

Trabecular Bone Radiograph Characterization Using Fractal, Multifractal Analysis and SVM Classifier

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Abstract : Osteoporosis is a common disease characterized by low bone mass and deterioration of micro-architectural bone tissue, which provokes an increased risk of fracture. This work treats the texture characterization of trabecular bone radiographs. The aim was to analyze according to clinical research a group of 174 subjects: 87 osteoporotic patients (OP) with various bone fracture types and 87 control cases (CC). To characterize osteoporosis, Fractal and MultiFractal (MF) methods were applied to images for features (attributes) extraction. In order to improve the results, a new method of MF spectrum based on the q-structure function calculation was proposed and a combination of Fractal and MF attributes was used. The Support Vector Machines (SVM) was applied as a classifier to distinguish between OP patients and CC subjects. The features fusion (fractal and MF) allowed a good discrimination between the two groups with an accuracy rate of 96.22%.

Keywords : fractal, micro-architecture analysis, multifractal, osteoporosis, SVM

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