

受験番号 : 32IPE015

Claim 1.

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

a measurement position estimation unit configured to estimate a right end position of a lung, a left end position of the lung, a right end position of a heart, and a left end position of the heart in the chest X-ray image; and

a cardiothoracic ratio calculation unit configured to calculate a cardiothoracic ratio based on the right end position of the lung, the left end position of the lung, right end position of the heart, and the left end position of the heart estimated, wherein

the measurement position estimation unit divides the chest X-ray image into a plurality of horizontal regions, detects, based on a pixel value, a candidate of a right end of the lung and a candidate of a left end of the lung, and detects, based on a differential value of the pixel value in a horizontal direction, a candidate of a right end of the heart and a candidate of a left end of the heart, for each of the horizontal regions, and

the measurement position estimation unit extracts a specific horizontal region based on a distance between a lung midpoint defined by the candidate of the right end of the lung and the candidate of the left end of the lung and a heart midpoint defined by the candidate of the right end of the heart and the candidate of the left end of the heart, or a ratio of the distance to a lung width defined by the candidate of the right end of the lung and the candidate of the left end of the lung, and estimates the candidate of the right end of the lung and the candidate of the left end of the lung, the candidate of the right end of the heart, and the candidate of the left end of the heart in the specific horizontal region, as the right end position of the lung, the left end position of the lung, the right end position of the heart, and the left end position of the heart.

Claim.2

The cardiothoracic ratio calculation device according to claim1, wherein

when the pixel value increases as the X-ray transmittance increases, the measurement position estimation unit detects, as the candidate of the right end of the lung, a position where the pixel value is lowest in a region within a predetermined range from a right end of the horizontal region, and detects, as the candidate of the left end of the lung, a position where the pixel value is lowest in a region within a predetermined range from a left end of the horizontal region

Claim.3

The cardiothoracic ratio calculation device according to claim1 or 2, wherein
the measurement position estimation unit detects, as the candidate of the right end of the heart, a position where the differential value is largest in a negative direction between the candidate of the right end of the lung and the candidate of the left end of the lung in the horizontal region, and detects, as the candidate of the left end of the heart, a position where the differential value is largest in a positive direction between the candidate of the right end of the lung and the candidate of the left end of the lung in the horizontal region

問 2

Conventionally, a technology called Blockchain is known. This technology is a mechanism to synchronize the same record between many nodes on the network, and is called Blockchain because, when a new record is added to an existing record, the block that is the recording unit is added one after another in chains while inheriting the contents (hash) of the immediately preceding block. In general, the term Blockchain may refer to a structure of a database in which blocks are chained together. However, it may also be used in a broad sense including a mechanism operating as a P2P network, a mechanism of transaction approval, or the like. Therefore, the definition of Blockchain is not clear at the present moment. In the specification, in order to prevent confusion between the two concepts, Blockchain is referred to as "Blockchain" when used in the former narrow sense, and is referred to as "Blockchain technology" when used in the latter broad sense. Blockchain technology has many advantages such as zero downtime, difficulty in tampering, and its low cost, so it is also beginning to attract attention as a method of managing, as transactions, information about various assets, in addition to virtual currencies including Bitcoins and its derivatives. For example, Non-Patent Document 1 describes the use of Blockchain, which can play an important role in establishing reliability, as proof of existence or proof of identity of various documents. Blockchain technology mainly has a public node method and a private node method. The public node method is a method in which anyone can participate as a node on the network. On the other hand, the private node method is a method in which only those who are authorized as nodes on the network can participate.

問 3

When flashback occurs

In the burner 100, when flashback R enters from the burner element 15, the heat of the flashback R causes the thermally expandable member 22 to thermally expand toward the inner peripheral side, thereby forming a heat-expandable member 222 with an opening 22H closed. As a result, the opening 22H of the heat-expandable member 222 (22) is closed. This suppresses arrival, to the flame detection sensor 23, of heat of the flashback R and the ultraviolet L emitted by the flame F generated by the burner element 15. In this embodiment, the control unit (not shown) is configured to determine that the burner 100 is operating normally when, for example, the flame detection sensor 23 detects ultraviolet L, and to determine that flashback or misfire has occurred when the amount of ultraviolet L detected by the flame detection sensor 23 is equal to or less than the set threshold value (including zero). As a result, the control unit determines that misfire or flashback has occurred in the burner 100 when the burner 100 misfires and does not emit ultraviolet L, and when the heat-expandable member 22 thermally expands, as shown in FIG. 3 (B), and thus ultraviolet L is not detected by the flame detection sensor 23, or the amount of ultraviolet L detected is equal to or less than a threshold value.