Local Binary Pattern based Features for Prostate Cancer Detection

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Prostate cancer is one of the most common cancers in males and one of the significant causes of cancer mortality. Most prostate malignancies are presently diagnosed based on an increased PSA level, despite this biomarker having only limited accuracy. Prostate cancer differs from most other cancers because it is frequently multifocal and does not appear as a single spherical mass. The illness progresses at different rates, and it is frequently asymptomatic until it has gone to late stages. Multi-parametric MRI (mpMRI) has advanced dramatically in the last 20 years, as has the treatment of localised prostate cancer. As a result, this research aims to develop an algorithm to identify features based on the Local Binary Pattern (LBP) based histogram and Grey Level Run Length Matrix (GLRLM) characteristics of mpMRI images, to improve detection rate and accuracy of prostate cancer diagnosis. Local binary patterns are texture descriptors that have been effectively employed as image descriptors in various applications. Images were gathered from a public image database to complete this work. The operator is applied to the selected region of interest (ROI) to generate the LBP image. Texture pattern probability was summarised into a histogram, and second-order statistics were obtained using the GLRLM operator. The statistical significance of the eleven characteristics was determined using an independent two-sample t-test using four features from the histogram and seven features from the GLRLM operator. The suggested approach yielded three favourable outcomes in the research, which can be utilised to identify malignant tumours from benign tumours. The positive results include the first-order statistics standard deviation and kurtosis and the second-order statistic Run Length Non-uniformity (RLN).

Keywords: prostate cancer diagnosis, LBP, GLRLM