ACTIVE CONTOUR-BASED BORDER DETECTION AND 3D FLOW PATTERN VISUALIZATION IN FAST PHASE-CONTRAST MAGNETIC RESONANCE IMAGI

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ABSTRACT

THIS THESIS PRESENTS A MODEL FOR BORDER DETECTION AND 3D FLOW PATTERN RECONSTRUCTION OF PORTAL VEINS. FIRST, BORDERS WERE DETECTED BY PERIODIC CUBIC SPLINE AND SNAKE ALGORITHM OF PORTAL VEIN FROM THE MAGNETIC RESONANCE IMAGING (MRI). THEN, A 2D IMAGE FROM Z DIRECTION AND 3D IMAGES FORM X, Y, Z DIRECTION WERE SEPARATELY USED TO RECONSTRUCT 3D FLOW OF PORTAL VEINS. THE TECHNIQUE OF DATA VISUALIZATION IS USED TO DISPLAY 3D PORTAL VEIN BLOOD FLOW PATTERN, WHICH PROVIDES DOCTORS INFORMATION OF 3D FLOWING SPEED OF PORTAL VEIN. THE BORDER DETECTION CONSISTS TWO METHODS: 1. THE PERIODIC CUBIC SPLINE FOR MANUAL OPERATION, 2. THE SNAKE ALGORITHM FOR SEMI-AUTOMATICOPERATION. EXPERIMENTAL RESULTS SHOW THAT THE BOR -DERS GENERATED BY SNAKE ALGORITHM ARE 13.5% DIFFERENT FROM THE GOLDEN STANDARD BORDER MANUALLY GENERATED BY PERIODIC CUBIC SPLINE IN AVERAGE. TWO METHODS ARE PROVIDED TO PRESENT THE DIRECTION OF BLOOD FLOW; 1.THE FIRST 25% INTENSITY BLOOD PRESENTS BLOOD FLOW IN THE Z DIRECTION, AND 2.THE IMAGE OF PORTAL VEIN FROM X, Y, Z DIRECTION. PRELIMINARY RESULTS SHOW THAT BOTH METH -ODS CAN ILLUSTRATE THE DIRECTION OF THE BLOOD FLOW OF PORTAL VAIN; HOW EVER THE PERFOR -MANCE OF VISUALIZATION IS NEEDED TO BE FUTURE VERIFIED BY OTHER TECHNIQUES.

Keywords : MAGNETIC RESONANCE IMAGING, DATA VISUALIZATION, PERIODIC CUBIC SPLINE, SNAKE ALGORITHM;

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