Analysis of Automobile Wheel Counting using Novel adaboosting Algorithm with Accuracy Compared to Logistic Regression Algorithm

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ABSTRACT: Aim: In order to determine the accuracy of a real-time traffic management system, this work compares novel adaboosting and logistic regression methods to forecast the AutoMobile Wheel Movement Counting. **Materials and Methods:** The dataset utilized in this article contains 12 columns or attributes and a total of 10,684 rows. The columns in the dataset are named Car Wheels, Bicycle Wheels, Motorcycle Wheels, and Truck Wheels. The data source link provided a sample size of 1,340 records. A Novel adaboosting algorithm (N=20) and Logistic regression (N=20) iterations are simulated by various parameters and automate vehicle monitoring systems to optimize the pH. The 40 iterations were calculated using CilnCal with G power 80% and CI of 95% . **Results:** Based on obtained results Novel adaboosting Algorithm has significantly better accuracy (84.71%) compared to Logistic regression Algorithm accuracy (80.60%). Statistical significance difference between Novel adaboosting and Logistic regression algorithm was found to be p=0.013 (Independent Sample T Test p<0.05). **Conclusion:** Novel adaboosting algorithms provide better results in Finding Road Traffic counting than Logistic regression algorithms.

Keywords: Artificial Intelligence, Machine Learning, Novel Adaboosting Algorithm, Logistic Regression Algorithm, Automobile, Vehicles Monitoring,Vehicles, Energy Efficiency

INTRODUCTION

AutoMobile wheel counting is widely used to predict vehicle movement using computer vision. By counting, this helps to reduce traffic by determining the energy efficiency of the vehicles in comparison to other processes. In artificial intelligence, vehicle counting is a

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computer vision technique that automates vehicle classification and detection (Oldenziel, Ohnemus, and Saralajew 2020). The goal of this paper is to use a variety of machine learning techniques to identify AutoMobile Wheel Movement and determine which combination is most effective for Traffic Management in terms of energy efficiency and classification. Man-made brainpower strategies are expected to perceive and predict vehicle development (Pavlic et al. 2012). We present several automobile wheel movement counting methods, such as vehicles movement detection in road traffic systems and traffic management, to enhance roadway counting. The accuracy of the seven classifiers is evaluated using two datasets by ML classification techniques like PART, JRip, Support Vector Machine, RT, J48, Random Forest, and K-Nearest Neighbor. Every video's IVMS coefficients, differentials, and speed increases are recovered (Hala, Ba Hala, and Belgorod State National Research University 2020). The irregular woodland calculation and the credulous predisposition calculation, both used in the cybercrime business, were among the vehicles Checking calculations with elite execution (Soryal and Saadawi 2013).

Last seven years, there has been a significant increase in the number of published papers on AutoMobile Movement detection, with more than 100 papers available on IEEE Xplore and Google Scholar. These studies have successfully addressed the issue of build drift in AutoMobile wheel Detection by implementing a learning leaderboard approach to rating the alerts (Mou, Xie et al. 2022). In 2020, Zhu et al. investigated the effectiveness of vehicle recognition algorithms for automatic vehicle detection, where the author used oversampling to balance the vehicle set, resulting in 44% real vehicles and 56% detected vehicles (Broughton et al. 2022; Gupta and Nedjah 2020). The precision score and accuracy of the techniques were evaluated for various variables.

The strengthening of the automobile wheel detection algorithm's energy efficiency with wheel recognition was not properly taken into account in the previous study as decreasing accuracy. The work's objective is to propose an Novel adaboosting wheel detection algorithm to improve CV wheel recognition accuracy.

MATERIALS AND METHODS

The research work is carried out in the Machine Learning Lab at Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai. Two numbers of groups are selected for comparing the process in e-commerce websites and their results. In each group, 20 sets of samples and 40 samples in total are selected for this work.The ClinCalc tool is a free software that is commonly used by researchers for machine learning projects is used to calculate the pre-test power values, with statistical test difference between two independent means, α=0.05, power=0.80, Two algorithms (Novel adaboosting and Logistic regression algorithms) are implemented using Technical Analysis software. In this work, no human and animal samples were used so no ethical approval is required (Dohnal, Hubacek, and Simkova 2019)**.**

In this research, the testing setup utilized a Jupyter Notebook environment, SPSS version 26.0.1, and a laptop with the following configuration: 16 GB RAM, Intel 10th gen i7 processor, and a 2GB graphics card. The dataset used in this study includes videos of multiple vehicles recorded from a camera. The dataset consists of 43,460 training video files, and the research focuses on vehicle counting through camera and computer vision techniques. An ADAB (Adaptive Boosting) approach has been implemented and compared with a SVM (Support Vector Machine) in this study. The dataset has been collected from the Kaggle website which is an freely available platform which has been used by many of the machine learning and the data scientists students for various research purposes. The

present dataset is named Wheel Prediction. The Data source link is: ("Kaggle" 2022). The present Dataset consists of 11 columns (attributes) and 10684 rows.

Novel Adaboosting Algorithm

An Ensemble Method in machine learning is the AdaBoost algorithm, which stands for Adaptive Boosting. Because the weights are re-assigned to each instance, instances that are incorrectly classified receive higher weights, which is why it is referred to as adaptive boosting. In supervised learning, boosting is used to reduce variance and bias. It is based on the idea that students develop sequentially. With the exception of the first, all subsequent learners are the offspring of earlier learners. To put it simply, weak students become strong ones. The AdaBoost algorithm works in a slightly different way than boosting.

Procedure for Novel adaboosting

Step 1: In your introduction, include the pydh and csv bundles, which are necessary for the calculation.

Step 2: The third machine learning step: Verify the frequency of vehicle monitoring before proceeding.

Step 3: creating a test and training set from the dataset.

Step 4: incorporating the necessary AI calculations.

Step 5: determining the number of relevant parameters, such as the F1 score, recall, and accuracy.

Logistic regression algorithm

Logistic regression is used to solve classification problems, and the most common use case is, where the outcome is binary (yes or no). In the real world, you can see logistic regression applied across multiple areas and fields. Logistic regression is one of the most popular Machine Learning algorithms, which comes under the Supervised Learning technique. It is used for predicting the categorical dependent variable using a given set of independent variables. Logistic regression requires that the dependent variable, in this case whether the item was an animal or not, be categorical. The outcome is either animal or not an animal there is no range in between. A problem that has a continuous outcome, such as predicting the grade of a student or the fuel tank range of a car, is not a good candidate to use logistic regression. Other options like linear regression may be more appropriate.

Procedure for Logistic regression algorithm

Step 1: Split the dataset into training and testing sets.

Step 2: Evaluate the performance of the model on unseen data.

Step 3: Choose the appropriate type of logistic regression for your dataset.

Step 4: Use the training data to fit the logistic regression model.

Step 5:Estimating the values of the coefficients that best fit the data using maximum likelihood estimation or another optimization method.

Step 6: Use the testing data to evaluate the performance of the model.

Step 7: This can provide insights into the data and inform future decision-making.

Statistical Analysis

SPSS software is used for statistical analysis of Novel adaboosting and Logistic regression algorithm based methods. The independent variable is accuracy and the dependent variable is loss. The independent sample T test analyses are carried out to calculate the accuracy of the Novel adaboosting for both methods.

RESULTS

The observed result from comparison of ADBA with LR to improve the performance of predicting automatic wheel counting has outperformed and shown a better accurate result in vehicle wheel counting.

Table 1. Group Statistics Results- Novel Novel adaboosting Algorithm and Logistic Regression algorithm for Statistical computation of independent samples tested among ADBA and LR algorithms. The mean accuracy of ADBA is 84.7190 and LR is 80.6740.

	Algorithm	**N**	**Mean**	**Std.Deviation**	**Std.Error Mean**
Accuracy	ADAB	20	84.7190	0.09780	0.03093
	LR	20	80.6740	0.13293	0.04204

Table 1 shows the simulation in energy efficiency results of the proposed algorithm. The mean accuracy of ADBA is 84.7190 and LR is 80.6740 . Standard Deviation of ADBA is .09780 and LR is .13293. The T-test for comparison for ADBA standard error mean (.03093) and LR (.04204).

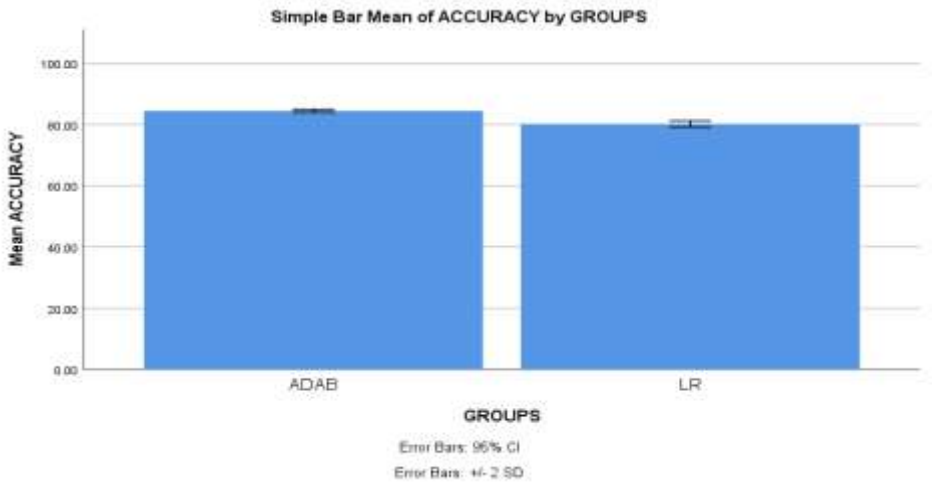

Fig. 1. The mean accuracy ADAB algorithm is 84.71% and the existing LR algorithm is 80.60% algorithm. The mean accuracy of ADAB is greater than the LR algorithm. X axis is ADAB vs LR, Y axis is Mean accuracy. Error bar is +/-2 SD.

Figure 1. gives the comparison chart of AdaBoosting of Logistic Regression algorithms in terms of mean and accuracy. The mean accuracy of the AdaBoosting algorithm is better than the Logistic Regression algorithm.

Table 2. Independent sample test for significance and standard error determination. P-value is less than 0.05 considered to be statistically significant and 95% confidence intervals were calculated with two-tailed value p=0.013 (p<0.05)

		Levene's Test for Equality of Variances		**T-test for Equality of Means**						
		Sig.	**F**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std.Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Accuracy	Equal variances assumed	.044	79.829	16.973	18	0.013	3.64100	.21451	3.19032	4.09168
Accuracy	Equal variances assumed			16.973	9.979	0.013	3.64100	.21451	3.16290	4.11910

Table 2 shows the ADBA, an independent variable T-test, and an effect size of p=0.013 were used to calculate the mean, standard error mean, and standard deviation

DISCUSSION

For automobile wheel counting, Novel adaboosting and logistic regression algorithms are used and compared to improve wheel recognition accuracy and vehicle monitoring through CV. According to the findings, the Novel adaboosting algorithm outperforms the Logistic regression algorithm in terms of accuracy for energy efficiency.

By introducing Novel adaboosting algorithm models and their capacity to retain future dependencies, the proposed algorithm helps to solve the problem of vehicles counting in the most recent survey(Fastiuk et al. 2021a; S. Li, Chang, and Liu 2021a). This directly suggests that all related technology will evolve into artificial intelligence, which could indicate a significant improvement in all marketing issues (Fastiuk et al. 2021b; S. Li, Chang, and Liu 2021b; Meimban et al. 2018a; Shopa, Sumitha, and Patra 2014a, Meimban et al. 2018b). The numerous advantages of utilizing such technology include a much improved quality of vision for the unknown and public satisfaction with vehicle monitoring(Shopa, Sumitha, and Patra 2014b).Using this tool would be a very interesting

addition to the Wheel Detection product in the case of a highly accurate model (D. Li, Liang, and Zhang 2014). In addition, developing models that are able to learn about future dependencies could be useful in a number of other fields, such as the counting and recognition of vehicles(Chaudhary, Nagpal, and Devgan 2020).
Wheel detection has limited detection capabilities, but the potential for significant profit in the future makes it necessary to develop a better vehicle counting recognition system. The algorithm for logistic regression can handle future wheel detection.

CONCLUSION

The work involves a semi-supervised algorithm to find the Wheel in wheel detection to be proved with better energy efficiency accuracy of 84.71% when compared to Logistic Regression accuracy is 80.67% for detecting in personal assistance.

DECLARATIONS

Conflict of interests

No conflict of interest in this manuscript

Authors Contributions

Author TM was involved in data collection, data analysis, manuscript writing, Author KL was involved in conceptualization, data validation and critical review manuscript.

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