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問 1

1. An apparatus for calculating a cardiothoracic ratio, the apparatus being configured to calculate a cardiothoracic ratio based on a chest radiograph, comprising:

a unit for estimating a measurement position, the unit being configured to estimate a position for a right edge of a lung, a position for a left edge of the lung, a position for a right edge of a heart, and a position for a left edge of the heart in the chest radiograph; and

a unit for calculating a cardiothoracic ratio, the unit being configured to calculate a cardiothoracic ratio based on the estimated position for the right edge of the lung, the estimated position for the left edge of the lung, the estimated position for the right edge of the heart, and the estimated position for the left edge of the heart, wherein

the unit for estimating a measurement position divides the chest radiography into a plurality of regions in a horizontal direction, and in each region in the horizontal direction, the unit for estimating a measurement position detects a candidate for the right edge of the lung, and a candidate for the left edge of the lung based on a pixel value, and detects a candidate for the right edge of the heart, and a candidate for the left edge of the heart based on a derivative value of the pixel value in the horizontal direction, and

the unit for estimating a measurement position further extracts a particular region in the horizontal direction based on a distance between a lung midpoint determined by the candidate for the right edge of the lung and the candidate for the left edge of the lung, and a heart midpoint determined by the candidate for the right edge of the heart and the candidate for the left edge of the heart, or based on a ratio of the distance with respect to a lung width determined by the candidate for the right edge of the lung and the candidate for the left edge of the lung, and estimates the candidate for the right edge of the lung, the candidate for the left edge of the lung, the candidate for the right edge of the heart, and the candidate for the left edge of the heart in the extracted region in the horizontal direction to be the position for the right edge of the lung, the position for the left edge of the lung, the position for the right edge of the heart, and the position for the left edge of the heart, respectively.

2. The apparatus for calculating a cardiothoracic ratio, according to claim 1, wherein

when larger X-ray transmittance leads to a larger pixel value,

the unit for estimating a measurement position detects a position with a lowest

pixel value as a candidate for the right edge of the lung in a region within a predetermined range from a right edge of the region in the horizontal direction, and

the unit for estimating a measurement position detects a position with a lowest pixel value as a candidate for the left edge of the lung in a region within a predetermined range from a left edge of the region in the horizontal direction.

3. The apparatus for calculating a cardiothoracic ratio, according to claim 1 or 2, wherein

the unit for estimating a measurement position detects a position with a derivative value largest in a negative direction as a candidate for the right edge of the heart between the candidate for the right edge of the lung and the candidate for the left edge of the lung in the region in the horizontal direction, and

the unit for estimating a measurement position detects a position with a derivative value largest in a positive direction as a candidate for the left edge of the heart between the candidate for the right edge of the lung and the candidate for the left edge of the lung in the region in the horizontal direction.

問 2

A technique referred to as block chain has been known conventionally. This technique refers to a mechanism that synchronizes identical records among many nodes on a network. When a new record is added to existing records, a block, serving as a recording unit, is successively added like a chain while inheriting the contents (hash) of the immediately preceding block. This is why the technique is called block chain. In general, the term "block chain" may refer to a database structure having blocks connected like a chain, but may be used in the broad sense including a mechanism operating as a P2P network and a mechanism for authorizing transactions. The definition of block chain is currently unestablished. In view of this, the term "block chain" is to be employed herein when used in the former narrow meaning, whereas the term "block chain technique" is to be employed herein when used in the latter broad meaning for the purpose of avoiding confusion between those meanings.

The block chain technique has many advantages including the absence of downtime, difficulty in tampering, and its low cost. Thus, the block chain technique is just beginning to receive attention as a method for managing information regarding not only virtual currencies such as Bitcoin and its derivative currencies but also various assets as transactions. Non-Patent Literature 1, for example, describes that block chain that can play an important role in establishing reliability is used for certifying the

existence or identity of various documents.

The block chain technique is mainly divided into a public node method and a private node method. According to the public node method, anyone can participate in as a node on a network. According to the private node method, however, only a person permitted as a node on a network can participate in.

問 3

During Occurrence of Backfire

If the backfire R is emitted from the burner element 15 in the burner 100, the thermally-expandable member 22 thermally expands in an inner peripheral direction due to the heat of the backfire R as shown in FIG. 3B, thus forming a thermally-expandable member 222 (22) with the opening 22H being closed.

Consequently, the closure of the opening 22H in the thermally-expandable member 222 (22) prevents the heat of the backfire R and ultraviolet rays emitted by the flame F produced by the burner element 15 from reaching the flame detection sensor 23.

A controller (not shown) in this embodiment is configured, for example, to determine that the burner 100 is operating properly when the flame detection sensor 23 detects the ultraviolet rays L, and determine that backfire or accidental fire has occurred when an amount of ultraviolet rays L detected by the flame detection sensor 23 is smaller than or equal to a set threshold value (including zero).

Thus, when the burner 100 causes accidental fire and thereby emits no ultraviolet rays L, when the thermally-expansive member 22 thermally expands as shown in FIG. 3B and thus no ultraviolet rays L are detected by the flame detection sensor 23, or when the amount of the detected ultraviolet rays L is smaller than or equal to the threshold value, it is determined that the burner 100 has accidental fire or backfire.