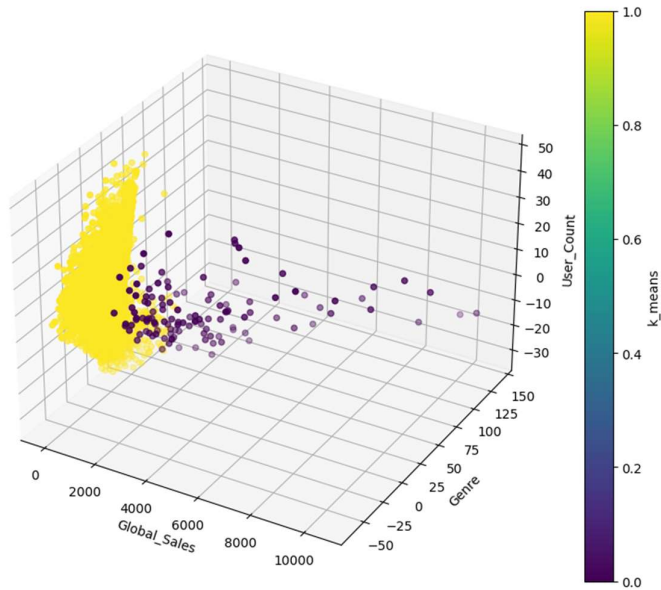


Nama : Dionisius Avelino

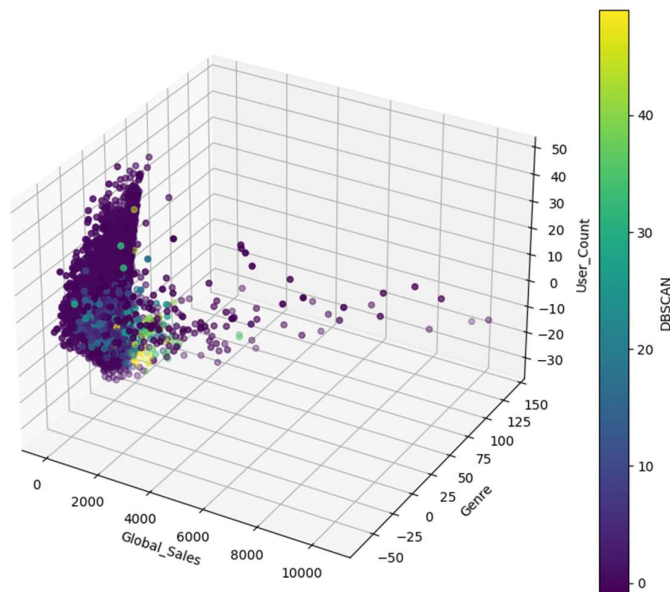
NIM : 2602117033

1a. Machine Learning approach that I will use is clustering, it's because the data provided has resulted in many ways and comes from many ways, so it's best to use clustering to define this data into a visualization

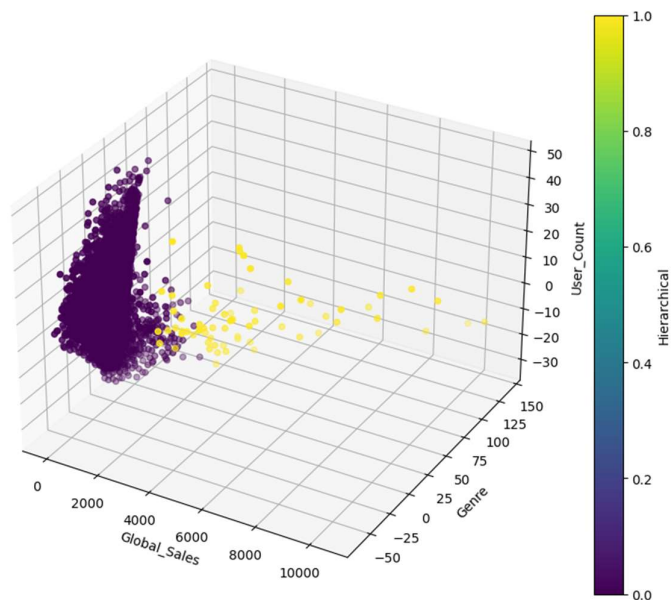
1d. For the K-Means Clustering, the plot shows a cluster of yellow points with some spread out in purple, which means it seems to capture a central region and separates the outliers.



The DBSCAN plot shows a more detailed clustering with several small clusters and will help identify core samples that will leads to a richer clustering structure.



The Hierarchical Clustering indicate yellow and purple colors as the two primary clusters, which helps to separate clusters, but it could struggle with noise data without preprocessing.



2a. Ensemble bagging focuses on reducing variance with averaging multiple models, while boosting focuses on reducing bias with iteratively improving model accuracy. Boosting is also more complex and intensive because the models are built sequentially by learning from the errors of the previous one, while bagging is built independently.

2e. Complete the following table:

	Metrics	Evaluation		
		Single Decision Tree Model	Bagging Model containing 25 decision tree models	Adaboost Model containing 25 decision tree models
Overall	Accuracy	0.84	0.88	0.85
	Support	428	428	428
Class 0	Precision	0.90	0.90	0.91
	Recall	0.88	0.94	0.89
	F1-Score	0.89	0.92	0.90
	Support	317	317	317
Class 1	Precision	0.68	0.80	0.70
	Recall	0.73	0.70	0.74
	F1-Score	0.70	0.75	0.72
	Support	111	111	111

2f. Based on the obtained results in the table above, Bagging Model containing 25 decision tree models is the best because the accuracy showed 0.88 which is higher than the others, and it's because the bagging model performs well in both class (Precision, Recall, and F1-Score). The worst model is Single Decision Tree Model because this model resulted in the lowest overall accuracy and performs worse in both class (Precision, Recall, and F1-Score).