ABSTRACT

There are various ways to detect osteoporosis disease (bone loss). One of them is by observing the osteoporosis image through rontgen picture or X-ray. Then, it is analyzed manually by Rheumatology experts. Article present the creation of a system which could detect osteoporosis disease on human, by implementing the Rheumatology principles. The main areas identified were between wrist and hand fingers. The working system in this software included 3 important processing, which were process of basic image processing, pixel reduction process, pixel reduction, and artificial neural networks. Initially, the color of digital X-ray image (30 x 30 pixels) was converted from RGB to grayscale. Then, it was threshold and its gray level value was taken. These values then were normalized to an interval [0.1, 0.9], then reduced using a PCA (Principal Component Analysis) method. The results were used as input on the process of Backpropagation artificial neural networks to detect the disease analysis of X-ray being inputted. It can be concluded that from the testing result, with a learning rate of 0.7 and momentum of 0.4, this system had a success rate of 73 to 100 percent for the non-learning data testing, and 100 percent for learning data.

Keywords: osteoporosis, image processing, PCA, artificial neural networks

ABSTRAK

Ada berbagai cara untuk mendeteksi penyakit osteoporosis (pengeroposan tulang), salah satunya adalah dengan melihat gambaran osteoporosis melalui foto rontgen atau X-ray. Kemudian, dianalisis secara manual oleh pakar Rheumatologi. Artikel menunjukkan pengembangan suatu sistem yang dapat mendeteksi penyakit osteoporosis pada manusia dengan menerapkan prinsip Rheumatologi. Daerah utama yang diidentifikasi adalah antara pergelangan tangan hingga jari tangan. Sistem kerja di dalam perangkat lunak ini meliputi 3 pemrosesan penting, yaitu proses pengolahan citra dasar, proses reduksi piksel, dan proses jaringan syaraf tiruan. Awalnya, citra X-ray digital (30 x 30 piksel) dilakukan pengkonversian warna dari RGB ke grayscale. Kemudian, di-thresholding dan diambil nilai gray level-nya. Nilai-nilai tersebut selanjutnya dinormalisasi ke interval [0.1, 0.9], lalu direduksi menggunakan metode PCA (Principal Component Analysis). Hasilnya dijadikan input pada proses jaringan syaraf tiruan Backpropagation untuk mengetahui analisis penyakit dari X-ray yang dimasukkan. Disimpulkan dari hasil pengujian dengan learning rate sebesar 0.7 dan momentum sebesar 0.4, sistem ini memiliki tingkat keberhasilan 73 hingga 100 persen untuk uji data non-learning, dan 100 persen untuk data learning.

Kata kunci: osteoporosis, pengolahan citra, PCA, jaringan syaraf tiruan