CHIP RECOGNITION SYSTEM

BACKGROUND

Technical Field

[0001]

The present invention relates to a chip recognition system that recognizes stacked chips.

Related Art

[0002]

In games such as a baccarat game, betting is done by stacking a plurality of chips. Hence, there is a need to correctly recognize the stacked chips.

SUMMARY

[0004]

Embodiments of t~~T~~he present invention ~~is made in view of such a problem, and an object of the present invention is~~seek to provide a chip recognition system capable of accurately recognizing stacked chips.

[0004a]

An aspect of the present invention provides a chip recognition system for a gaming table, the chip recognition system comprising a first game recording apparatus, wherein the first game recording apparatus is configured to capture a first image of chips stacked on the gaming table; a second game recording apparatus, wherein the second game recording apparatus is configured to capture a second image of the chips stacked on the gaming table; and at least one processor, wherein the at least one processor is configured to:

perform an image analysis of the first image and an image analysis of the second image; for each of the image analyses, use an artificial intelligence technology to determine, based on a result of the respective image analysis, a respective number of the chips stacked on the gaming table; and decide a correct number of the chips stacked on the gaming table when the respective determined numbers are different from each other.

[0004b]

Another aspect of the present invention provides a chip recognition system for a gaming table, the chip recognition system comprising a first game recording apparatus, wherein the first game recording apparatus is configured to capture a first image of chips stacked on the gaming table; a second game recording apparatus, wherein the second game recording apparatus is configured to capture a second image of the chips stacked on the gaming table; and at least one processor, wherein the at least one processor is configured to: perform an image analysis of the first image and an image analysis of the second image; for each of the image analyses, use an artificial intelligence technology to determine, based on a result of the respective image analysis, a respective at least one type of the chips stacked on the gaming table; and decide a correct at least one type of the chips stacked on the gaming table when the respective determined at least one type are different from each other.

[0004c]

Another aspect of the present invention provides a chip recognition system for a gaming table, the chip recognition system comprising a game recording apparatus, wherein the game recording apparatus is configured to capture an image of chips stacked on the gaming table; and at least one processor, wherein the at least one processor is configured to: perform an image analysis of the image; perform a first determination and a second determination of a number of the chips stacked on the gaming table to obtain respective values of the number, wherein at least one of the determinations is performed using an artificial intelligence technology; and decide a correct value of the number of the chips stacked on the gaming table when the respective determined values of the first determination and the second determination are different from each other.

[0004d]

Another aspect of the present invention provides a chip recognition system for a gaming table, the chip recognition system comprising a game recording apparatus, wherein the game recording apparatus is configured to capture an image of chips stacked on the gaming table; and at least one processor, wherein the at least one processor is configured to: perform an image analysis of the image; perform a first determination and a second determination regarding the chips stacked on the gaming table to obtain by each of the first determination and the second determination a respective determined at least one type of the chips stacked on the gaming table,

wherein at least one of the determinations is performed using an artificial intelligence technology; and decide a correct at least one type of the chips stacked on the gaming table when the respective determined at least one type of the first determination and the second determination are different from each other.

[0005]

According to one embodiment, provided is a chip recognition system that recognizes a chip on a gaming table in an amusement place having the gaming table, the chip recognition system comprising: a game recording apparatus that records, as an image, a state of chips stacked on the gaming table, using a camera; an image analysis apparatus that performs an image analysis on the recorded image of the state of chips; a plurality

~~What is claimed is:~~CLAIMS

~~1. A chip recognition system that recognizes a chip on a gaming table in an amusement place having the gaming table, the chip recognition system comprising:~~

~~a game recording apparatus that records, as an image, a state of chips stacked on the gaming table, using a camera;~~

~~an image analysis apparatus that performs an image analysis on the recorded image of the state of chips;~~

~~a plurality of chip determination apparatuses comprising at least a first artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result obtained by the image analysis apparatus; and~~

~~a second artificial intelligence apparatus that decides a correct number of the chips stacked, when the plurality of chip determination apparatuses obtain different determination results for the number of the chips stacked.~~

~~2. The chip recognition system according to claim 1, wherein~~

~~the plurality of chip determination apparatuses comprise at least:~~

~~the first artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result for a first image, the image analysis~~

result being obtained by the image analysis apparatus; and

a third artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result for a second image, the image analysis result being obtained by the image analysis apparatus and the second image being different from the first image.

3. The chip recognition system according to claim 1, wherein

the plurality of chip determination apparatuses comprise at least:

the first artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result obtained by the image analysis apparatus; and

a physical measurement determination apparatus that determines a number of the chips stacked, by a physical measurement method different from a method used by the first artificial intelligence apparatus.

4. The chip recognition system according to claim 1, wherein

the plurality of chip determination apparatuses comprise at least:

the first artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result for a first image, the image analysis

result being obtained by the image analysis apparatus;

a third artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result for a second image, the image analysis result being obtained by the image analysis apparatus and the second image being different from the first image; and

a physical measurement determination apparatus that determines a number of the chips stacked, by a physical measurement method different from methods used by the first and third artificial intelligence apparatuses.

5. The chip recognition system according to claim 3, wherein

the physical measurement determination apparatus determines a number of the chips stacked, using a measurement result that uses trigonometry.

6. The chip recognition system according to claim 1, wherein

the second artificial intelligence apparatus decides a correct number of the chips stacked, using at least one of:

a position of the camera used by the game recording apparatus;

a number of pixels obtained from the camera;

a focal position of the image; and

past results obtained by the plurality of chip

~~determination apparatuses.~~

~~7. A chip recognition system that recognizes a chip on a gaming table in an amusement place having the gaming table, the chip recognition system comprising:~~

~~a game recording apparatus that records, as an image, a state of chips stacked on the gaming table, using a camera;~~

~~an image analysis apparatus that performs an image analysis on the recorded image of the state of chips;~~

~~a plurality of chip determination apparatuses comprising at least a first artificial intelligence apparatus that determines a number and a type of the chips stacked, using an image analysis result obtained by the image analysis apparatus; and~~

~~a second artificial intelligence apparatus that decides a correct number or a type of the chips stacked, when the plurality of chip determination apparatuses obtain different determination results for the number or the type of the chips stacked.~~

~~8. The chip recognition system according to claim 7, wherein~~

~~the plurality of chip determination apparatuses comprise at least:~~

~~the first artificial intelligence apparatus that determines a number and a type of the chips stacked,~~

~~using an image analysis result for a first image, the image analysis result being obtained by the image analysis apparatus; and~~

~~a third artificial intelligence apparatus that determines a number and a type of the chips stacked, using an image analysis result for a second image, the image analysis result being obtained by the image analysis apparatus and the second image being different from the first image.~~

~~9. The chip recognition system according to claim 7, wherein~~

~~the plurality of chip determination apparatuses comprise at least:~~

~~the first artificial intelligence apparatus that determines a number and a type of the chips stacked, using an image analysis result obtained by the image analysis apparatus; and~~

~~a physical measurement determination apparatus that determines a number of the chips stacked, by a physical measurement method different from a method used by the first artificial intelligence apparatus.~~

~~10. The chip recognition system according to claim 7, wherein~~

~~the plurality of chip determination apparatuses comprise at least:~~

~~the first artificial intelligence apparatus that determines a number and a type of the chips stacked, using an image analysis result for a first image, the image analysis result being obtained by the image analysis apparatus;~~

~~a third artificial intelligence apparatus that determines a number and a type of the chips stacked, using an image analysis result for a second image, the image analysis result being obtained by the image analysis apparatus and the second image being different from the first image; and~~

~~a physical measurement determination apparatus that determines a number of the chips stacked, by a physical measurement method different from methods used by the first and third artificial intelligence apparatuses.~~

~~11. The chip recognition system according to claim 9, wherein~~

~~the physical measurement determination apparatus determines a number of the chips stacked, using a measurement result that uses trigonometry.~~

~~12. The chip recognition system according to claim 7, wherein~~

~~the second artificial intelligence apparatus decides a correct number or a type of the chips stacked, using at least one of:~~

~~a position of the camera used by the game recording apparatus;~~

~~a number of pixels obtained from the camera;~~

~~a focal position of the image; and~~

~~past results obtained by the plurality of chip determination apparatuses.~~

~~13. The chip recognition system according to claim 7, wherein~~

~~the image analysis apparatus is configured such that even if a part of a plurality of stacked chips or a whole of a single chip among the plurality of stacked chips is hidden due to a blind spot of the camera, the image analysis apparatus can obtain information about a type, a number, and a position of the chips.~~

~~14. A chip recognition system that recognizes a chip on a gaming table in an amusement place having the gaming table, the chip recognition system comprising:~~

~~a game recording apparatus that records, as an image, a state of chips stacked on the gaming table, using a camera;~~

~~an image analysis apparatus that performs an image analysis on the recorded image of the state of chips;~~

~~a chip determination apparatus comprising an artificial intelligence apparatus that determines a number of chips bet by a player, using an image analysis result~~

~~obtained by the image analysis apparatus;~~

~~a physical measurement determination apparatus that determines a number of the chips bet by the player, by a physical measurement method different from a method used by the artificial intelligence apparatus; and~~

~~a management and control apparatus that controls the image analysis apparatus, the chip determination apparatus, and the physical measurement determination apparatus, wherein~~

~~the management and control apparatus further has a function of outputting and displaying "undetermined" as a determination result when a determination result for the number of chips obtained from the chip determination apparatus differs from a determination result for the number of chips obtained from the physical measurement determination apparatus.~~

~~15. The chip recognition system according to claim 14, wherein~~

~~the physical measurement determination apparatus determines a number of the chips using a measurement result that uses trigonometry.~~

~~16. A chip recognition system that recognizes a chip on a gaming table in an amusement place having the gaming table, the chip recognition system comprising:~~

~~a plurality of cameras that obtain images of a chip bet by a player from different positions or different~~

~~angles;~~

~~a game recording apparatus that records, as images, a state of chips stacked on the gaming table, using the plurality of cameras;~~

~~an image analysis apparatus that performs an image analysis on the recorded images of the state of chips;~~

~~a plurality of chip determination apparatuses comprising at least a first artificial intelligence apparatus that determines a number of the chips stacked, using an image analysis result obtained by the image analysis apparatus; and~~

~~a management and control apparatus that controls the image analysis apparatus and the plurality of chip determination apparatuses, wherein~~

~~the management and control apparatus further has a second artificial intelligence apparatus function of analyzing the images in the game recording apparatus when the plurality of chip determination apparatuses obtain different determination results for the number of the chips stacked, to determine whether the difference in determination result is caused by a stacking state of the chips stacked on the gaming table, and decides a correct number of the chips stacked, based on the determination results obtained by the respective plurality of chip determination apparatuses.~~

1. A chip recognition system for a gaming table, the chip recognition system comprising:

a first game recording apparatus, wherein the first game recording apparatus is configured to capture a first image of chips stacked on the gaming table;

a second game recording apparatus, wherein the second game recording apparatus is configured to capture a second image of the chips stacked on the gaming table; and

at least one processor, wherein the at least one processor is configured to:

perform an image analysis of the first image and an image analysis of the second image;

for each of the image analyses, use an artificial intelligence technology to determine, based on a result of the respective image analysis, a respective number of the chips stacked on the gaming table; and

decide a correct number of the chips stacked on the gaming table when the respective determined numbers are different from each other.

2. The chip recognition system according to claim 1, wherein:

the first game recording apparatus includes a first camera;

the second game recording apparatus includes a second camera;

the first camera and the second camera are installed in different locations and/or at different angles such that the first camera and the second camera capture different aspects of same chips of the chips stacked on the gaming table.

3. The chip recognition system according to claim 2, wherein the decision of the correct number is obtained based on at least one of:

respective positions of the first camera and the second camera; and

respective numbers of pixels of the first camera and the second camera.

4. The chip recognition system according to claim 1, wherein the decision of the correct number is obtained based on at least one of:

respective focal positions of the first image and the second image;

definitions of the first image and the second image; and

past results of numbers of chips stacked on the gaming table obtained by the at least one processor respectively based on the first game recording apparatus and the second game recording apparatus.

5. The chip recognition system according to claim 1, wherein the first and second game recording apparatuses include respective cameras, and the at least one processor is configured to determine information about the number, a type, and a position of the chips stacked on the gaming table even when a part or an entirety of one or more of the chips is hidden due to a blind spot of at least one of the cameras.

6. A chip recognition system for a gaming table, the chip recognition system comprising:

a first game recording apparatus, wherein the first game recording apparatus is configured to capture a first image of chips stacked on the gaming table;

a second game recording apparatus, wherein the second game recording apparatus is configured to capture a second image of the chips stacked on the gaming table; and

at least one processor, wherein the at least one processor is configured to:

perform an image analysis of the first image and an image analysis of the second image;

for each of the image analyses, use an artificial intelligence technology to determine, based on a result of the respective image analysis, a

respective at least one type of the chips stacked on the gaming table; and

decide a correct at least one type of the chips stacked on the gaming table when the respective determined at least one type are different from each other.

7. The chip recognition system according to claim 6, wherein:

the first game recording apparatus includes a first camera;

the second game recording apparatus includes a second camera;

the first camera and the second camera are installed in different locations and/or at different angles such that the first camera and the second camera capture different aspects of same chips of the chips stacked on the gaming table.

8. The chip recognition system according to claim 7, wherein the decision of the correct at least one type is obtained based on at least one of:

respective positions of the first camera and the second camera; and

respective numbers of pixels of the first camera and the second camera.

9. The chip recognition system according to claim 6, wherein the decision of the correct at least one type is obtained based on at least one of:

respective focal positions of the first image and the second image;

definitions of the first image and the second image; and

past results of one or more types of chips stacked on the gaming table obtained by the at least one processor respectively based on the first game recording apparatus and the second game recording apparatus.

10. The chip recognition system according to claim 6, wherein the first and second game recording apparatuses include respective cameras, and the at least one processor is configured to determine information about a number, the at least one type, and a position of the chips stacked on the gaming table even when a part or an entirety of one or more of the chips is hidden due to a blind spot of at least one of the cameras.

11. A chip recognition system for a gaming table, the chip recognition system comprising:

a game recording apparatus, wherein the game recording apparatus is configured to capture an image of chips stacked on the gaming table; and

at least one processor, wherein the at least one processor is configured to:

perform an image analysis of the image;

perform a first determination and a second determination of a number of the chips stacked on the gaming table to obtain respective values of the number, wherein at least one of the determinations is performed using an artificial intelligence technology; and

decide a correct value of the number of the chips stacked on the gaming table when the respective determined values of the first determination and the second determination are different from each other.

12. A chip recognition system for a gaming table, the chip recognition system comprising:

a game recording apparatus, wherein the game recording apparatus is configured to capture an image of chips stacked on the gaming table; and

at least one processor, wherein the at least one processor is configured to:

perform an image analysis of the image;

perform a first determination and a second determination regarding the chips stacked on the gaming table to obtain by each of the first determination and the second determination a respective determined at least one type of the chips stacked on the gaming table, wherein at least one of the determinations is performed using an artificial intelligence technology; and

decide a correct at least one type of the chips stacked on the gaming table when the respective determined at least one type of the first determination and the second determination are different from each other.