

A Decision Support System to Detect the Lumbar Disc Disease on the Basis of Clinical MRI

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Abstract : In this study, a decision support system comprising three stages has been proposed to detect the disc abnormalities of the lumbar region. In the first stage named the feature extraction, T2-weighted sagittal and axial Magnetic Resonance Images (MRI) were taken from 55 people and then 27 appearance and shape features were acquired from both sagittal and transverse images. In the second stage named the feature weighting process, k-means clustering based feature weighting (KMCFW) proposed by Gunes et al. Finally, in the third stage named the classification process, the classifier algorithms including multi-layer perceptron (MLP- neural network), support vector machine (SVM), Naïve Bayes, and decision tree have been used to classify whether the subject has lumbar disc or not. In order to test the performance of the proposed method, the classification accuracy (%), sensitivity, specificity, precision, recall, f-measure, kappa value, and computation times have been used. The best hybrid model is the combination of k-means clustering based feature weighting and decision tree in the detecting of lumbar disc disease based on both sagittal and axial MR images.

Keywords : lumbar disc abnormality, lumbar MRI, lumbar spine, hybrid models, hybrid features, k-means clustering based feature weighting

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020