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Prediction of Sales in Video Games using Random Forest Algorithm in Comparison with Gradient Boosting Algorithm to Improve Accuracy

INTRODUCTION

- This research aims to enhance the accuracy of sales predictions in the video game industry by comparing two powerful algorithms: the Random Forest Algorithm and the Gradient Boosting Algorithm
- In the video game industry, the problem is the lack of precise sales forecasts in most competitive video gaming industry
- The machine learning algorithm like RF and GB will give exact sales predictions in the video gaming industry
- Predicting sales in video games is crucial for strategic planning, marketing decisions, and resource allocation within the gaming industry
- Random Forest Algorithm is an ensemble learning technique that constructs multiple decision trees during training and outputs the mode of the classes or mean prediction of the individual trees
- Gradient Boosting is a machine learning technique used for building predictive models, particularly decision trees, in a sequential manner. It works by iteratively improving the model's performance by focusing on the errors of previous iterations, adjusting subsequent models to reduce those errors

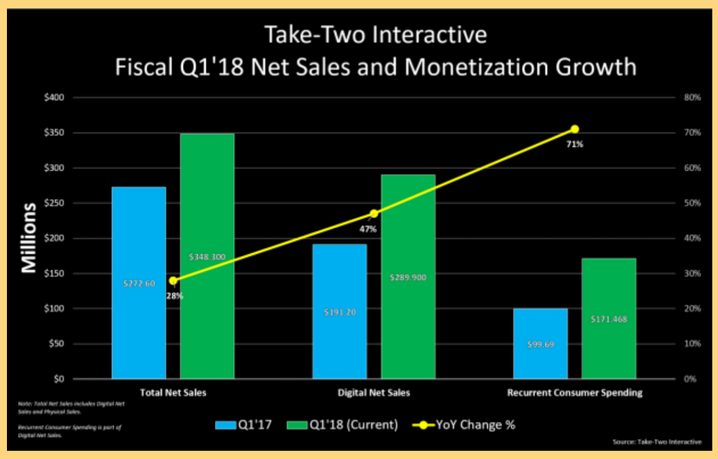

Fig.1 Video games sales prediction

MATERIALS AND METHODS

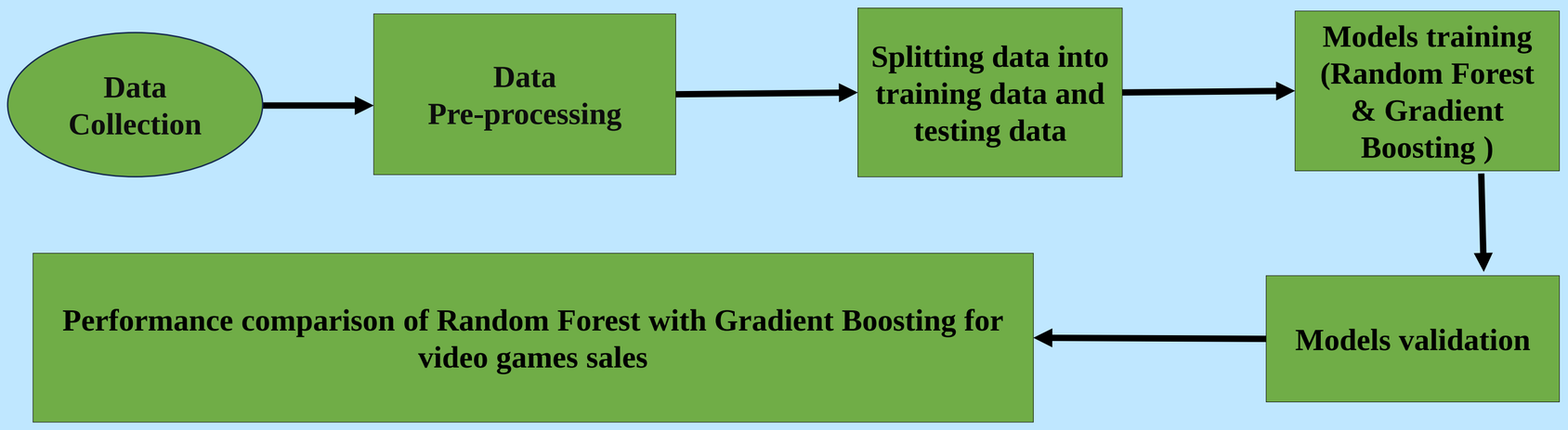

Fig.2 Flow chart of Video game Sales Prediction for RF algorithm in comparison with GB algorithm

- Sample Size: 20
- Group-1 (Random Forest): 10 samples
- Group-2 (Gradient Boosting): 10 samples
- The samples are tested in SPSS statistical analysis and outputs have been derived
- The statistical features extracted are count of samples, mean, standard deviation, minimum and maximum
- Non-number data is converted into numerical data for comparison between two algorithms in the dataset

RESULTS

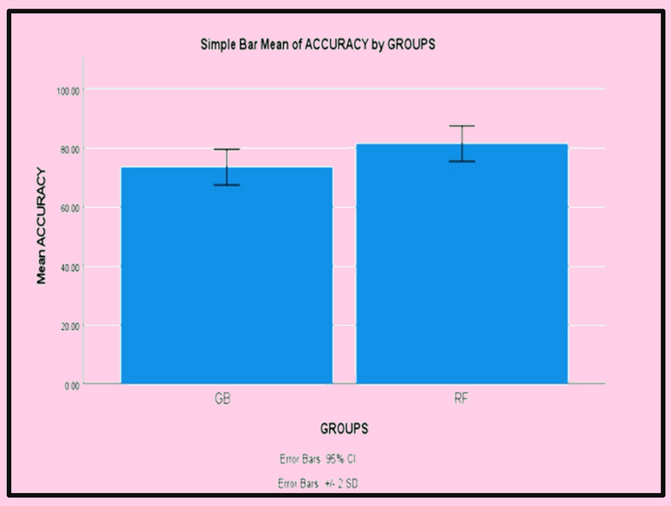

Fig.3 Mean Accuracy Analysis (GB Vs RF)

Table.1 Group Statistics of Random Forest and Gradient Boosting Algorithms which contains mean, standard deviation and standard deviation error

Groups		N	Mean	Standard deviation	Standard deviation error
Accuracy rate	RF	10	86.40	3.027	0.954
	GB	10	78.75	3.027	0.957

- In the present work, Random Forest Algorithm is compared with GB algorithm and it depicts that the proposed algorithm gives more accuracy than GB
- The Random Forest model attained 86.40% accuracy, on the other hand Gradient Boosting Algorithm attained an accuracy of 78.75%

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 GB and RF. The average accuracy values of two Algorithms: Random Forest Algorithm - 86.40% Gradient Boosting – 78.75%
- From the work , it is concluded that the Random Forest algorithm attains the high accuracy when comparing with other Machine Learning Algorithms in video games sales Prediction. Moving forward, researchers could delve deeper into optimizing hyperparameters and feature engineering to further enhance predictive accuracy
- Additionally, exploring the integration of alternative data sources such as user behavior analytics and sentiment analysis from social media platforms could provide valuable insights for improving sales forecasts in the video game industry
- Furthermore, investigating the scalability and computational efficiency of these algorithms for large-scale datasets could broaden their applicability in real-world scenarios. In conclusion, the comparison between Random Forest and Gradient Boosting algorithms highlights their effectiveness in refining sales predictions within the video game industry

BIBLIOGRAPHY

- Edwards, Caitlyn G., Catherine C. Pollack, Sara J. Pritschet, Keally Haushalter, John W. Long, and Travis D. Masterson. 2022. “Prevalence and Comparisons of Alcohol, Candy, Energy Drink, Snack, Soda, and Restaurant Brand and Product Marketing on Twitch, Facebook Gaming and YouTube Gaming.” Public Health Nutrition 25 (1). DOI: 10.1109/MPOT.2011.941083
- Etchells, Peter J., Alexandra L. Morgan, and Daniel S. Quintana. 2022. “Loot Box Spending Is Associated with Problem Gambling but Not Mental Wellbeing.” Royal Society Open Science 9 (8): 220111. DOI: 10.1109/CSIE.2009.1001
- Gard, Elizabeth Townsend, and W. Ronald Gard. 2021. Video Games and the Law. Routledge. DOI: 10.1109/CIG.2018.8490456
- Islam, Md Irteja, Raaj Kishore Biswas, and Rasheda Khanam. 2023. “Effect of Internet Use and Electronic Game-Play on Academic Performance of Australian Children.” Scientific Reports 10 (1): 21727. DOI:10.1109/ISKE54062.2021.9755343
- Hansch, Ronny. 2024. Handbook of Random Forests: Theory and Applications for Remote Sensing. World Scientific Publishing Company. DOI: 10.1098/rsos.220111