is requested that not only the outlines of the chips be recognized but also the differences in colors of the chips be recognized, and further, that the quantity of chips stacked up be grasped for each type of chip. However, chips recognized by cameras, even if the chips have the same color, are imaged or recognized as having different colors due to the difference in lighting environments in which the chips are placed, and are not recognized as having the same color. Conventionally, it has been thus difficult for example to count the quantity of chips type-by-type from images.

[0005]

The present disclosure has been made in view of such a problem, and provides a chip recognition system having a mechanism enabling the recognition of chip color via images and the counting of the quantity of chips even under different lighting environments.

[0005a]

According to an aspect, there is provided a learning system comprising: one or more cameras for photographing a plurality of betting areas arranged in a two-dimensional direction on a game table from an obliquely upward direction enough to recognize which bet target a chip is on, and generating an image including a plurality of chips bet on the plurality of betting areas; a learning model for recognizing the positions, types, and numbers of chips bet on the front side and chips bet on the inside by a player, by analyzing one of the image using learned artificial intelligence or deep learning; a device for acquiring training data for generating or learning

the learning model by photographing; and a learning device for learning the learning model using the training data, wherein the training data comprises a plurality of images having different lighting conditions and different hidden states of chips.

[0005b]

According to another aspect, there is provided a learning system comprising: one or more cameras for photographing a plurality of betting areas arranged in a two-dimensional direction on a game table from an obliquely upward direction enough to recognize which bet target a chip is on, and generating an image including a plurality of chips bet on the plurality of betting areas; a learning model for recognizing the positions, types, and numbers of chips bet on the front side and chips bet on the inside by a player, by analyzing one of the image using learned artificial intelligence or deep learning; a device for acquiring training data for generating or learning the learning model by photographing; and a learning device for learning the learning model using the training data, wherein the training data comprises an image in which a plurality of chips having different specific colors on the sides stacked one on top of another is visible.

[0005c]

According to another aspect, there is provided a learning system comprising: one or more cameras for photographing a plurality of betting areas arranged in a two-dimensional direction on a game table from an obliquely upward direction enough to recognize which bet target a chip is on, and generating

an image including a plurality of chips bet on the plurality of betting areas; a learning model for recognizing the positions, types, and numbers of chips bet on the front side and chips bet on the inside by a player, by analyzing one of the image using learned artificial intelligence or deep learning; a device for acquiring training data for generating or learning the learning model by photographing; and a learning device for learning the learning model using the training data, wherein the training data comprises an image in which a plurality of chips that are stacked misaligned from each other are visible.

[0006]

A chip recognition system as disclosed is a recognition system for recognizing a chip used on a game table of a game house, the chip configured to at least partially have a specific color indicative of a value of the chip, the recognition system including:

a recording device that uses a camera and records a state of the chip as an image;

an image analysis device that subjects the image so recorded to image analysis and recognizes at least two colors being the specific color and a reference color that is present

[0010]

The recognition device determines specific colors of a plurality of the chips stacked one on top of another, and may be configured to be capable of determining the specific colors or a quantity of the chips even when some of the chips are in hidden state due to a dead angle of the camera.

[0011]

A recognition system for recognizing an article as disclosed, the article at least partially having, on the article itself or a wrapping of the article, a specific color enabling the article or the wrapping to be specified, includes:

a recording device that uses a camera and records a state of the article as an image;

an image analysis device that subjects the image so recorded to image analysis and recognizes at least two colors being the specific color and a reference color that is present in the image and differs from the specific color; and

a recognition device at least including an artificial intelligence device that uses a result of the image analysis by the image analysis device and specifies the specific color of the article itself or the wrapping, wherein

the artificial intelligence device of the recognition device has been subjected to teaching using, as training data, a plurality of images of the reference color and the specific color of the article itself or the wrapping irradiated with different illumination intensities.

colors even when some of the articles are in hidden state due to a dead angle of the camera. Further, the recognition device determines specific colors of a plurality of the articles stacked one on top of another or the wrappings of the articles, and is configured to be capable of determining a total quantity of the articles or a quantity of the articles of each of the specific colors even when some of the articles are in hidden state due to a dead angle of the camera.

[0016]

A chip recognition system as disclosed is:

a chip recognition system for recognizing a chip used on a game table of a game house, the chip configured to at least partially have a specific color indicative of the value of the chip, the chip recognition system including:

a recording device that uses a camera and records a state of the chip as an image;

an image analysis device that subjects the image so recorded to image analysis and recognizes at least two colors being the specific color and a reference color that is present in the image and differs from the specific color; and

a recognition device at least including an artificial intelligence device that uses a result of the image analysis by the image analysis device and specifies the specific color of the chip, wherein

the artificial intelligence device of the recognition device is configured to extract a center line from the image

of the chip and subject, to image analysis, a surrounding image covering a predetermined range centered on the center line to recognize, in the surrounding image, at least two colors being the specific color and the reference color, which differs from the specific color, and has been subjected to teaching using, as training data, a plurality of the surrounding images of the chip and the reference color irradiated with different illumination intensities.

[0017]

A recognition system for recognizing an article as disclosed is:

a recognition system for recognizing an article, the article at least partially having, on the article itself or a wrapping of the article, a specific color enabling the article or the wrapping to be specified, the recognition system including:

a recording device that uses a camera and records a state of the article as an image;

an image analysis device that subjects the image so recorded to image analysis and recognizes at least the specific color and a reference color that is present in the image and differs from the specific color; and

a recognition device at least including an artificial intelligence device that uses a result of the image analysis by the image analysis device and specifies the specific color of the article itself or the wrapping, wherein

the artificial intelligence device of the recognition

device is configured to recognize the specific color from the image of the article itself or the wrapping, extract an image portion having the specific color, and subject a surrounding image of the specific color to image analysis to recognize, in the surrounding image, at least two colors being the specific color and the reference color, and has been subjected to teaching using, as training data, a plurality of the surrounding images of the specific color of the article itself or the wrapping and the reference color irradiated with different illumination intensities.

[0018]

The present disclosure may enable the recognition of chips used on a game table type-by-type and the counting of the quantity of the chips from images.

[0019]

The foregoing and other objects, features, aspects and advantages of the exemplary embodiments will become more apparent from the following detailed description of the exemplary embodiments when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG. 1 schematically illustrates a chip recognition system in an embodiment of the present invention;

[0021]

FIG. 2 is a lateral view of a chip in an embodiment of