DATA VISUALIZATION OF PORTAL VEIN FLOW PATTERNS IN FAST PHASE-CONTRAST MAGNETIC RESONANCE IMAGING

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ABSTRACT

LIVER DISEASES OFTEN CAUSE HIGH BLOOD PRESSURE OF THE PORTAL VEIN, WHICH PREVENTS THE TOXIN AND NUTRITION FROM ENTERING THE LIVER, AND THE PORTAL VEIN IS A MAJOR INDEX TO EVALUATE THE FUNCTION OF THE LIVER. MAGNETIC RESONANCE IMAGING (MRI) IS ONE OF THE MOST POWERFUL RADIOLOGICAL TOOLS FOR DIAGNOSIS. IT HAS HIGH RESOLUTION AND THE CAPACITY OF MEASURING BLOOD FLOW, WHICH IS NONINVASIVE AND GENERATES CLEAR IMAGES. IN THIS THESIS, PRINCIPAL COMPONENT TRANSFORM (PCT) METHOD IS USED TO ENHANCE THE IMAGE BY INTEGRATING PORTAL VEIN OF MR PHASE IMAGE AND PORTAL VEIN OF MR MAGNITUDE IMAGE. PERIODIC CUBIC SPLINE IS USED TO DEFINE PORTAL VEIN BORDER FROM THE ENHANCED IMAGE. IN ADDITION TO THE BORDER OF PORTAL VEIN, THE LOCATION OF HIGH BLOOD FLOW AREA WITHIN THE PORTAL VEIN IS CALCULATED FROM 2D MR IMAGE AS THE PRE-PROCESSOR OF THE 3D DISPLAY OF THE BLOOD FLOW PATTERN WITHIN THE PORTAL VEIN. THE TECHNIQUE OF DATA VISUALIZATION IS USED TO DISPLAY 3D PORTAL VEIN BLOOD FLOW PATTERN. PRELIMINARY EXPERIMENTAL RESULTS SHOW THE BLOOD IN PORTAL VEIN FLOWS IN A HELIX FROM INSTEAD OF A SIMPLE STRAIGHT LINE, WHICH PROVIDE THE ESSENTIAL INFORMATION FOR MEDICAL DOCTORS FOR FURTHER RESEARCH OR DIAGNOSIS.

Keywords : MAGNETIC RESONANCE IMAGING, PRINCIPAL COMPONENT TRANSFORM, PERIODIC CUBIC SPLINE, DATA VISUALIZATION

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