. Therefore, it is possible for the player to recognize that there is an individual sub display unit 6A on the display unit 6.

[0047] On the other hand, one end and the other end of the second frame member 62B are provided so as to face each other. Therefore, it is possible to display the same image (partition image) as the appearance of the short side of the frame body 62 in the second partition area 612B from the one end to the other end thereof. Thus, the second frame member 62B and the partition image are connected to form an annular frame member (second frame member 62B). In other words, the partition image appears to be integrally formed with the second frame member 62B. Therefore, it is possible for the player to recognize that there is an individual sub display unit 6B on the display unit 6.

[0048] Thus, the first frame member 62A and the partition image constitute the frame body 62 for the

first sub game device 1A. Further, the second frame member 62B and the partition image constitute the frame body 62 for the second sub game device 1B. This makes it possible to divide one frame body 62 into two frame members 62A and 62B, thereby giving the impression of the existence of two game devices to the player regardless of one game device 1. The first frame member 62A (first area 611A) and the first sub operation unit 3A, and the second frame member 62B (second area 611B) and the second sub operation unit 3B are arranged symmetrically with respect to a center axis of the partition image. Therefore, it is possible to give the impression that there are two game devices to the player.

[0049] <Illuminance Detection Unit>

The illuminance detection unit S has a function of detecting illuminance (luminance, chromaticity, etc.) around the display unit 6. For example, the illuminance detection unit S is incorporated in the long side on the upper side of the frame body 62 of the display unit 6. In this embodiment, the illuminance detection unit S is provided in the vicinity of the joint portion 621 on the upper side of the first frame member 62A. Examples of such an illuminance detection unit S includes an optical sensor, an imaging device, and the like. In the present embodiment, the optical sensor is used. The optical sensor acquires signals of the luminance and the chromaticity such as three stimulus values X, Y, Z for incident light. Then, this signal information is provided to the storage unit 7 (FIG. 7). In this regard, a plurality of illuminance detection units S may be incorporated in the frame body 62. In this case, since the predetermined parameter of the partition image is adjusted on the basis of the signal information from the plurality of illuminance detection units S, it becomes possible to adjust with higher accuracy. Further, the

illuminance detection unit S may be configured to be externally attached to the frame body 62. Further, when the imaging device is used as the illuminance detection unit S, for example, the illuminance detection unit S may be provided on the back side of the operation field 32 of the operation unit 3 to detect the illuminance of the frame body 62 of the display unit 6.

[0050] <Storage Unit>

Next, description will be made on the storage unit 7. The storage unit 7 stores a game program and game data. The game program is a program for causing the game device 1 to execute the game and is realized by cooperation with a hardware. Further, the game data is data related to the game and includes character data, music data, image data, effect sound data, and the like.

[0051] Examples of the character data includes data such as the name, killer moves, weapons, and the strength (force) of the character. The music data is data flowing from the speaker 5. Examples of the music data includes a plurality of music data such as a song of a singer or music of the game. The image data is game image data. Examples of the game image data includes data such as a character image, a background image, and various kinds of effect images. The effect sound data is sound data to be reproduced during the game play and is different from the music data. Examples of the effect sound data includes evaluation sound data flowing according to operation results of the player.

[0052] In the game device 1 of the present embodiment provided with the illuminance detection unit S, the storage unit 7 stores the data for adjusting the predetermined parameter of the partition image as shown in FIG. 7. First, the imaging device or the like

measures the chromaticity at various brightness (luminance) for a plurality of types of frame bodies 62 having different color variations. Thus, the storage unit 7 stores the chromaticity as frame body information (parameter of the frame body). In this case, a point where the luminance and the chromaticity are measured corresponds to the location where the illuminance detection unit S is provided. In the present embodiment, three attributes (hue, brightness and saturation) of the color calculated on the basis of the luminance (visual sense reflectance Y_a) and the chromaticity (xy chromaticity coordinates (x_a , y_a)) based on the CIE XYZ color system are referred as the "predetermined parameter". However, the "predetermined parameter" may be information such as the luminance and the chromaticity based on other color systems (for example, RGB color systems, Yuv color systems, etc.), information related to the other color systems, or any signal information of the luminance or the chromaticity. The luminance (visual sense reflectance Y_a) based on the CIE XYZ color system corresponds to the "brightness" of the three attributes of the color. Further, the chromaticity (xy chromaticity coordinates (x_a , y_a)) based on the CIE XYZ color system corresponds to the "hue" and "saturation" of the three attributes of the color.

[0053] In addition, the storage unit 7 stores a predetermined threshold corresponding to each frame body information (No. 1, 2,). The predetermined threshold may be the same as each other in each frame body information, or may be changed depending on a value of the luminance. For example, as shown in FIG. 7, when the luminance is high (70% in No. 2), it is preferred that the thresholds of the luminance and the chromaticity are set to large values. When the luminance is low (5% in No. 6), it is preferred that the thresholds of the

luminance and the chromaticity are set to small values. This is based on the following reasons. In the case where the surrounding environment is bright, even if the luminance and the chromaticity of each of objects to be compared are somewhat different, the objects appear to be the same as each other. In contrast, in the case where the surrounding environment becomes dark, the objects appear to be different from each other by a slight difference of the luminance and the chromaticity between the objects to be compared.

[0054] The storage unit 7 stores the luminance (detected value) detected by the illuminance detection unit S. The detected value, the frame body information, and the threshold information are provided to a parameter determination means 86 and a parameter adjustment means 87 described later.

[0055] As shown in FIG. 8, the storage unit 7 stores a predetermined event. The predetermined event includes a boss character appearance event, a bonus event, a breaking battle event, a hit character, and the like as shown in FIG. 8. Such a predetermined event corresponds to a display area for displaying the game image and the partition image for partitioning the display area and is stored. For example, the boss character appearance event A corresponds to that the display area is only the full screen area 61 and the partition image is not present. At this time, as shown in FIG. 5, the image is displayed in the full screen area 61. Further, the boss character appearance event B corresponds to that the display area is the individual area 611 and the partition area 612 and the partition image is the image of the boss character B and the letter image of "power 20%". At this time, as shown in FIG. 6, the partition image is displayed in the partition area 612.

[0056] Further, for example, when one player plays with the full screen area 61 using the first sub game device 1A, the event is triggered in the case where another player starts to play with the second sub game device 1B. In other words, when the second sub operation unit 3B of the second sub game device 1B receives the operation input of the breaking battle from another player, the event of the breaking battle B is triggered. At this time, the breaking battle B corresponds to that the display area is the individual area 611 and the partition area 612 and the partition image is a bar image. At this time, as shown in FIG. 4, the partition image is displayed in the partition area 612.

[0057] In addition, when a play is executed in the first sub game device 1A and the second sub game device 1B in a state that the recording mediums 11 of the same hit character are dispensed from the first sub game device 1A and the second sub game device 1B, an event is triggered. In other words, during the play in the first sub game device 1A, the play of the second sub game device 1B is executed, so that the event of the hit character is triggered. At this time, for example, as shown in FIG. 5, the image is displayed on the full screen area 61.

[0058] <Control Unit>

Next, description will be made on the control unit 8. The control unit 8 controls all functions related to the execution of the game. As shown in FIG. 3, such a control unit 8 includes an acquisition means 81, a game processing means 82, a display control means 83, a switching means 84, a partition means 85, a parameter determination means 86, a parameter adjustment means 87, and a sound output control means 88.

[0059] (Acquisition Means)

The acquisition means 81 has a function of acquiring the information on the operation input by the player, the character information of the recording medium 11, the game information, and the like. The acquisition means 81 acquires the information on the operation input by pressing the push buttons 31 by the player. This makes it possible to simultaneously receive the information on the operation input from the first sub operation unit 3A and the second sub operation unit 3B. Examples of such information on the operation input includes information related to a breaking play and information related to character selection. Further, the acquisition means 81 acquires the character information or the like read by the reading unit 4. In addition, the acquisition means 81 acquires various kinds of information acquired via the communication unit 9 as described later.

[0060] (Game Processing Means)

The game processing means 82 has a function of processing the information acquired by the acquisition means 81 and the progress of the game. For example, the game processing means 82 determines the information of the game image stored in the storage unit 7 and provides the information to the display control means 83. The game processing means 82 determines the sound information and provides the sound information to the sound output control means 88. Further, the game processing means 82 determines and triggers the predetermined event. In this way, the game processing means 82 processes the progress of the entire game.

[0061] Here, the determination of the predetermined event by the game processing means 82 may be performed

at random, performed periodically, performed by receiving the operation input by the player, or performed depending on the number(s) of the hit recording medium 11. Further, as shown in FIG. 7, the game processing means 82 determines a specific partition image corresponding to the predetermined event, but may determine so as to display the predetermined image other than the partition image.

[0062] (Display Control Means)

The display control means 83 has a function of controlling the display of all the images related to the game. In other words, the display control means 83 controls the display of the game image information provided by the game processing means 82 and the display of the partition image by the partition means 85. For example, as shown in FIG. 4, the display control means 83 controls the display of the game image independently in both the first area 611A and the second area 611B of the display unit 6. Further, as shown in FIG. 5, the display control means 83 controls the display of the game image in the full screen area 61. The display control means 83 controls the display of the partition image (FIG. 6) such as a linear-shaped partition image (FIG. 4), the game image and the character image in the partition area 612. Further, the display control means 83 controls the display of the partition image in which the predetermined parameter is adjusted when the information to adjust the predetermined parameter (hue, brightness and saturation) of the partition image is provided by the parameter adjustment means 87. In this way, the display control means 83 can control to display the predetermined image separately in each area of the display unit 6.

[0063] (Switching Means)

The switching means 84 has a function of switching the full screen area 61 and the individual area 611 to one another when the predetermined event is triggered by the game processing means 82 or the operation unit 3 receives the predetermined input information. Specifically, in the case where the game play is executed, the switching means 84 switches the display area of the display unit 6 from the individual area 611 to the full screen area 61 or from the full screen area 61 to the individual area 611 by the trigger of the predetermined event or receiving the input information. That is, when there is the predetermined event, the switching means 84 refers to the event table of FIG. 7 and controls to switch the display area to the display area corresponding to the event.

[0064] In general, the game device 1 is set so that each sub game device executes the game individually. Therefore, the partition image is displayed in the partition area 612 between the first area 611A and the second area 611B. Therefore, when the predetermined event is triggered, the switching means 84 switches the display area from the first area 611A to the full screen area 61 and simultaneously executes the switching of the display area from the second area 611B to the full screen area 61.

[0065] On the other hand, in the case where each sub game device is set to execute the game in cooperation, the game image is displayed in the full screen area 61. Therefore, when the predetermined event is triggered, the switching means 84 can switch the display area from the full screen area 61 to the individual area 611 (the first area 611A and the second area 611B) and partition area 612.

[0066] (Partition Means)

The partition means 85 has a function of partitioning between the first area 611A and the second area 611B and is constituted of the partition image. Specifically, when the switching means 84 switches the display area, the partition means 85 refers to the information table of FIG. 8 to determine the partition area 612 and the partition image which correspond to the event. The partition means 85 provides the determined partition area 612 and the information of the partition image to the display control means 83.

[0067] The partition image is not particularly limited as long as the partition image can partition the first area 611A and the second area 611B. Therefore, the partition image may be an elongated image (bar image), an annular image, a curved image, a game image, a predetermined letter image or the like. For example, as shown in FIG. 8, when the event of the breaking battle B is triggered, the partition means 85 determines the bar image and the display area of the partition image. The partition means 85 provides such information to the display control means 83. In this case, as shown in FIG. 4, the bar image is displayed in each of the first partition area 612A and the second partition area 612B. At this time, the bar image is constituted of the same image as the appearance of the opposing frame member. Thus, the first frame member 62A and the bar image are visually recognized so that the first frame member 62A is formed into the frame shape. Further, the second frame member 62B and the bar image are visually recognized so that the second frame member 62B is formed into the frame shape. Therefore, it is possible to give the recognition that there are two game devices to the player.

[0068] Also, as shown in FIG. 8, when the boss character appearance event A and the hit character event are triggered, the partition means 85 determines that there is no partition image to be displayed. Therefore, the partition means 85 provides information for deleting the displayed partition image to the display control means 83. In this case, as shown in FIG. 5, the partition image is deleted and the game image is displayed in the full screen area 61. This makes it possible for two players to simultaneously enjoy the game with one display unit 6.

[0069] Also, as shown in FIG. 8, when the boss character appearance event B is triggered, the partition means 85 determines the "boss character B" and the "power 20%" as the partition image and the display area. The partition means 85 provides such information to the display control means 83. In this case, as shown in FIG. 6, the boss character B is displayed in the third partition area 612C and the letter image of the "power 20%" is displayed in the fourth partition area 612D. As a result, it is possible to inform the player of how much power the boss character B has. The layout of the third partition area 612C and the fourth partition area 612D is not particularly limited, and the fourth partition area 612D may be positioned at the upper side of the third partition area 612C.

[0070] (Parameter Determination Means)

The parameter determination means 86 determines the predetermined parameter (hue, brightness and saturation) of the partition area 612 to be adjusted depending on the illuminance detected by the illuminance detection unit S. Specifically, the parameter determination means 86 refers to the frame body information and the detected value in the data table for the parameter adjustment

(frame body information, threshold information, detected value) shown in FIG. 7 to determine the predetermined parameter of the partition area 612.

[0071] Based on the data table shown in FIG. 7, the parameter determination means 86 calculates a deviation amount (difference) between the frame body information (luminance and chromaticity) stored in the storage unit 7 and the detected value (luminance and chromaticity) detected by the illuminance detection unit S. For example, referring to the frame body information No. 1 in FIG. 7, the luminance Y_a value to be displayed is 50%, whereas the detected luminance Y_b value is 55%. Therefore, the deviation amount of the luminance to be adjusted becomes 5% ($=55-50$). In addition, the xy chromaticity coordinates (x_a, y_a) to be displayed are (0.46, 0.44), whereas the detected xy chromaticity coordinates (x_b, y_b) are (0.52, 0.38). Therefore, the deviation amount of the xy chromaticity coordinates to be adjusted becomes 0.06 ($=0.52-0.46$) for the x-coordinate and -0.06 ($=0.38-0.44$) for the y-coordinate.

[0072] The deviation amounts of the hue, the brightness, and the saturation calculated on the basis of the deviation amount of each of the thus calculated luminance and chromaticity are determined as the data of the predetermined parameter to be adjusted. The parameter determination means 86 provides the calculated deviation amounts to the parameter adjusting means 87. In the above example, the deviation amounts are determined so that the luminance and chromaticity of the partition image coincide completely with the luminance and chromaticity of the frame body information. However, the predetermined parameter to be adjusted may include an error in a range where the partition image and the frame body 62 are seen integrally.

[0073] (Parameter Adjustment Means)

The parameter adjustment means 87 has a function of adjusting the predetermined parameter (hue, brightness and saturation) of the partition image displayed in the partition area 612 on the basis of the predetermined parameter determined by the parameter determination means 86. The parameter adjustment means 87 may (i) always adjust the predetermined parameter of the partition image based on the deviation amounts of the hue, the brightness and the saturation determined by the parameter determination means 86, and (ii) adjust the predetermined parameter of the partition image in the only case where the deviation amounts exceed the ranges of the thresholds. In the case of the above (i), the parameter determination means 86 subtracts and adds the deviation amounts of the luminance and the chromaticity (hue, brightness and saturation) determined by the parameter determination means 86 from the luminance and the chromaticity of the display data of the currently displayed partition image. By doing so, the parameter determination means 86 adjusts so that the luminance and the chromaticity of the partition image coincide with the luminance and the chromaticity of the frame body information, completely.

[0074] Also, in the case of the above (ii), the parameter determination means 87 adjusts so that the luminance and the chromaticity of the partition image coincide with the luminance and the chromaticity of the frame body information completely as the above (i) when the deviation amounts of the luminance and the chromaticity determined by the parameter determination means 86 exceed the ranges of the thresholds based on the data table shown in FIG. 7. On the other hand, if the deviation amounts fall within the ranges of the

thresholds, the predetermined parameter of the partition image is not adjusted. For example, in the frame body information No. 1, the deviation amount (5%) of the luminance to be adjusted does not exceed the range of the threshold. However, the deviation amount (x: 0.06, y: -0.06) of the xy chromaticity coordinates to be adjusted exceeds the range of the threshold, so that the parameter of the partition image is adjusted. Further, in the frame body information No. 2, although the deviation amount (8%) of the luminance to be adjusted is large, the range of the threshold is not exceeded. Further, the deviation amount (x: -0.09, y: 0.05) of the xy chromaticity coordinates to be adjusted also does not exceed the range of the threshold. Therefore, the parameter of the partition image is not adjusted.

[0075] In the game device 1 of the present embodiment, the illuminance detection unit 5 detects the illuminance around the display unit 6 and adjusts the predetermined parameter (hue, brightness, saturation, etc.) of the partition image depending on the detected illuminance. Specifically, the display unit 6 displays the partition image so that the frame body 62 and the partition image are seen integrally depending on the detected illuminance. For example, when the game device 1 is located in a relatively dark place, the luminance (reflectance) of the frame body 62 of the display unit 6 is lowered. Therefore, if the partition image in the partition area 612 is displayed with the same luminance as that of the display image of the individual area 611, the partition image becomes too bright. As a result, the frame body 62 and the partition image may not be seen integrally. Further, the frame body 62 and the partition image may not be seen integrally depending on the color or the like of illumination at a place where the game device 1 is located.

[0076] In contrast, in the game device 1 of the present embodiment, the display unit 6 displays the partition image so that the frame body 62 and the partition image are seen integrally depending on the detected illuminance. Therefore, it is possible to give the impression that there are the two game devices to the player strongly without being influenced by the place where the game device 1 is located. Further, by seeing the partition image and the frame body 62 more integrally, it is possible to improve the visibility of the display image in each of the individual areas 611A and 611B.

[0077] In the case where the predetermined parameter of the partition image in the partition area 612 is adjusted at the time of starting of the game, the parameter adjustment means 87 cancels the adjusted parameter when the switching means 84 switches from each individual area 611 to the full screen area 61. Further, when the switching means 84 switches the display area from the full screen area 61 to the individual area 611 and the partition area 612, the parameter adjustment means 87 adjusts the predetermined parameter of the partition image again.

[0078] (Sound Output Control Means)

The sound output control means 88 controls the output of all the sounds and music related to the game. Specifically, the sound output control means 88 controls the output of the music and sounds determined by the game processing means 82. By providing the sound and music information to the speaker 5 by the sound output means 88, the speaker 5 can output the sounds and music.

[0079] In addition to the above-described

configuration, the control unit 8 of the present invention may include an appearance changing means which has a function capable of changing the appearance of the partition image. The appearance changing means can change the appearance of the partition image at random or by receiving the operation input. For example, in the case where the frame body 62 of the display unit 6 of the game device 1 as shown in FIG. 1 is changed to another frame body which has a different appearance (design) from that of the frame body 62, the appearance changing means can change the appearance of the partition image so as to correspond to the appearance of another frame member. Further, the appearance changing means can also change the color and design of the partition image determined by the partition means 85 and decorate the partition image with images stored in advance. Thus, even if the frame member has any appearance, it is possible to change the partition image so as to correspond to the appearance thereof.

[0080] The control unit 8 may include a mode changing means for changing a play mode. The mode includes a single play mode, a player-versus-player play mode, a cooperative play mode, a cup play mode, and the like. The mode changing means can change the play mode at random or by receiving the operation input. The mode changing means can execute this mode change at any time. When the mode is changed, the control unit 8 executes the above-described processing so as to correspond to the mode change.

[0081] <Communication Unit>

The communication unit 9 has a function of communicating with an external network (LAN, WAN, Internet, etc.) or a device via wired or wireless. The game device 1 of the present invention may communicate

data with other devices such as other game devices and information terminals via the communication unit 9. For example, the communication unit 9 communicates with the other devices to obtain the music data and the game program. This makes it possible to update the game program to provide the latest game. In this regard, it is to be noted that the game device 1 may not have the communication unit 9.

[0082] Although the image display device of the present invention has been described as the game device 1, the game device 1 according to the present embodiment is also provided with a coin slot, a coin return port, and an outlet for the recording medium 11 on the front surface of the housing 2 in addition to the above-mentioned parts.

[0083] B. Method for Controlling Operation of Image Display Device

Next, description will be made on the operation control method of the image display device of the present invention. In the following, for the convenience of explanation, an example of the case where the image display device is the game device will be described. FIG. 9 is a flowchart showing a game processing of the game device according to the first embodiment of the present invention. FIG. 10(A) and 10(B) are flowcharts showing a processing for adjusting a parameter of a partition image in the game processing shown in FIG. 9. FIG. 10(A) is the flowchart showing the processing of adjusting the parameter after displaying a game image on the display unit. FIG. 10(B) is the flowchart showing the processing of adjusting the parameter before displaying the game image on the display unit.

[0084] First of all, description will be made on a

flow of the game processing of the game device except for the processing of adjusting the parameter of the partition image. First, if the player drops in a coin, the display control means 83 controls the display of the game image. Thus, the display unit 6 displays the game image (S1). During the game play by the player, the control unit 8 determines whether or not the game processing means 82 has triggered the predetermined event (S2). If the predetermined event is not triggered, the process proceeds to the step S1, and thus the steps S1 to S2 are repeated. On the other hand, if the predetermined event is triggered, the process proceeds to the step S3.

[0085] In the step S3, the control unit 8 determines whether or not the game image is displayed in the individual area 611 (S3). If the control unit 8 determines that the game image is displayed in the individual area 611, the game image is displayed in the first area 611A and the second area 611B, and thus it is determined that the partition image is displayed in the partition area 612. At this time, the switching means 84 switches the display area of the display unit 6 from the individual area 611 to the full screen area 61 (S4). Thereafter, the partition image is deleted from the partition area 612 (S5). Thus, the display unit 6 displays the game image in the full screen area 61 (S6), so that the process ends.

[0086] On the other hand, in the step S3, if the control unit 8 determines that the game image is not displayed in the individual area 611, the control unit 8 determines that the game image is displayed in the full screen area 61. At this time, the process proceeds to the step S7. Next, the control unit 8 determines whether or not the full screen area 61 is switched to

the individual area 611 (S7). If the control unit 8 determines that the full screen area 61 is not switched to the individual area 611, the process proceeds to the step S6, and the game image is continuously displayed in the full screen area 61 (S6). Thus, the process ends.

[0087] On the other hand, if the control unit 8 determines that the full screen area 61 is switched to the individual area 611, the switching means 84 switches the display area from the full screen area 61 to the individual area 611 (S8). Then, the partition means 85 determines the partition image and the partition image is displayed (S9). Thereafter, the process proceeds to the step S1. Thus, the steps S1 to S9 are repeated.

[0088] Next, description will be made on the processing of adjusting the parameter of the partition image. According to the present embodiment, a processing method of adjusting the parameter of the partition image includes: (i) a method for adjusting the predetermined parameter of the partition image depending on the illuminance around the display unit 6 after or with displaying the game image on the display unit 6; and (ii) a method for adjusting the predetermined parameter of the partition image depending on the illuminance around the display unit 6 preliminarily before displaying the game image on the display unit 6.

[0089] In the above method (i), as shown in FIG. 10(a), in a state that the display unit 6 displays the game image (S1), the illuminance detection unit S detects the illuminance (luminance, chromaticity) around the display unit 6 (S11). The detected illuminance is provided to the storage unit 7, and the data table as shown in FIG. 7 is updated. Next, the parameter determination means 86 refers to the data table to

determine the deviation amounts (predetermined parameter to be adjusted) between the frame body information and the detected value (S12).

[0090] Next, the parameter adjustment means 87 refers to the data table to determine whether or not the deviation amount exceeds the range of the threshold (S13). If the parameter adjustment means 87 determines that the deviation amounts exceed the ranges of the thresholds, the parameter adjustment means 87 adjusts the deviation amounts from the luminance and the chromaticity of the image data of the currently displayed partition image (S14). Thereafter, the display unit 6 displays the partition image in which the hue, the brightness and the saturation are adjusted (S15). On the other hand, in the step S13, if the parameter adjustment means 87 determines that the deviation amounts do not exceed the ranges of the thresholds, that is, the deviation amounts are within the ranges of the thresholds, the parameter adjustment means 87 does not adjust the hue, the brightness, and the saturation of the partition image of the display unit 6.

[0091] In the above method (ii), when the player drops in the coin, as shown in FIG. 10(b), the illuminance detection unit S detects the illuminance (luminance, chromaticity) around the display unit 6 before displaying the game image on the display unit 6 (S11). The detected illuminance is provided to the storage unit 7, and the data table as shown in FIG. 7 is updated. Next, the parameter determination means 86 refers to the data table to determine the deviation amount (predetermined parameter to be adjusted) between the frame body information and the detection value (S12).

[0092] Next, the parameter adjustment means 87

refers to the data table to determine whether or not the deviation amounts exceed the thresholds (S13). If it is determined that the deviation amounts exceed the ranges of the thresholds, the parameter adjustment means 87 adjusts the deviation amounts from the luminance and the chromaticity of the image data of the partition image to be displayed (S14). Thereafter, the display unit 6 displays the game image including the partition image in which the hue, the brightness and the saturation are adjusted (S15). Thus, the process proceeds to the step S2. On the other hand, in the step S13, if the parameter adjustment means 87 determines that the deviation amounts do not exceed the ranges of the thresholds, that is, the deviation amounts are within the ranges of the thresholds, the parameter adjustment means 87 does not adjust the hue, the brightness, and the saturation of the partition image of the display unit 6. Thereafter, the display unit 6 displays the usual game image (in which the hue, the brightness, and the saturation of the partition image are not adjusted) (S1).

[0093] As described above, the processing method can be created with a program executed by a computer. Such a program is realized by the CPU (Central Processing Unit), a microprocessor (Micro Processor), a GPU (Graphic Processing Unit), a RAM (Random Access Memory), a ROM (Read Only Memory), and the like.

[0094] <<Second Embodiment>>

Next, description will be made on a second embodiment of the image display device of the present invention with reference to the accompanying drawings.

[0095] FIG. 11 is a plan view schematically showing an image display device according to a second embodiment of the present invention. Hereinafter, the description

will be made on the second embodiment by focusing on different points from the first embodiment described above and the descriptions on the common points are omitted. It is to be noted that the same reference numerals are given to the same configurations as those of the first embodiment described above.

[0096] The image display device 100 of the present embodiment is different from the game device 1 of the image display device of the first embodiment in that the operation unit 3 is constituted from a touch panel and there is no reading unit 4. Specifically, the image display device 100 of the present embodiment is constituted from a smartphone as shown in FIG. 11. The image display device 100 has the display unit 6 which has the first area 611A and the second area 611B, and the operation unit 3 which has the first sub operation unit 3A corresponding to the first area 611A and the second sub operation unit 3B corresponding to the second area 611B. Thus, it is possible to execute the processing of the image displayed in the first area 611A by the first sub operation unit 3A and the processing of the image displayed in the second area 611B by the second sub operation unit 3B, simultaneously.

[0097] The image display device 100 according to the present embodiment can operate an image in the first area 611A by the first sub operation unit 3A and an image of the second area 611B by the second sub operation unit 3B while displaying the images in the first area 611A and the second area 611B. When the predetermined event is triggered, the switching means 84 switches the display area to the full screen area 61 in which the first area 611A and the second area 611B are combined. At the same time, the partition means 85 deletes the partition image. Thus, the image display device 100 of the present

embodiment has the same effects as those of the image display device 1 of the first embodiment.

[0098] Further, in the present embodiment, the predetermined parameter is adjusted so that the partition image displayed in the partition area 612 appears integrally with an outer frame of the display unit 6 (the outer frame of the housing 2). Therefore, it is possible to improve the visibility of the display image in each of the areas 611A and 611B. This makes it possible to give the impression that there are two game devices to the player in spite of the small image display device such as the smartphone. In this regard, it should be noted that the parameter may not necessarily be adjusted so that the partition image displayed in the partition area 612 is seen integrally with the outer frame (housing 2) of the display unit 6. For example, in order to improve the realistic sensation at the time of occurrence of the event, the hue, the brightness and the saturation may be adjusted temporarily so as to be more conspicuous than each of the areas 611A and 611B.

[0099] Since the image display device 100 of this embodiment has no reading unit 4, it is possible to downsize the device in itself. Further, since the operation unit 3 and the display unit 6 are overlapped with each other in the image display device 100 of the present embodiment, it is possible to further downsize the device in itself. Accordingly, it is possible to reduce the cost required for the device.

[0100] In the present embodiment, as shown in FIG. 11, the partition area 612 is an elongated area connected to the opposing long side of the display unit 6. However, the partition area 612 is not limited thereto, for example may be formed into various shapes such as a

shape in which a part of the partition area 612 is notched, a divided shape, or the like.

[0101] <<Third Embodiment>>

Next, description will be made on a third embodiment of the image display device of the present invention with reference to the accompanying drawings.

[0102] FIG. 15 is a perspective view schematically showing a game device according to a third embodiment of the present invention. FIG. 16 is an enlarged view schematically showing a configuration of the display unit of the game device according to the third embodiment of the present invention. Hereinafter, the description will be made on the third embodiment by focusing on different points from the first and second embodiments described above and the descriptions on the common points are omitted. It is to be noted that the same reference numerals are given to the same configurations as those of the first embodiment described above.

[0103] As shown in FIG. 15, the game device 1 of the present embodiment is different from the game device 1 of the image display device of the first embodiment in that there is no illumination detection unit S and the parameter adjustment means 87 adjusts the predetermined parameter (hue, brightness, and saturation) of the partition image displayed in the partition area 612 by receiving the direct operation input from the user. Further, in the game device 1 of the present embodiment, the control unit 8 does not include the parameter determination means 86. In the game device 1 of the present embodiment, the parameter adjustment means 87 changes and adjusts the predetermined parameter (hue, brightness and saturation) of the partition image in the partition area 612 by receiving the operation input from

the user. The parameter adjustment means 87 can change and adjust the predetermined parameter of the partition image in the first partition area 612A or the second partition area 612B for each sub game device. In this case, the parameter adjustment means 87 can change and adjust the predetermined parameter of the partition image for each of the upper area, the middle area, and the lower area of the first partition area 612A.

[0104] For example, as shown in FIG. 16, the predetermined parameter of the partition image in the upper area of the first partition area 612A is displayed on the display unit 6 of the first sub game device 1A. Adjacent to each parameter name, a bar representing the degree of the parameter and a current ratio are displayed. For example, the higher ratio of the parameter "saturation" indicates a higher color vividness. The "hue" and "brightness" are the same. The parameter adjustment means 87 can also change and adjust the color parameter of the partition image in each of the upper area, the middle area, and the lower area, collectively. Therefore, it is possible to adjust the predetermined parameter of the partition image so that the frame body 62 is seen integrally with the partition image, depending on the illuminance around the display unit 6 in the game device 1 having such a configuration. Therefore, it is possible to obtain the same effects as those of the game device 1 of the first embodiment.

[0105] Further, the operation control method of the image display device (game device) according to the present embodiment is the same as the operation control method of the image display device of the first embodiment described above except that the processing of adjusting the parameter of the partition image is different. More specifically, the processing method for

adjusting the parameter of the partition image according to the present embodiment includes: (i) the method for adjusting the predetermined parameter of the partition image by receiving the direct operation input from the user after or with displaying the game image on the display unit 6; and (ii) the method for adjusting the predetermined parameter of the partition image by receiving the direct operation input from the user preliminarily before displaying the game image on the display unit 6.

[0106] Although the image display device and its operation control method of the present invention have been described based on the preferred embodiments, the present invention is not limited to this. The configuration of each part can be replaced with an arbitrary configuration having the same function. In addition, any other means or compositions may be added to the present invention. Further, the present invention may be a combination of two or more arbitrary configurations (features) among the above embodiments.

[0107] FIG. 12 is a front view, a plan view and a bottom view schematically showing the game device according to the first embodiment of the present invention. FIG. 13 is a back view and a left side view schematically showing the game device according to the first embodiment of the present invention. Although the game device is constituted from one game device, it is possible to give the impression that it constituted from two separate game devices.

INDUSTRIAL APPLICABILITY

[0108] According to the present invention, for example, it is possible to improve the visibility of the image displayed in each area by adjusting the

predetermined parameter of the part of the image displayed between the areas in the image display device in which two areas capable of each displaying the image independently are provided in the display area of the display unit. Further, since the predetermined parameter can be adjusted depending on the illuminance around the display unit, it is possible to display the image with the excellent visibility always regardless of the illuminance of the use environment of the image display device. Further, by adjusting the predetermined parameter of the part of the image, the part of the image and a part (for example, a frame part) other than the display area of the display unit can be seen integrally. By doing so, it is also possible to improve the visibility of the image displayed in the predetermined area of the display area. Thus, it is possible to provide the image display device capable of displaying the image with the excellent visibility depending on various forms of the image display. Further, it is also possible to provide the method of controlling the operation of the image display device. Accordingly, the present invention has industrial applicability.

What is claimed is:

1. An image display device configured to be capable of adjusting a predetermined parameter of a part of an image displayed on a display unit depending on an illuminance around the display unit, comprising:

the display unit having a display area for displaying the image; and

a parameter adjustment means for adjusting the predetermined parameter of the part of the image in the display area depending on the illuminance around the display unit.

2. The image display device as claimed in claim 1, wherein the display area of the display unit includes a first area, a second area different from the first area, and a third area for displaying the part of the image,

the first area and the second area are partitioned through the third area.

3. The image display device as claimed in claim 1 or 2, wherein the display unit further has a frame body provided along an outer edge of the display area,

the parameter adjustment means adjusts the predetermined parameter of the part of the image so that the frame body is seen integrally with the part of the image depending on the illuminance around the display unit.

4. The image display device as claimed in any one of claims 1 to 3 further comprising:

an illuminance detection unit for detecting the illuminance around the display unit; and

a parameter determination means for determining the predetermined parameter of the part of the image to be adjusted, depending on the illuminance detected by the

illuminance detection unit,

wherein the parameter adjustment means adjusts the predetermined parameter of the part of the image in the display area based on the predetermined parameter determined by the parameter determination means.

5. The image display device as claimed in claim 4 further comprising a storage unit for storing a parameter of the frame body,

wherein the parameter determination means determines the predetermined parameter so that the predetermined parameter corresponds to the parameter stored in the storage unit.

6. The image display device as claimed in claim 5, wherein the predetermined parameter is the same as the parameter.

7. The image display device as claimed in any one of claims 4 to 6, wherein the parameter adjustment means adjusts the predetermined parameter when the predetermined parameter determined by the parameter determination means exceeds a predetermined threshold.

8. The image display device as claimed in any one of claims 1 to 7, wherein the predetermined parameter is at least one of hue, brightness and saturation.

9. The image display device as claimed in any one of claims 1 to 8, wherein the image display device is a game device.

10. A method for controlling an operation of an image display device configured to be capable of adjusting a predetermined parameter of a part of an image displayed on a display unit depending on an illuminance around the

display unit, the method comprising:

- displaying the image on the display unit; and
- adjusting the predetermined parameter of the part of the image depending on the illuminance around the display unit.

11. The method for controlling the operation of the image display device as claimed in claim 10 further comprising:

- detecting the illuminance around the display unit;
- and

- determining the predetermined parameter of the part of the image to be adjusted depending on the detected illuminance;

- wherein the adjusting the predetermined parameter of the part of the image is performed based on the determined predetermined parameter.

12. A method for controlling an operation of an image display device configured to be capable of adjusting a predetermined parameter of a part of an image displayed on a display unit depending on an illuminance around the display unit, the method comprising:

- displaying the image on the display unit in a state that the predetermined parameter of the part of the image is adjusted depending on the illuminance around the display unit.

13. The method for controlling the operation of the image display device as claimed in claim 12 further comprising:

- detecting the illuminance around the display unit;
- and

- determining the predetermined parameter of the part of the image to be adjusted depending on the detected illuminance;

wherein the displaying the image on the display unit is performed based on the determined predetermined parameter in a state that the predetermined parameter of the part of the image is adjusted.

14. The method for controlling the operation of the image display device as claimed in any one of claims 10 to 13, wherein the predetermined parameter is at least one of hue, brightness and saturation.