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Enhancing Glaucoma Diagnosis with Artificial Intelligence through Comparative Study of Support vector machine algorithm and Gaussian Naive Bayes Algorithm in Retinal Fundus Image Analysis

INTRODUCTION

- AI can improve glaucoma diagnosis by comparing Support Vector Machines and Gaussian Naive Bayes in retinal image analysis.
- Early detection is vital in combating glaucoma, a leading cause of blindness. This study investigates the use of AI to enhance early diagnosis, potentially saving sight and improving quality of life.
- By comparing Support Vector Machine (SVM) and Gaussian Naive Bayes algorithms, this research contributes to the evolution of AI tools tailored for medical applications, particularly in diagnosing glaucoma from retinal images.
- This study applies artificial intelligence to improve glaucoma diagnosis by comparing two machine learning algorithms, Support Vector Machines and Gaussian Naive Bayes, on retinal fundus images.
- The Gaussian Naive Bayes technique uses probabilistic modeling for efficient glaucoma detection, providing a comparative approach to improving diagnostic accuracy.
- The advantage of the Support Vector Machine(SVM) has proven to be faster when compared with the Gaussian Naive Bayes algorithm(GNB).

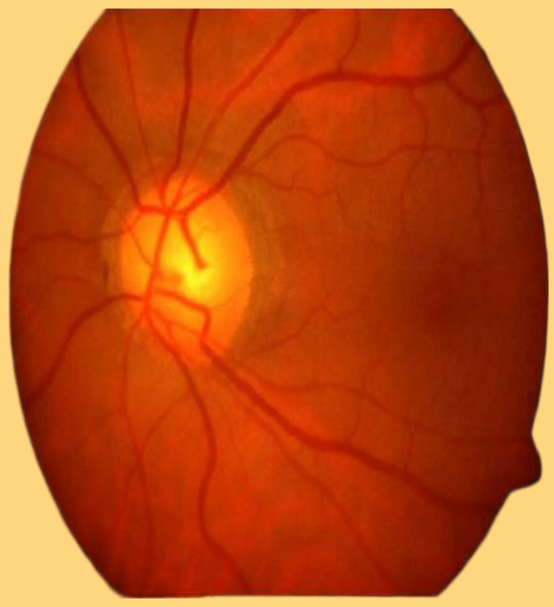

Fig.1 Retinal Image

MATERIALS AND METHODS

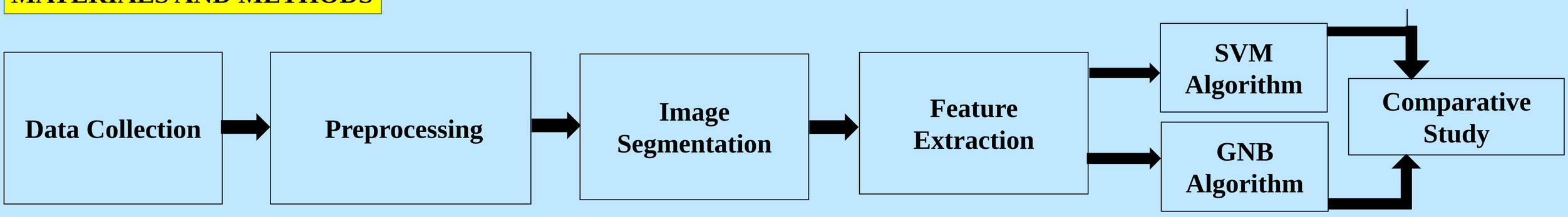

Image Processing Workflow

RESULTS

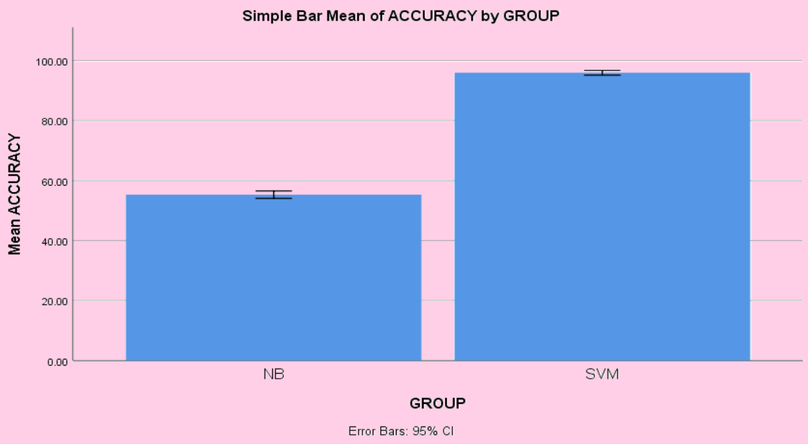

Fig. 2 Bar Graph showing the comparison of the mean accuracy of Glaucoma Detection with SVM and GNB .

Table 1. Statistical computation of independent samples tested among SVM and GNB algorithms

	Group Statistics				
Accuracy	Groups	N	Mean	Std deviation	Std. Error Mean
	SVM	20	95.9500	1.70062	.38027
	GNB	20	55.3000	2.63778	.58983

Table 2: The independent sample t-test has a significant value p=0.001(p<0.05) indicating the study between the SVM and the GNB is statistically significant

	Independent Sample T-Test								
	Levene's Test for Equality of Variances		T-test for Equality of Means						
Accuracy	F	Sig	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	5.673	.022	57.924	38	.000	40.65000	.70178	39.22931	42.07069
Equal variances not assumed			57.924	32.468	.000	40.65000	.70178	39.22132	42.07868

DISCUSSION AND CONCLUSION

- Based on T-test Statistical analysis, the significance value of p=0.001 (independent sample T - test p<0.05) is obtained and shows that there is a statistical significant difference between the group 1 and group 2.
- Overall , the accuracy of the SVM is 97.00% and it is better than Gaussian Naïve Bayes(GNB) which has up to 50.00%.
- The group statics reveal that SVM has mean accuracy of 97 with a standard deviation of 1.70062, whereas GNB has a mean accuracy of 50 with a standard deviation of 2.63778.
- Glaucoma Detection using SVM and Gaussian Naïve Bayes algorithms shows promise for improving accuracy and efficiency. SVM provides speed and simplicity, while Gaussian Naïve Bayes excels at managing complexity. These developments might lead to earlier Glaucoma Detection.
- Furthermore, the development of models adept at learning future dependencies could offer significant benefits across diverse domains, including artificial intelligence. These models could excel in tasks such as detecting and quantifying desolation dependencies.

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