

ABSTRAK

Nama : SITI SALAMAH
Program Studi : Fisika
Judul : Klasifikasi Tingkat Keparahan Retinopati Diabetik Berdasarkan Ekstraksi Fitur Citra Fundus Retina Menggunakan *Gray Level Co-occurrence Matrix (GLCM)*

Retinopati diabetik adalah penyakit yang menyerang bagian retina dan menyebabkan kebutaan utama secara global akibat komplikasi dari diabetes melitus. Sebanyak 285 juta orang dengan diabetes melitus di seluruh dunia, sepertiga dari jumlah tersebut memiliki tanda-tanda retinopati diabetik dan mengancam penglihatan. Penentuan tingkat keparahan dari retinopati diabetik yang akurat sangat penting untuk menentukan prognosis dan pengobatan yang efektif. Penentuan tingkat keparahan dari retinopati diabetik secara manual oleh dokter memiliki keterbatasan karena karakteristik dari retinopati diabetik sendiri sulit dibedakan secara langsung. Pemilihan fitur tekstur menggunakan *Gray Level Co-occurrence Matrix (GLCM)* diusulkan untuk dapat menentukan tingkat keparahan dari retinopati diabetik berdasarkan fitur-fitur yang diekstrak pada citra fundus retina. Sebanyak 364 citra fundus retina bersumber dari repositori *Indian Diabetic Retinopathy Image Dataset (IDRiD)* digunakan. Proses penelitian terdiri dari segmentasi, ekstraksi fitur, dan klasifikasi. Sebanyak tiga belas fitur GLCM yang berhasil diekstrak digunakan untuk proses pelatihan sistem dengan *Support Vector Machine (SVM)* dan *Random Forest (RF)*. Akurasi, sensitivitas, dan spesifitas dari sistem klasifikasi SVM berturut-turut 95.43%, 91.27%, dan 96.90%, Sedangkan untuk RF berturut-turut 94.20%, 86.73%, dan 96,90%.

Kata Kunci: *Citra Fundus Retina, Ekstraksi Fitur GLCM, Kamera Fundus, Retinopati Diabetik, Segmentasi, Sistem Klasifikasi*

ABSTRACT

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Title : *Diabetic Retinopathy Severity Level Classification Based on Retinal Fundus Image Feature Extraction Using Gray Level Co-occurrence Matrix (GLCM)*

Diabetic retinopathy is a disease that attacks the retina and is the main cause of blindness globally due to complications of diabetes mellitus. As many as 285 million people with diabetes mellitus worldwide, one third of whom have signs of diabetic retinopathy and are vision threatening. An accurate determination of the severity of diabetic retinopathy is very important for determining the prognosis and effective treatment. Manual determination of the severity of diabetic retinopathy by doctors has limitations because the characteristics of diabetic retinopathy are difficult to distinguish directly. Selection of texture features using Gray Level Co-occurrence Matrix (GLCM) is proposed to be able to determine the severity of diabetic retinopathy based on features extracted on retinal fundus images. A total of 364 retinal fundus images sourced from the Indian Diabetic Retinopathy Image Dataset (IDRiD) repository were used. The research process consists of segmentation, feature extraction, and classification. A total of thirteen GLCM features that were successfully extracted were used for the system training process with Support Vector Machine (SVM) and Random Forest (RF) The accuracy, sensitivity, and specificity of the SVM classification system respectively 95.43% , 91.27%, and 96.90%, while for RF it is 94.20%, 86.73%, and 96.90%.

Keywords: Retina Fundus Image, GLCM Feature Extraction, Fundus Camera, Diabetic Retinopathy, Segmentation, Classification System