Segmentasi Kelenjar Meibom Pada Penyakit Mata Kering Menggunakan Metode SegNet = Meibomian Gland Segmentation on Dry Eye Disease Using SegNet Method

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Abstrak

Mata merupakan salah satu panca indra dan menjadi aset terpenting yang dimiliki oleh manusia dalam menjalani kehidupan sehari hari. Salah satu bagian terpenting dari mata adalah bagian kelopak karena terdapat sebuah kelenjar yaitu kelenjar meibom yang berfungsi untuk menyekresikan lipid dan berperan dalam menjaga kelembaban bola mata. Sehingga, permasalahan yang terjadi pada kelenjar meibom dapat menyebabkan suatu pernyakit yang disebut penyakit mata kering. Dikarenakan proses diagnosis yang dilakukan oleh dokter masih terbilang subjektif, disini penulis mengusulkan untuk menggunakan pendekatan deep learning untuk melakukan segmentasi pada citra kelenjar meibom atau citra meibography. Segmentasi dilakukan dengan membagi area kedalam 3 segmen (latar, kelenjar meibom, dan atrophy) yang diharapkan dapat membantu proses diagnosis tersebut. Metode deep learning yang digunakan dalam segmentasi ini adalah Metode SegNet yang merupakan salah satu model Convolutional Neural Network (CNN). Data yang digunakan pada penelitian ini merupakan data sekunder yang berasal dari 35 pasien penyakit mata kering di Rumah Sakit Ciptomangunkusumo (RSCM) Departemen Kirana dengan total 139 data citra yang terbagi atas 35 citra kelopak mata pada masingmasing bagian kanan atas, kanan bawah, dan kiri bawah. Sedangkan 34 citra kelopak mata bagian kiri atas. Pada tahap persiapan data, dilakukan pembuatan ground truth dengan proses anotasi. Pada tahap pre-processing, dilakukan resize citra menjadi ukuran 224 x 224 yang kemudian data dibagi menjadi 80% data training dan 20% data testing. Dari 80% data training, diambil 10% untuk dijadikan data validation yang kemudian kedua data training dan validation diterapkan teknik augmentasi yaitu rotation dan flip horizontal agar dataset yang digunakan dalam proses modelling bisa menjadi lebih banyak. Setelah augmentasi, jumlah data training, validation, dan testing berturut-turut menjadi 300, 33, dan 28 data. Kemudian dilakukan stacking pada citra asli dan one hot encoding pada ground truth. Training model dilakukan menggunakan model SegNet dengan hyerparameter model yaitu batch size 32, learning rate 0.0001, dan epoch sebanyak 300. Model juga diterapkan fungsi optimasi yaitu Adam (Adaptive moment estimation) dan fungsi loss categorical cross entropy. Proses modelling dilakukan sebanyak 10 kali percobaan dan berhasil memperoleh nilai rata-rata kinerja training model sebesar 99,31% dan 92,01% pada akurasi training dan akurasi validation-nya, diperoleh nilai 27,45% dan 44,33% pada loss training dan loss validation. Sedangkan rata-rata kinerja testing model berhasil memperoleh akurasi testing sebesar 92,99%, testing loss sebesar 0,4265 dan Mean-IoU sebesar 70,03%.

.....Eyes is one of the five senses that play a role to see a things, eyes also one of the most important asset that humans have. One of the most important parts of the eye is the eyelids, because there is a gland, called meibomian gland. Meibomian gland has a function to secrete the lipids and plays a role at keeping our eyes moist. So therefore. The problems that may occur at meibomian gland can cause a disease called dry eye disease. Because a diagnosis process that performed by doctors is still fairly subjective, right now the writer propose to use deep learning approach by segmenting meibomian gland images. Segmentation is done by dividing the area itu 3 segments (background, meibomian gland, and atrophy) which is expected to help the

diagnosis process. The deep learning method used in this segmentation is the Segnet method, which is one of the Convolutional Neural Network (CNN) models. The data used in this study were the secondary data derived from 35 dry eye patients at Ciptomangunkusumo Hospital, Kirana Department with a total of 139 images data divided into 35 eyelid images on each of the upper right, lower right, and lower left. And 34 images of the upper left eyelid. During the data preparation, a ground truth was made by the annotation process which the marking area of segmentation was given directly by the relevant opthalmologists. At the pre-processing, the images and ground truths were resize to a size of 224 x 224, then divided into 80% training data and 20% testing data. From 80% of the training data, 10% is taken to used as validation data. Then both training data and validation are applied augmentation techniques, namely rotation and horizontal flip so that the dataset used in the modeling process can become more numerous. After the augmentation, the number of data for training, validation, and testing respectively become 300, 33, and 28 data. Then, images data were applied a stacking and ground truth were applied an one hot encoding. Model training was carried out by using SegNet model with hyperparameter models were batch size of 32, learning rate of 0.0001, and epoch of 300. The model also applied an optimization function, named Adam (Adaptive moment estimation) and also applied loss function called categorical cross entropy. The modelling was done by 10 times trial and the training process succeeded reach the average performance value of 99,31% and 92,01% in training and validation accuracy, reach the average performace value of 27,45% and 44,33 % in loss training and loss validation. Meanwhile the testing process succeeded reach the average performace value of 92,99% in testing accuracy, 0,4265 in testing los, and Mean-IoU of 70,03%.