

★★★ <第32回知的財産翻訳検定試験【第17回和文英訳】> ★★★
《 1 級課題 -電気・電子工学- 》

【問 1】

1. A cardiothoracic ratio calculation apparatus for calculating a cardiothoracic ratio, based on a chest X-ray image,

the cardiothoracic ratio calculation apparatus comprising:

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

a cardiothoracic ratio calculation unit configured to calculate a cardiothoracic ratio, based on the estimated lung right-edge position, lung left-edge position, heart right-edge position, and heart left-edge position,

wherein

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

the measurement position estimation unit extracts a specific one of the horizontal regions, based on a distance between a lung midpoint determined from the candidate for the lung right-edge position and the candidate for the lung left-edge position and a heart midpoint determined from the candidate for the heart right-edge position and the candidate for the heart left-edge position or based on a ratio of the distance to a lung width determined from the candidate for the lung right-edge position and the candidate for the lung left-edge position, and estimates the candidate for the lung right-edge position, the candidate for the lung left-edge position, the candidate for the heart right-edge position, and the candidate for the heart left-edge position in the extracted horizontal region to be the lung right-edge position, the lung left-edge position, the heart right-edge position, and the heart left-edge position.

2. The cardiothoracic ratio calculation apparatus according to claim 1, wherein

on condition that a pixel value is larger as X-ray transmittance is higher,

the measurement position estimation unit detects, as the candidate for the lung right-edge position, a position having a minimum pixel value in an area within a predetermined range from a right end of each horizontal region, and

the measurement position estimation unit detects, as the candidate for the lung left-edge position, a position having a minimum pixel value in an area within a predetermined range from a left end of each horizontal region.

3. The cardiothoracic ratio calculation apparatus according to claim 1 or 2, wherein

the measurement position estimation unit detects, as the candidate for the heart right-edge position, a position having a maximum differential value in a negative direction between the candidate for the lung right-edge position and the candidate for the lung left-edge position in each horizontal region, and

the measurement position estimation unit detects, as the candidate for the heart left-edge position, a position having a maximum differential value in a positive direction between the candidate for the lung right-edge position and the candidate for the lung left-edge position in each horizontal region.

【問 2】

A technology called a blockchain has been known. This technology is a mechanism that synchronizes identical records among multiple nodes on a network, and is called a blockchain since blocks as recording units are added one after another in the form of a chain while each block takes the content (hash) of its immediately preceding block in adding a new record to an existing record. In general, the term “blockchain” may refer to a structure of a database including blocks linked in the form of a chain. The term “blockchain” may also be used in a broader sense involving, for example, a mechanism that works as a P2P network and a mechanism for approving transactions. The definition of the term “blockchain” therefore remains unclear at present. To distinguish between the two meanings, hence, the term “blockchain”, as used herein, refers to the former, narrower meaning, while the term “blockchain technology”, as used herein, refers to the latter,

broader meaning.

Blockchain technology has many advantages such as zero downtime, difficulty in falsification, and low cost. Attention is therefore being given to blockchain technology as methods for managing information on various assets as transactions, besides cryptocurrencies including Bitcoin and its derivative currencies. For example, Non-Patent Literature 1 describes that a blockchain which can play an important role in establishing reliability is used for proof of existence of various documents and identity verification.

Blockchain technology includes mainly a public node method and a private node method. The public node method allows anyone to participate as a node on a network, while the private node method allows only an authorized person to participate as a node on a network.

【問 3】

Upon occurrence of backfire

In the burner 100, upon occurrence of the backfire R from the burner element 15, the thermally expansive member 22 thermally expands toward its inner peripheral side in response to the heat of the backfire R to turn into a thermally expansive member 222 with a hole 22H closed as illustrated in FIG. 3(B).

As a result, since the hole 22H in the thermally expansive member 222 (22) is closed, the heat of the backfire R and the ultraviolet light L emitted by the flames F produced by the burner element 15 are less likely to reach the flame detection sensor 23.

In this embodiment, for example, a controller (not illustrated) is configured to determine that the burner 100 operates normally when the flame detection sensor 23 detects the ultraviolet light L, and is configured to determine that a backfire or a misfire has occurred when the amount of the ultraviolet light L detected by the flame detection sensor 23 is not more than a set threshold value (including zero).

As a result, the controller determines that a misfire or a backfire has occurred in the burner 100 when no ultraviolet light L is emitted due to a misfire in the burner 100, when the flame detection sensor 23 no longer detects the ultraviolet light L due to the thermal expansion of the thermally expansive member 22 as illustrated in FIG. 3(B), or when the amount of the detected ultraviolet light L is not more than the threshold value.