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Cancerous Tissue Detection Using Dynamic Contrast-Enhanced MRI Data for Prostate Region

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Prostate cancer is one of the leading causes of cancer death worldwide. Among males, prostate cancer has the second highest incidence rate after lung cancer. Although death rates have been decreasing in some countries, it remains a considerable disease affecting many patients and early diagnosis and treatment are critical. Preliminary identification of cancer involves biopsy PSA protein screening, elevated levels of which indicate an increased likelihood of prostate cancer. Unfortunately, such testing is invasive and prone to false-negative and false-positive results, so a less invasive and more reliable procedure is needed. Currently, evaluation is done using different types of imaging, each having own acquisition methods and purpose, and the final diagnosis is formulated based on all of them in conjunction. Dynamic contrast-enhanced (DCE) images, one of such imaging types, is unique in a way that it shows the flow of a contrast medium injected into patient's bloodstream over time highlighting tissues that have higher vascular density, for instance, cancerous growth. This work is dedicated to investigating the usage of DCE imaging to detect malignant tissues by constructing time-signal intensity curves showing stepwise changes in enhancement over time in different prostate regions.