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Q1

1. A cardiothoracic ratio calculation device for calculating a cardiothoracic ratio based on a chest X-ray image, comprising:

a measurement location estimation unit for estimating a rightmost lung location, a leftmost lung location, a rightmost heart location, and a leftmost heart location in the chest X-ray image; and

a cardiothoracic ratio calculation unit for calculating a cardiothoracic ratio based on the estimated rightmost lung location, leftmost lung location, rightmost heart location, and leftmost heart location,

wherein the measurement location estimation unit divides the chest X-ray image into a plurality of horizontal regions and, for each horizontal region, detects a rightmost lung candidate and a leftmost lung candidate based on pixel values as well as a rightmost heart candidate and a leftmost heart candidate based on a horizontal differential value of the pixel values, and

wherein the measurement location estimation unit further extracts a specific horizontal region based on a distance between a lung midpoint defined by the rightmost lung candidate and the leftmost lung candidate and a heart midpoint defined by the rightmost heart candidate and the leftmost heart candidate, or based on a ratio of this distance to a lung width defined by the rightmost lung candidate and the leftmost lung candidate, and estimates the rightmost lung candidate, the leftmost lung candidate, the rightmost heart candidate, and the leftmost heart candidate in the extracted horizontal region as the rightmost lung location, the leftmost lung location, the rightmost heart location, and the leftmost heart location.

2. The cardiothoracic ratio calculation device according to Claim 1, wherein

the measurement location estimation unit detects

a location with the lowest pixel value in an area within a predetermined range from a rightmost edge of the horizontal area as the rightmost lung candidate, and

a location with the lowest pixel value in an area within a predetermined range from a leftmost edge of the horizontal area as the leftmost lung candidate,

assuming the higher an X-ray transmittance, the higher the pixel value.

3. The cardiothoracic ratio calculation device according to Claim 1 or 2, wherein

the measurement location estimation unit

detects a location with the largest differential value in negative direction between the rightmost lung candidate and the leftmost lung candidate in the horizontal area as a rightmost heart candidate, and

detects a location with the largest differential value in positive direction between the rightmost lung candidate and the leftmost lung candidate in the horizontal area as the leftmost heart candidate.

Q2

There is a conventionally known technology called blockchain. This technology is a mechanism for synchronizing identical records among a multitude of nodes in a network. When a new record is added to an existing record, blocks, which are units of record, are added one after another in a chain-like fashion while inheriting the content (hash) of the previous block, hence the name. In general, the term "blockchain" may refer to the structure of a database in which blocks are connected in a chain, but it may also be used in a broader sense that also includes a mechanism for operating as a P2P network, a mechanism for approving transactions, etc. At present, the definition of the term is not clear. Therefore, in order to prevent confusion between the two definitions, this specification will refer to "blockchain" when used in the former, narrower sense, and "blockchain technology" when used in the latter, broader sense.

Since blockchain technology has many advantages such as zero downtime, being hard to tamper with, and low cost, it is beginning to attract attention not only as a method for managing virtual currencies including Bitcoin and its derivatives, but also as a method for managing information on various assets as transactions. For example, Non-Patent Document 1 describes the use of blockchain, which can play an important role in establishing trustworthiness, for a proof of existence and a proof of identity of various documents.

There are two main types of blockchain technology: a public node method and a private node method. The public node method allows anyone to participate as a node in the network. On the other hand, the private node method allows only authorized persons to participate as nodes in the network.

Q3

<When a backfire occurs>

When a backfire R enters the burner 100 from the burner element 15, the heat of the backfire R causes the thermally expandable member 22 to thermally expand toward the inner circumference side, forming a thermally expandable member 222 with the opening 22H closed, as shown in Fig. 3(B).

As a result, the opening 22H of the thermally expandable member 222 (22) is blocked, preventing the heat of the backfire R and the ultraviolet light L emitted by the flame F generated by

the burner element 15 from reaching the flame detection sensor 23.

In this embodiment, a control unit (not shown) is configured such that it determines, for example, that the burner 100 is burning normally when the flame detection sensor 23 detects ultraviolet light L, and determines that a backfire or misfire has occurred when the quantity of light of the ultraviolet light L detected by the flame detection sensor 23 is below a set threshold (including zero).

As a result, when the burner 100 misfires and no longer emits ultraviolet light L, or when the flame detection sensor 23 no longer detects ultraviolet light L due to a thermal expansion of the thermally expandable member 22 as shown in Fig. 3(B), or when the quantity of light of the detected ultraviolet light L is below the threshold value, it is judged that a misfire or a backfire has occurred in the burner 100.