ABSTRAK

Nama	:	TSANIA NURHAYATI KARUNIA DEWI
Program Studi	:	Fisika
Judul	:	Klasifikasi Stadium Kanker Ginjal Jenis *Clear Cell Renal Cell Carcinoma* (ccRCC) pada Citra CT Scan dengan Pendekatan Fitur Radiomics

Menurut data *Global Burden of Cancer* (GLOBOCAN) 2018, kanker ginjal termasuk kasus kanker yang menyebabkan 9,6 juta kematian di 185 negara. *Clear cell renal cell carcinoma* (ccRCC) merupakan jenis kanker RCC yang paling umum terjadi. Penentuan stadium kanker ccRCC yang akurat penting untuk menentukan prognosis dan merumuskan pengobatan yang efektif. Penentuan stadium klinis (pra operasi) memiliki keterbatasan dalam mengidentifikasi kanker berukuran kecil, serta identifikasi metastasis getah bening dan organ lain. Pendekatan radiomics diusulkan untuk dapat menentukan stadium ccRCC pra operasi secara non invasif berdasarkan fitur-fitur informatif yang diekstrak pada citra CT Scan. Sebanyak 237 citra CT ccRCC bersumber dari repositori *the cancer imaging archive* (TCIA) dan dataset stadium patologis dari portal *genomic data commons* (GDC) digunakan. Proses penelitian terdiri dari: seleksi pasien, segmentasi *mask* kanker, ekstraksi dan seleksi fitur, serta klasifikasi. 56 fitur radiomics diekstrak dari ROI citra yang dibatasi oleh *mask*. 33 fitur radiomics yang relevan terhadap label stadium terseleksi dan digunakan untuk proses pelatihan sistem dengan *Support Vector Machine* dan *Random Forest*. Akurasi, sensitifitas, dan spesifitas dari sistem klasifikasi SVM berturut-turut 90%, 90%, dan 96,67%. Sedangkan untuk RF berturut-turut 80%, 80%, dan 93,33%. Kurva ROC untuk sistem SVM dan RF berada di atas garis diagonal prediksi acak. Serta nilai AUC antara sistem SVM dan RF secara berturut-turut 0,954 dan 0,957.

Kata Kunci: CT Scan, Citra CT, Kanker Ginjal ccRCC, Stadium ccRCC, Segmentasi, Fitur Radiomics, Sistem Klasifikasi.

ABSTRACT

Name	:	TSANIA NURHAYATI KARUNIA DEWI
Studies Program	:	Physics
Title	:	Kidney Cancer Stage Classification of Clear Cell Renal Cell Carcinoma (ccRCC) on CT Scan Image using Radiomics Feature Approach

According to *Global Burden of Cancer* data 2018, kidney cancer is one of the cancer cases that causes 9,6 million deaths in 185 countries. *Clear cell renal cell carcinoma* (ccRCC) is the most common type of RCC cancer. Accurate staging of ccRCC is important for determining prognosis and formulating effective treatment. Clinical staging (preoperative) has limitations in determining the detection of small size cancer, as well as knowing the metastases of lymph and other organs. A radiomics approach is proposed to be able to non-invasively determine prreoperative ccRCC staging based on informative features extracted from CT scan images. A total of 237 CT ccRCC images sourced from the *The cancer imaging archive* (TCIA) repository and the stadium dataset from the *Genomic Data Commons* (GDC) portal were used. The research process consists of: patient selection, cancer *mask* segmentation, feature extraction and selection, and classification. 56 radiomics features were extracted from the ROI image bounded by the *mask*. 33 radiomics features relevant to stadium labels were selected and used for system training by using *Support Vector Machine* and *Random Forest*. The accuracy, sensitivity, and specificity of the SVM classification system were 90%, 90%, and 96,67%, respectively. As for RF, respectively 80%, 80%, and 93,33%. The ROC curves for SVM and RF systems are above the random diagonal prediction line. And the AUC values between SVM and RF systems are 0,954 and 0,957, respectively.

Keywords: CT Scan, CT Image, ccRCC Kidney Cancer, ccRCC Stage, Segmentation, Radiomics Features, Classification System.