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問 1

[Claim 1]

A cardiothoracic ratio calculating apparatus that calculates a cardiothoracic ratio on the basis of a chest X-ray image, the cardiothoracic ratio calculating apparatus comprising:

a measurement position estimating unit that estimates a lung right-end position, a lung left-end position, a heart right-end position, and a heart left-end position in the chest X-ray image; and

a cardiothoracic ratio calculating unit that calculates a cardiothoracic ratio on the basis of the estimated lung right-end position, lung left-end position, heart right-end position, and heart left-end position, wherein

the measurement position estimating unit divides the chest X-ray image into a plurality of horizontal-direction regions and detects, for each horizontal-direction region, (i) a candidate lung right end and a candidate lung left end on the basis of pixel values, and (ii) a candidate heart right end and a candidate heart left end on the basis of horizontal-direction derivative values of the pixel values, and

the measurement position estimating unit extracts a specific horizontal-direction region on the basis of a distance between a lung midpoint determined by the candidate lung right end and the candidate lung left end and a heart midpoint determined by the candidate heart right end and the candidate heart left end or a ratio of the distance to a lung width determined by the candidate lung right end and the candidate lung left end, and estimates the candidate lung right end, the candidate lung left end, the candidate heart right end, and the candidate heart left end in the extracted horizontal-direction region as the lung right-end position, the lung left-end position, the heart right-end position, and the heart left-end position, respectively.

[Claim 2]

The cardiothoracic ratio calculating apparatus according to claim 1, wherein when the pixel values increase as an X-ray transmittance increases, the measurement position estimating unit

detects, as the candidate lung right end, a position having a smallest pixel value in a region within a predetermined range from a right end of the horizontal-direction region, and

detects, as the candidate lung left end, a position having a smallest pixel value

in a region within a predetermined range from a left end of the horizontal-direction region.

[Claim 3]

The cardiothoracic ratio calculating apparatus according to claim 1 or 2, wherein the measurement position estimating unit

detects, as the candidate heart right end, a position having a largest negative derivative value between the candidate lung right end and the candidate lung left end in the horizontal-direction region, and

detects, as the candidate heart left end, a position having a largest positive derivative value between the candidate lung right end and the candidate lung left end in the horizontal-direction region.

問 2

Hitherto, a technique called "blockchain" has been known. This technique is a system for synchronizing the same record among many nodes on a network. In the case of adding a new record to an existing record, blocks each serving as a recording unit are sequentially added to form a chain shape, with the content (hash) of the preceding block being taken over. Thus, this technique is called "blockchain". The term "blockchain" typically means the structure of a database having blocks connected to each other in a chain shape, but may also be used in a broad meaning, including the meaning of a system that operates as a P2P network and the meaning of a system for approving a transaction. At present, the definition of this term is not fixed. Thus, in this specification, to avoid confusion between both of them, the term "blockchain" is used for the former case in the narrow meaning whereas the term "blockchain technique" is used for the latter case in the broad meaning.

The blockchain technique has many advantages including zero-downtime, difficulty in falsification, and low cost, and is thus beginning to attract attention as a method for managing, as a transaction, information about various assets as well as virtual currencies including bitcoin and derivative currencies thereof. For example, Non-patent Document 1 describes using a blockchain that may play an important role for establishing reliability, to prove the existence of various documents or to establish identity.

The blockchain technique mainly includes a public node scheme and a private node scheme. The public node scheme is a scheme in which anyone can participate as a node on a network. On the other hand, the private node scheme is a scheme in which only a person permitted as a node on a network can participate.

問 3

<At Occurrence of Backfire>

In the burner 100, when the backfire R enters from the burner element 15, heat of the backfire R causes the thermally-expandable member 22 to thermally expand toward an inner side, thereby forming a thermally-expandable member 222 having the opening portion 22H that is closed.

As a result, the opening portion 22H of the thermally-expandable member 222 (22) is closed, which prevents the heat of the backfire R and the ultraviolet ray 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 illustrated) is configured to, for example, detect that the burner 100 is normally burning in a case where the flame detection sensor 23 detects the ultraviolet ray L, and to determine that backfire or no fire has occurred in a case where the amount of the ultraviolet ray L detected by the flame detection sensor 23 is smaller than or equal to a set threshold (including zero).

As a result, when the burner 100 does not generate fire any more and does not generate the ultraviolet ray L, and when the thermally-expandable member 22 thermally expands and the flame detection sensor 23 does not detect the ultraviolet ray L as illustrated in FIG. 3(B) or when the detected amount of the ultraviolet ray L is smaller than or equal to the threshold, the control unit determines that the burner 100 has stopped burning or backfire has occurred in the burner 100.