

受験番号 : 32IPE016

Ans.1

[Claim 1]

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

a measurement position inferring unit configured to infer 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 calculation unit configured to calculate a cardiothoracic ratio on the basis of the lung right end position, the lung left end position, the heart right end position, and the heart left end position which have been inferred,

wherein

the measurement position inferring unit divides the chest X-ray image into a plurality of horizontal-direction regions, and, in each of the horizontal-direction regions, detects a lung right end candidate and a lung left end candidate on the basis of pixel values and detects a heart right end candidate and a heart left end candidate on the basis of a derivative, in the horizontal direction, of the pixel values, and furthermore,

the measurement position inferring unit

extracts a specific horizontal-direction region on the basis of

a distance between a lung intermediate point determined according to the lung right end candidate and the lung left end candidate and a heart intermediate point determined according to the heart right end candidate and the heart left end candidate, or

a proportion of the distance to a lung width determined according to the lung right end candidate and the lung left end candidate, and

infers the lung right end candidate, the lung left end candidate, the heart right end candidate, and the heart left end candidate 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.

[Claim 2]

The cardiothoracic ratio calculation device according to claim 1, wherein,  
if a higher X-ray transmittance is set to lead to a larger pixel value, the measurement position inferring unit

detects, as the lung right end candidate, a position at which the pixel

value is smallest in a region that is within a predetermined range from a right edge of the horizontal-direction region, and

detects, as the lung left end candidate, a position at which the pixel value is smallest in a region that is within a predetermined range from a left edge of the horizontal-direction region.

[Claim 3]

The cardiothoracic ratio calculation device according to claim 1 or 2, wherein the measurement position inferring unit

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

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

Ans.2

Conventionally, a technology called blockchain has been known. This technology is a mechanism in which synchronization for the same record is performed among a large number of nodes on a network. This technology is called blockchain because, in the case of adding new records to among existing records, blocks each serving as the unit of record are added one after another in the form of a chain while taking over content (hash) of the immediately preceding block. In general, although the term “blockchain” sometimes refers, in a narrow sense, to a database structure in which blocks are linked in the form of a chain, the term is sometimes used also in a broad sense encompassing a mechanism in which the nodes operate as a peer-to-peer network and a mechanism of approval of transactions. Thus, currently, the definition of the term is not clear. Considering this, both senses are distinguish from each other in the present specification in the following manner. That is, if the term is used in the former narrow sense, the technology is referred to as “blockchain”, whereas, if the term is used in the latter broad sense, the technology is referred to as “blockchain technologies”.

The blockchain technologies have many advantages such as zero down time, difficulty of manipulation, and low cost. Thus, the blockchain technologies have started to attract attention, not only as technologies for virtual currencies including bitcoin and currencies derived therefrom but also as a means for managing, as transactions, information about various assets. For example, non-patent document 1

describes using, for certification of existences and identities of various documents, a blockchain capable of playing an important role of establishing reliability.

As the blockchain technologies, a blockchain technology of a public node type and a blockchain technology of a private node type exist. The public node type is a type in which anyone can participate as a node on a network. Meanwhile, the private node type is a type in which only permitted persons can participate as nodes on a network.

Ans.3

<In Case of Occurrence of Reverse Fire>

When reverse fire R comes in from the burner element 15, the burner 100 is such that, as shown in FIG. 3(B), the thermally expandable member 22 thermally expands toward the inner circumference side owing to heat of the reverse fire R, to be formed as a thermally expanded member 222 of which the opening 22H has been closed.

As a result, since the opening 22H of the thermally expanded member 222(22) is closed, the heat of the reverse fire R and the ultraviolet light L emitted from the flame F generated by the burner element 15 are less likely to reach the flame detection sensor 23.

In the present embodiment, a control unit (not shown) is configured as follows, for example. That is, if the flame detection sensor 23 detects the ultraviolet light L, the control unit (not shown) determines that the burner 100 is normally performing burning. Meanwhile, if the amount of the ultraviolet light L detected by the flame detection sensor 23 takes a value (inclusive of zero) that is equal to or smaller than a preset threshold value, the control unit (not shown) determines that reverse fire or misfire has occurred.

As a result, if misfire occurs in the burner 100 and ultraviolet light L is not emitted, or if, as shown in FIG. 3(B), the thermally expandable member 22 thermally expands and the flame detection sensor 23 becomes unable to detect the ultraviolet light L or the amount of the detected ultraviolet light L is equal to or smaller than the threshold value, the control unit (not shown) determines that misfire or reverse fire has occurred in the burner 100.