DETEKSI CT PENYAKIT GINJAL DENGAN EKSTRAKSI FITUR GLCM DAN MENGGUNAKAN METODE KLASIFIKASI *KERNEL EXTREME LEARNING MACHINE* (KELM)

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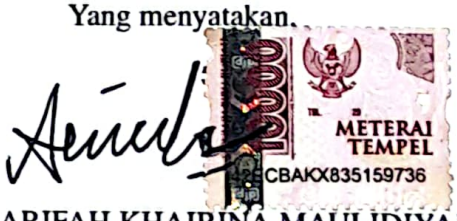

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ABSTRAK

DETEKSI CT PENYAKIT GINJAL DENGAN EKSTRAKSI FITUR GLCM DAN MENGGUNAKAN METODE KLASIFIKASI *KERNEL EXTREME LEARNING MACHINE* (KELM)

Penyakit ginjal adalah kondisi atau gangguan yang terjadi pada organ ginjal sehingga mempengaruhi fungsi ginjal. Gangguan pada organ ginjal yang umum terjadi antara lain, kista ginjal, tumor ginjal, dan batu ginjal. Penyakit ini dapat mempengaruhi fungsi ginjal jika tidak ditangani dan jika semakin parah dapat menyebabkan penyakit ginjal kronis dan dapat menyebabkan kematian. Oleh karena itu, penelitian ini bertujuan untuk mengklasifikasikan penyakit ginjal dengan menerapkan *Gray Level Co-occurrence Matrix* (GLCM) sebagai ekstraksi fitur dan *Kernel Extreme Learning Machine* (KELM) sebagai metode klasifikasi berdasarkan citra CT ginjal. Pada penelitian ini proses klasifikasi dibagi kedalam empat kelas yaitu Cyst, Normal, Stone, dan Tumor yang merupakan data citra CT-Radiography dalam bentuk perpotongan axial dan coronal, dan diperoleh dari website Kaggle. Data yang digunakan sebesar 4232 data citra, pada tiap kelasnya berjumlah 1058 yang terdiri dari masing-masing citra axial dan coronal berjumlah sebesar 529 data. Tahapan proses klasifikasi akan dibagi data secara acak dengan menggunakan teknik k-fold cross validation dimana menggnakan nilai k=5 dan k=10 dan menggunakan fungsi kernel Radial Basis Function (RBF). Berdasarkan beberapa uji coba yang telah dilakukan berdasarkan pembagian data dan parameter yang digunakan pada KELM seperti, σ dan nilai C maka diperoleh model yang optimal yaitu pada sudut 90° dengan persentase nilai akurasi, sensitifitas, dan spesitifitas berturut-turut sebesar 98.35%, 98.34%, dan 99.44% dan membutuhkan waktu training (*runtime*) selama 15.91 detik, pada pembagian data dengan nilai k = 10, σ sebesar 10^{-2} dan nilai C adalah 10^{4}.

Kata kunci: Penyakit Ginjal, *Gray Level Co-occurrence Matrix* (GLCM), *Kernel Extreme Learning Machine* (KELM), *Radial Basis Function* (RBF)

ABSTRACT

DETECTION OF CT KIDNEY DISEASE USING GLCM FEATURE EXTRACTION AND KERNEL EXTREME LEARNING MACHINE (KELM) CLASSIFICATION METHOD

Kidney disease is a condition or disorder that occurs in the kidney organs, affecting kidney function. Common disorders of the kidney organs include kidney cysts, kidney tumors and kidney stones. This disease can affect kidney function if left untreated, and if it gets worse it can causes chronic kidney disease and can cause death. Therefore, this study aims to classify kidney disease by applying Gray Level Co-occurrence Matrix (GLCM) as extraction features and Kernel Extreme Learning Machine (KELM) as a classification method based on renal CT images. In this research the classification process is divided into four classes, namely Cyst, Normal, Stone, and Tumor which are image data CT-Radiography in the form of axial and coronal intersections, and obtained from Kaggle website. The data used is 4232 image data, in each class totaling 1058 consisting of each number of axial and coronal images amounting to 529 data. The stages of the classification process will divide the data randomly using the k-fold cross validation technique which uses the value k=5 and k=10 and uses the kernel function Radial Basis Function (RBF). Based on several trial and error have been carried out based on data and parameter in KELM such as σ and C values, the optimal model is obtained, namely at an angle of 90 degrees with the percentage of accuracy, sensitivity and specificity values respectively is 98.35%, 98.34%, and 99.44% and requires training time (runtime) of 15.91 seconds, when dividing the data with a value of k = 10, σ is 10^{-2} and the value of C is 10^{4}.

Keywords: Kidney Disease, Gray Level Co-occurrence Matrix (GLCM), Kernel Extreme Learning Machine (KELM), Radial Basis Function (RBF).

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