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【問 1】

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

a measurement position estimator for estimating a position of a right edge of a lung, a position of a left edge of a lung, a position of a right edge of a heart, and a position of a left edge of a heart in the chest X-ray image; and

a cardiothoracic ratio calculator for calculating the cardiothoracic ratio based on the estimated position of the right edge of the lung, the estimated position of the left edge of the lung, the estimated position of the right edge of the heart, and the estimated position of the left edge of the heart,

wherein the measurement position estimator divides the chest X-ray image into a plurality of areas in a horizontal direction, and, for each area in the horizontal direction, detects a candidate of a right edge of a lung and a candidate of a left edge of a lung based on a pixel value, and detects a candidate of a right edge of a heart and a candidate of a left edge of a heart based on a differential value in the horizontal direction of the pixel value, and

wherein the measurement position estimator selects a specific area of the horizontal direction based on either a distance between a lung midpoint determined by the candidate of the right edge of the lung and the candidate of the left edge of the lung, and a heart midpoint determined by the candidate of the right edge of the heart and the candidate of the left edge of the heart, or a ratio of the distance to a width of a lung determined by the candidate of the right edge of the lung and the candidate of the left edge of the lung, and estimates the candidate of the right edge of the lung, the candidate of the left edge of the lung, the candidate of the right edge of the heart, and the candidate of the left edge of the heart in the selected area of the horizontal direction to be the position of the right edge of the lung, the position of the left edge of the lung, the position of the right edge of the heart, and the position of the left edge of the heart.

2. The cardiothoracic ratio calculating device according to claim 1, wherein

when the pixel value becomes higher as the transmission rate of the X-ray becomes higher,

the measurement position estimator detects a position with the lowest pixel value within an area of a specific range from the right edge of the area in the horizontal direction to be the candidate of the right edge of the lung, and

detects a position with the lowest pixel value within an area of a specific range from the left edge of the area in the horizontal direction to be the candidate of the left edge of the lung.

3. The cardiothoracic ratio calculating device according to claim 1 or claim 2, wherein

the measurement position estimator detects a position having the largest differential value in the negative direction between the candidate of the right edge of the lung and the candidate of the left edge of the lung in the area in the horizontal direction to be the candidate of the right edge of the heart, and

detects a position having the largest differential value in the positive direction between the candidate of the right edge of the lung and the candidate of the left edge of the lung in the area in the horizontal direction to be the candidate of the left edge of the heart.

【問 2】

There is a conventional technology known as block chain, which synchronizes the same record between numerous nodes on a network. The term block chain is used because when adding a new record onto an existing record, the recording unit block succeeds the contents (hash) of the immediately preceding block, and blocks are added successively like a chain. Generally, the term block chain refers to a database structure where blocks are connected like chains; however, the term may also be used in a broader sense, including a structure operating as a P2P network or a structure approving transactions. Because the definition is unclear as of now, to avoid confusion between the meanings, we will call the former “block chain” when referring to the narrower definition, and the latter “block chain technology” when referring to the broader definition in the present specification.

Block chain technology is starting to receive attention as a method to manage not just virtual currencies including Bitcoins or its derivatives but also various asset related information as transactions, because of its many merits such as zero downtime, difficulty in falsification, and low cost. For example, non-patent literature 1 discloses using block chains that could play an important role in establishing authenticity to prove the existence of various documents or prove one’s identity.

Block chain technology mainly has a public node method and a private node method. In the public node method, anyone can participate as a node on a network. In

contrast, in the private node method, only permissioned persons can participate as a node on a network.

【問 3】

＜When a flashback occurs＞

As shown in Figure 3 (B), when a flashback R extends from the burner element 15, the heat-expandable unit 22 of the burner 100 thermally expands inwards to the inner circumference by the heat from flashback R. This forms a heat-expandable unit 222 that blocks the opening 22H.

This in turn blocks the opening 22H of the heat-expandable unit 222 (22), and prevents the heat from the flashback R and the ultraviolet light L emitted from the flame F generated by the burner element 15 from reaching the flame detection sensor 23.

In this embodiment, for example, when the flame detection sensor 23 detects an ultraviolet light L, the controller (not shown) is configured to determine that the burner 100 is operating properly, and when the flame detection sensor 23 detects the intensity of ultraviolet light L to be equal to or less than the threshold value or the intensity to be zero, the controller is configured to determine that there is a flashback or misfire.

Consequently, when the burner 100 misfires and does not emit ultraviolet light L, or, as shown in Figure 3 (B), when the heat-expandable unit 22 thermally expands and the flame detection sensor 23 fails to detect the ultraviolet light or the intensity of the detected ultraviolet light L is equal to or less than the threshold value, it is determined that the burner has misfired or has had a flashback.