Plagiarism Detector .net

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Plagiarism Scan Report

Characters:4416	Words:725
Sentences:32	Speak Time: 6 Min

Excluded URL	None

Content Checked for Plagiarism

Table 2: Results of each edge detection method in detecting the presence or absence of objects Prewitt Roberts Canny Sobel Sharp Metric\filter 90.28 90.15 87.15 90.05 89.01 Precision 90.28 89.84 86.30 89.92 88.09 Recall 90.15 89.8 86.27 89.90 88.05 Accuracy 0.9956 0.9952 0.9918 0.9954 0.9936 ROC AUC 1 2 4 3 5 Rank Table 3: Average results in detecting the types of surgical tools present in the image Prewitt Roberts Canny Sobel Sharp Metric\filter 46.26 43.78 48.43 43.94 54.30 Precision 47.57 30.55 38.06 44.07 59.76 Recall 47.57 30.55 38.06 44.07 59.76 Accuracy 3 5 2 4 1 Rank Figure 3: ROC curve for detecting surgical tools using different edge detection filters The following results of the proposed method are presented based on the detection of surgical tool types. The results in this section are based on multi-class classification. Table 3 presents the average results for detecting surgical tools for each of the methods. In this case, the Sharp method showed better performance compared to other methods. Figures 4 to 8 show ROC curves for the Sharp, Sobel, Canny, Roberts, and Prewitt filters, respectively. A higher area under the ROC curve indicates better performance. Figure 4: ROC curve for detecting the type of surgical instrument using the Sharp filter Figure 5: ROC curve for detecting the type of surgical instrument using the Sobel filter Figure 6: ROC curve for detecting the type of surgical instrument using the Canny filter Figure 7: ROC curve for detecting the type of surgical instrument using the Roberts filter Figure 8: ROC curve for detecting the type of surgical instrument using the Prewitt filter For a better understanding of the AUC value for each class of images and the filter used in Table 4, the results related to the AUC of filters for each class are provided. In the row and column labeled "average" in Table 4, the average results for each class (average by column) and the average results for each filter (average by row) are presented. 5. Results and Discussion This paper focuses on the detection of surgical tools and their types using various edge detection filters combined with the model proposed in [16]. Therefore, the idea and innovation of the proposed method lie in utilizing edge detection filters to enhance important features and eliminate irrelevant information from the image. This helps the proposed method to detect tools more efficiently. Based on Table 2 and Figure 3, the proposed method using different edge detection filters was able to accurately detect the presence or absence of surgical tools in the image. Among the edge detection filters, the Prewitt filter showed better performance in detecting the presence of surgical tools in the image compared to other

filters. Following the Prewitt filter, the Roberts, Sobel, Canny, and Sharp filters were ranked accordingly. According to Table 3 and Figures 4 to 8, which represent the results for detecting the type of surgical tools, the results show relatively good performance. Among them, the Sharp method demonstrated better performance in detecting the type of surgical instrument compared to other filters. Following the Sharp filters, the Canny, Prewitt, Sobel, and Roberts filters were placed in subsequent positions. An interesting point is that in detecting the presence or absence of tools in the image, the Sharp method had the worst performance, and the Prewitt method, which initially Table 4: AUC value for each tool based on the filter used Rank Average Clipper Scissor Hook Grasper Filter\Class 3 0.807 0.61 0.82 0.85 0.95 Sharp 4 0.775 0.89 0.58 0.79 0.85 Sobel 1 0.945 0.87 1 1 0.91 Canny 2 0.937 0.90 0.93 1 0.92 Robert 5 0.465 0.31 Nan (=0) 0.82 0.75 Prewitt 0.726 0.667 0.892 0.876 Average 3 4 1 2 Rank detects the presence of tools in the image, is in third place in this case. In general, the results indicate that the use of different filters, depending on the type of information they capture, directly affects performance. Based on the overall results of the two general experiments conducted, it can be said that the Prewitt filter preserves general image information, which can be suitable for image classification, while the Sharp filter provides more detailed information about image details, which can lead to better performance in detecting the type of objects present in the image. This conclusion can be extended to other filters as well.

Sources