United States Patent [19]

Arnold et al.

[11] **Patent Number: 4,922,915**

[45] **Date of Patent: May 8, 1990**

[54] **AUTOMATED IMAGE DETAIL LOCALIZATION METHOD**

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[21] Appl. No.: **406,836**

[22] Filed: **Sep. 13, 1989**

Related U.S. Application Data

[63] Continuation of Ser. No. 126,631, Nov. 27, 1989, abandoned, which is a continuation-in-part of Ser. No. 48,004, May 11, 1987, abandoned, which is a continuation-in-part of Ser. No. 47,415, May 6, 1987, abandoned.

[51] **Int. Cl.**[5] **A61B 6/00**

[52] **U.S. Cl.** ..... **128/653 R;** 382/6; 382/18; 378/18

[58] **Field of Search** 128/653, 659; 378/18, 378/901; 364/413.13–413.14; 382/6, 18, 48, 61

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[57] **ABSTRACT**

An automated image detail localization system for digital image systems, such as CT, MRI, digital radiograph, includes a calibration phantom having plural reference samples of materials having known, fixed imaging properties. The phantom is positioned with respect to a patient and scanned simultaneously to produce an image that includes a cross-section of the patient and a cross-section of the phantom. The cross-sectional image of the phantom includes cross-sectional images of the reference samples. The system automatically finds the phantom and the centers of the reference sample images and then positions regions of interest (ROIs) within the reference sample images to define the portions of the images that are included in a step of averaging the intensities of the reference sample images. The system further automatically places an ROI of regular (e.g., elliptical) or irregular shape in a specific region of the image of the patient's anatomy, such as the trabecular bone region of the patient's spine. The system automatically performs a histogram analysis of the tissue within an ROI to exclude tissue components that are undesirable in the calculation of tissue density. By using the phantom in combination with the histogram analysis, component tissues that cannot be readily separated spatially can be isolated by density or signal intensity and thus quantified in an automated manner. Small or irregularly-shaped tissues, such as lung nodules, can be accurately quantified without requiring precise placement of an ROI in the tissue image.

25 Claims, 26 Drawing Sheets