Turtle Games – Predicting Future Outcomes

Prepared and Presented by

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LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

TURTLE GAMES

Analysis Objective

- *Identifying Key drivers of Customer Engagement & Retention*
- *Understanding Customer Persona*
- *Decoding Customer Voice*
- *Refining Loyalty Points mechanism*

01. Data Exploration

- Data set review
- Statistical Insights

02. Customer Loyalty Drivers

- Key factors influencing Loyalty points
- Predicting Loyalty point (factors and reliability) [MLR]
- Optimizing the Loyalty program

03. Customer Segmentation

- Key Customer Attributes
- Customer clusters and their features [K-Means]
- Targeted Marketing recommendations

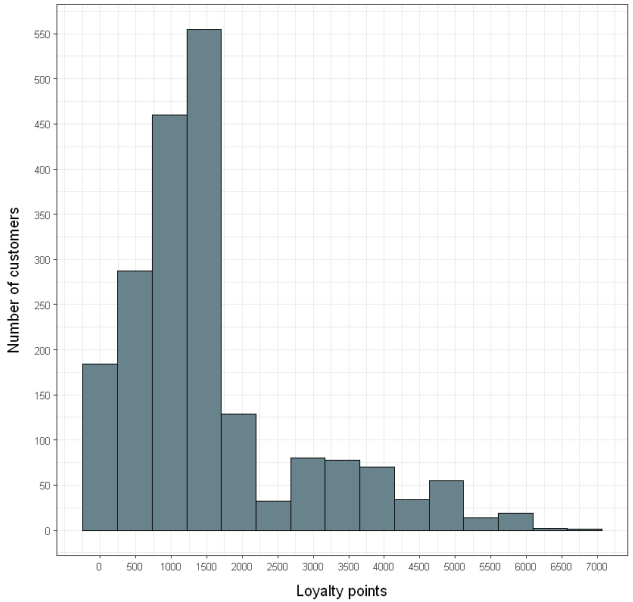
04. Sentiment Review

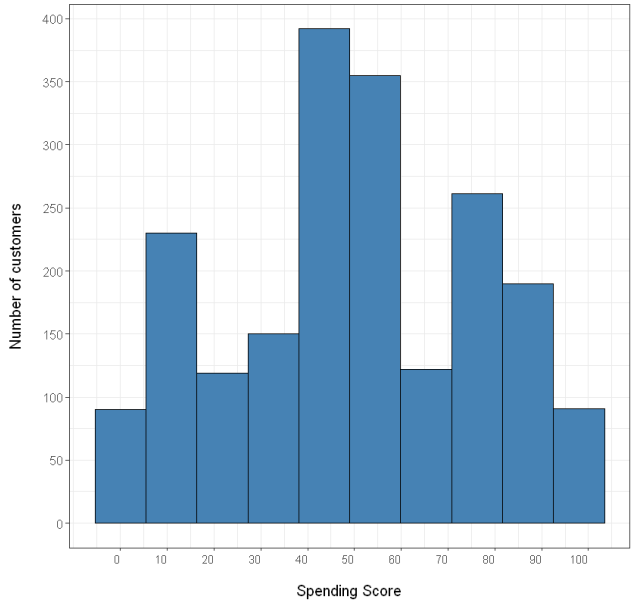
- Review Sentiment Analysis [NLP Text Analytics]
- Product and Customer based sentiments

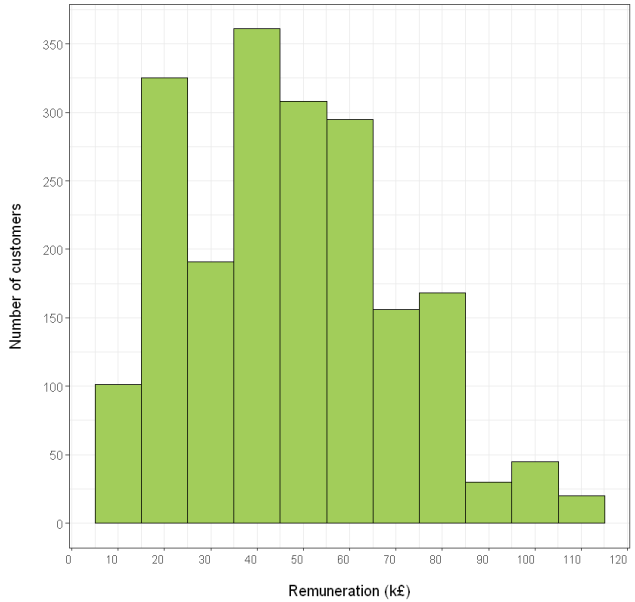
05. Recommendations

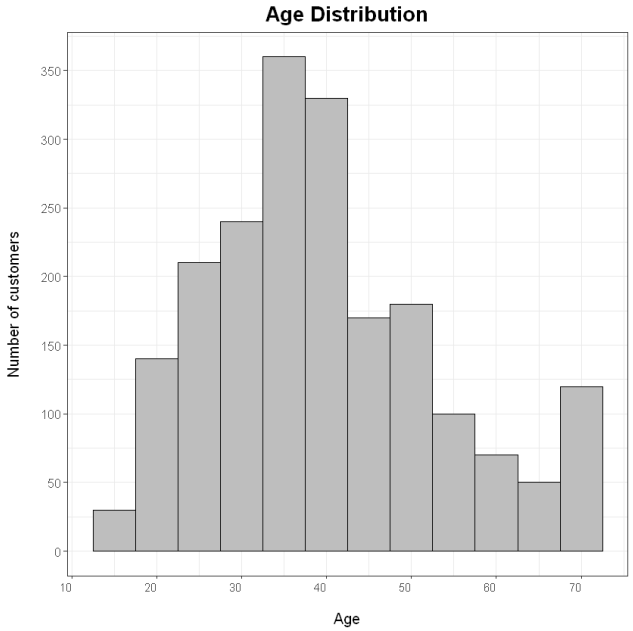
Data Exploration

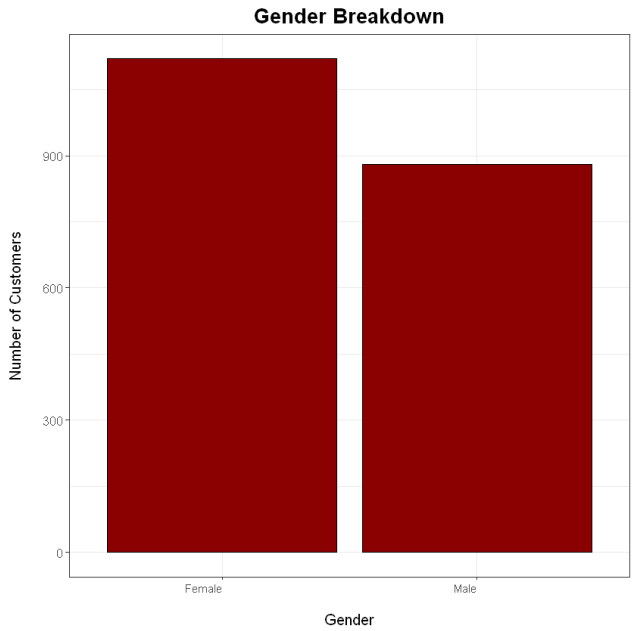
- 2000 rows of customer reviews for Turtle Game products.
- Customer information on 6 features.

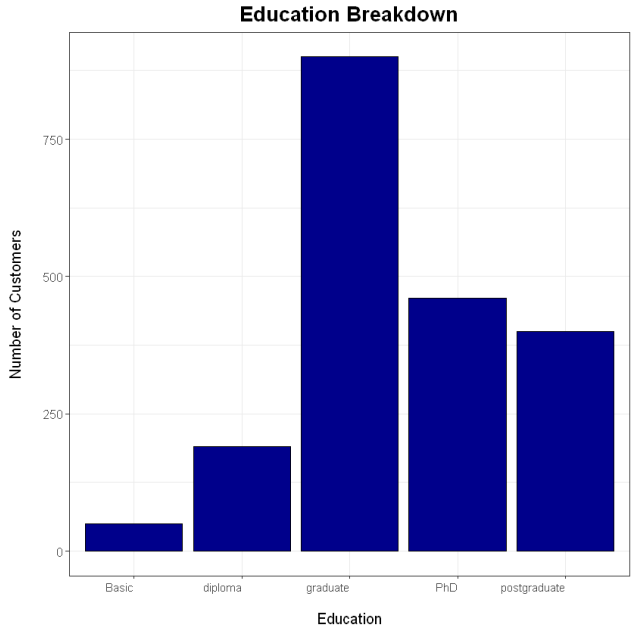






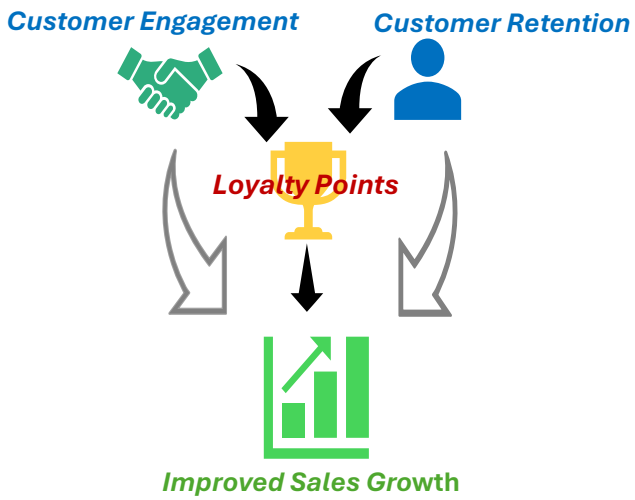


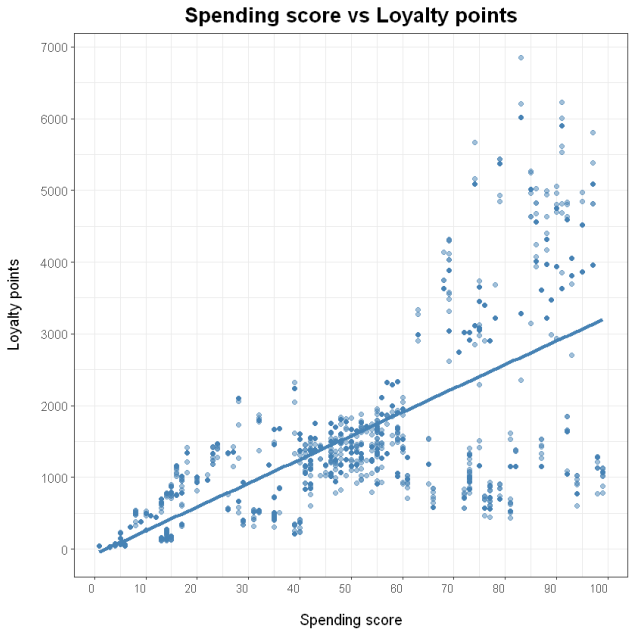


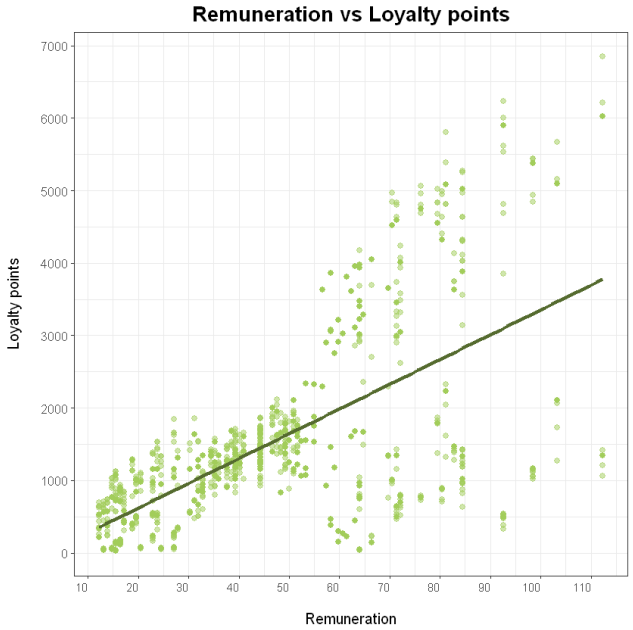


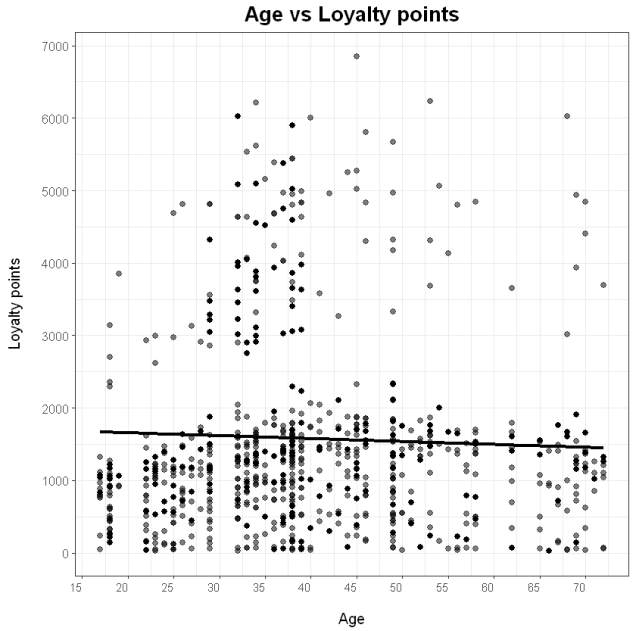
Data Exploration

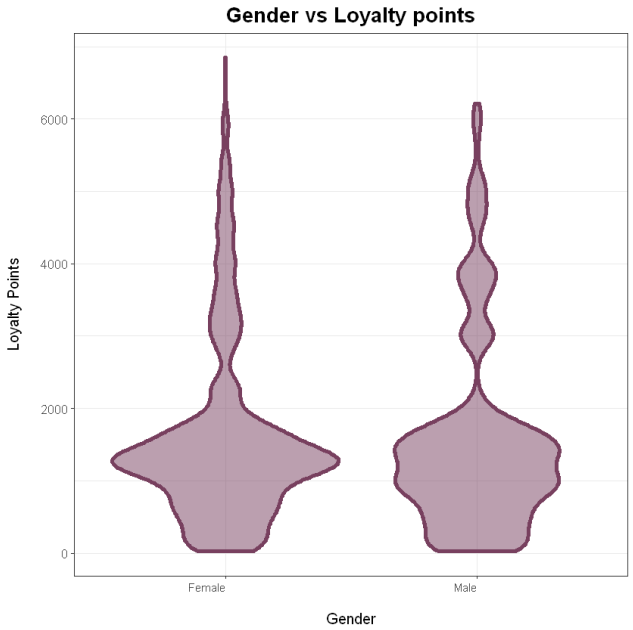
- Loyalty Points – Factor for Sales Improvement
- Relation to Spending score, Remuneration, Age

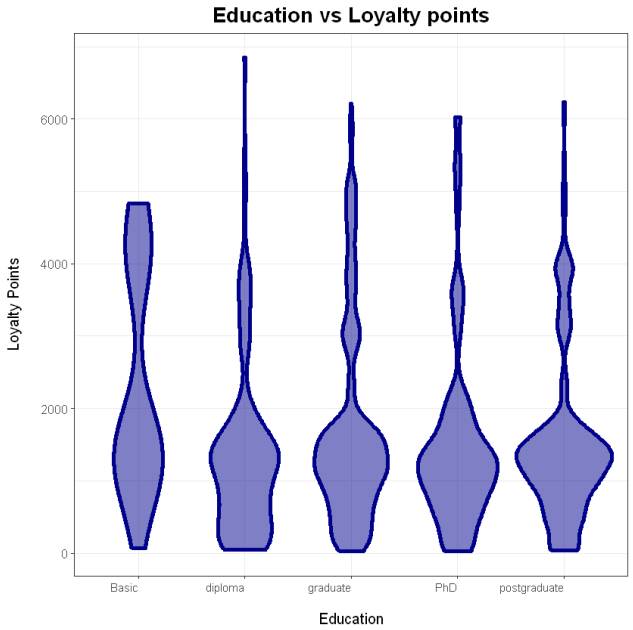








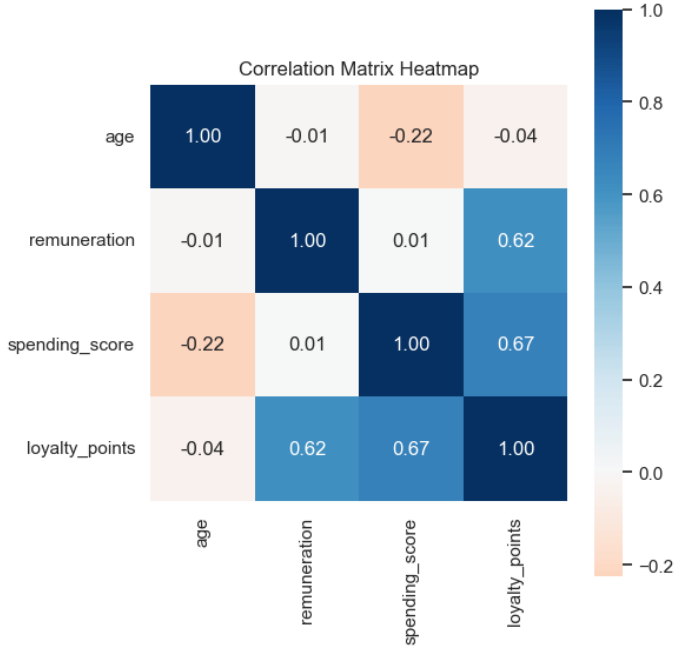


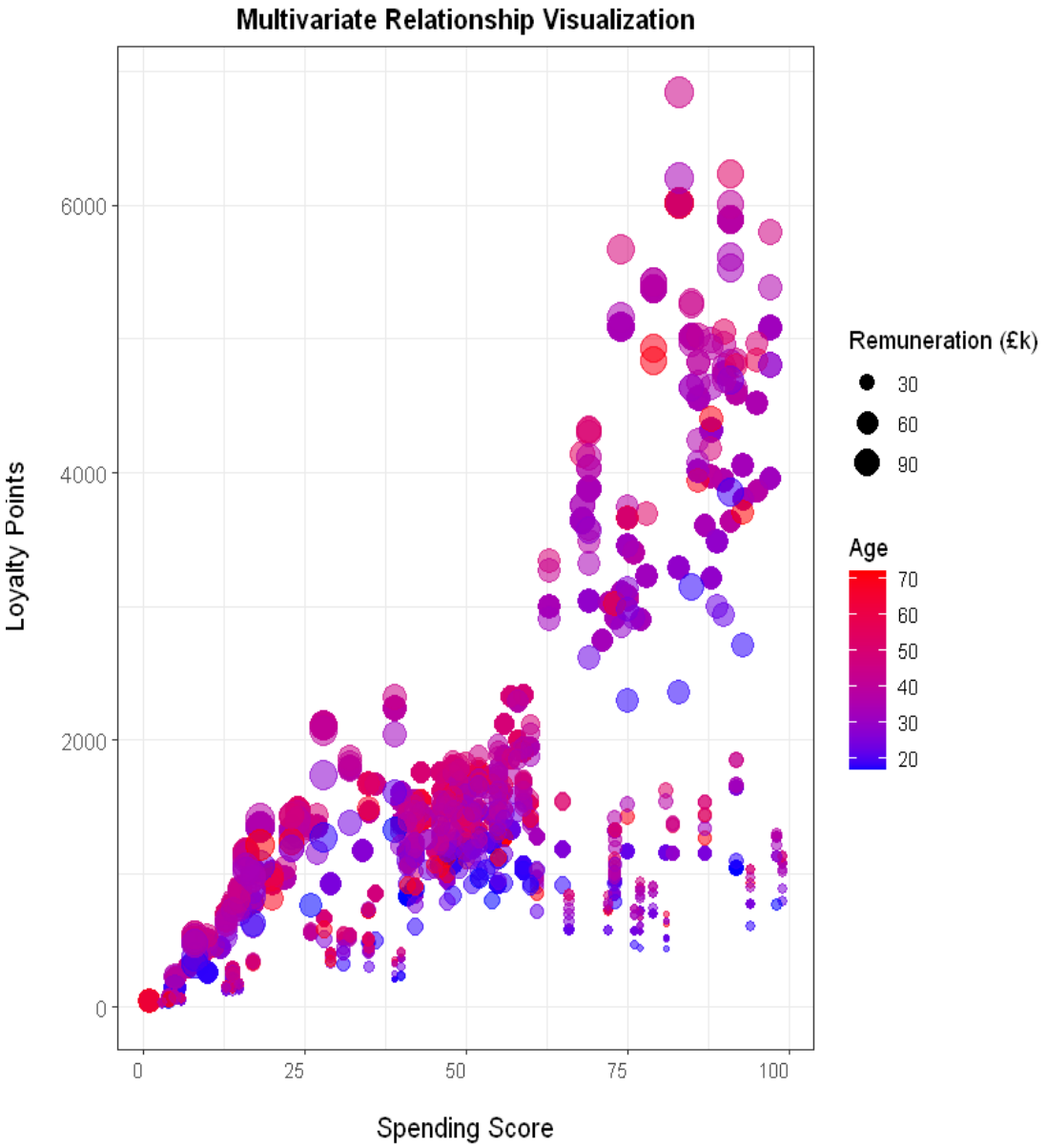


Dec 2024

Turtle Games

Customer Loyalty Drivers





- Initial analysis and correlation plot shows Spending score, and Remuneration are key factors in predicting Loyalty points of a customers.
- Customer's Age has a relatively lower significance in the relationship – The scatterplot shows that lower age and lower remuneration are within.
- **A linear prediction model to predict customer loyalty points based on these drivers, could serve as a valuable proxy for measuring customer engagement. This predictive capability will empower us to proactively identify and retain high-value customers.**

Customer Loyalty Drivers

Recommendation: Weighted-Multiple-Linear Regression model

$$\textbf{Loyalty Points} = -1944.89 + (31.87 \times \textbf{Spending Score}) + (31.39 \times \textbf{Remuneration}) + (10.57 \times \textbf{Age})$$

- Theoretical starting point when all predictors are zero.
- Negative value suggests minimum thresholds of spending and income needed for loyalty point accumulation.

- Strong positive relationship between loyalty points and spending score.
- For every 1-point increase in spending score, loyalty points increase by ~31.87 points.

- Strong positive relationship between loyalty points and remuneration.
- For every £1,000 increase in remuneration, loyalty points increase by ~31.39 points.

- Weak positive relationship between loyalty points and age.
- For every 1 year increase in age, loyalty points increase by ~10.57 points.

🎯 Model Accuracy (R^2): 82.1%

🎯 Confidence Indicator (p-Value): < $2.2e^{-16}$

Strongest Statistical Model

Model #	Dependent Variable	Independent Variables / Factors	Model Accuracy (Adj R^2)	Normality	Heteroscedasticity
1	LP	SS,REM	82.7%	Pass	Fail
2	LP	SS,REM,AGE	84.0%	Pass	Fail
3	Log (LP)	Log (SS, REM, AGE)	99.2%	Fail	Pass
4	Sqrt (LP)	SS,REM,AGE	90.7%	Fail	Pass
5	LP	SS,REM,AGE + Weights from model 2	82.1%	Pass	Pass

- LP – Loyalty Points
- SS – Spending Score
- REM – Remuneration

Prediction Logic

Parameter	Value
Age	34
Remuneration	£60k
Spending Score	25

→ **Predicted Loyalty Points** **1094.65**

Parameter	Value
Age	42
Remuneration	£80k
Spending Score	80

→ **Predicted Loyalty Points** **3559.85**

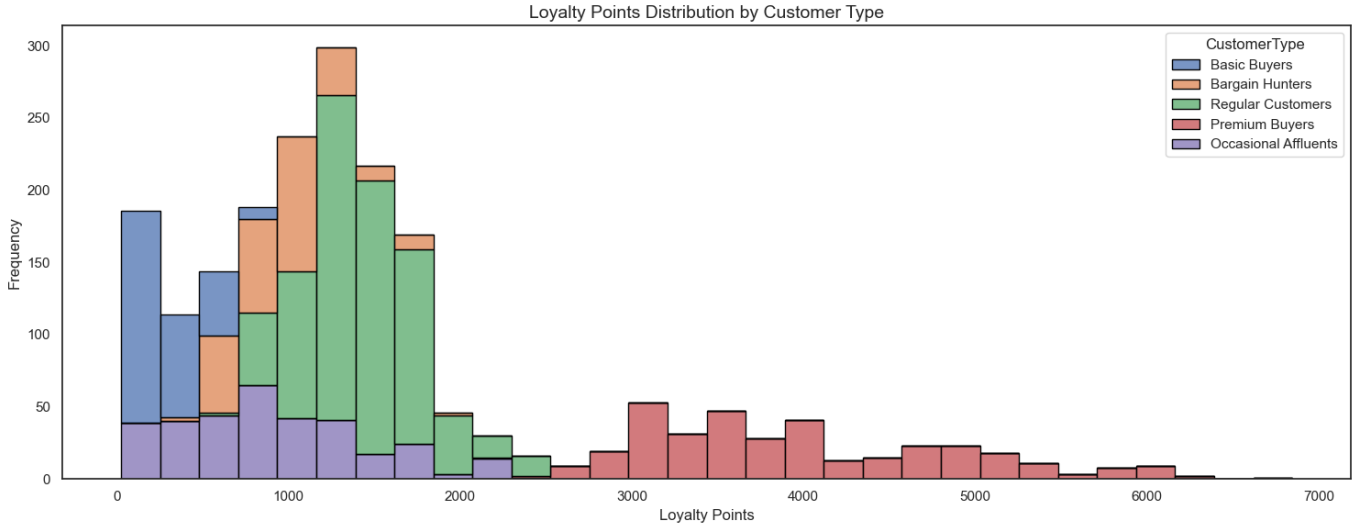
Customer Segmentation

Segmenting customers based on their Loyalty behaviour, we can create personalized experiences and deliver targeted offers, leading to increased customer loyalty and revenue.

- An optimized decision tree model was built to identify Spending Score and Remuneration as the features with high importance scores.
- Applying an **optimized K-Means clustering model** on these features – 5 clear **behaviour driven** customer personas have been identified.

	Persona	Description	Size (%)	Avg Loyalty Points	Income Range (k£)	Spending Level
	Basic Buyers	Low spending, price-sensitive customers	13.6	275.06	12.3-32.0k	Low (3-40)
	Bargain Hunters	Budget-conscious customers who seek deals	13.4	971.94	12.3-32.0k	High (61-99)
	Regular Customers	Mid-market customers with consistent spending	38.7	1420.38	32.0-62.3k	Medium (34-61)
	Premium Buyers	High income customers who spend frequently	17.8	3988.24	56.6-112.3k	High (63-97)
	Occasional Affluents	High income customers who spend occasionally	16.5	911.76	57.4-112.3k	Low (1-39)

Classifying the Loyalty points distribution by the Customer Persona:



Customer Segmentation

Recommendation: Tiered Loyalty Program based on Cluster Persona

- Loyalty Points program can be reprogrammed to a tiered system – A gamified naming system would add to the branding opportunity.
- This would also introduce an automatic segmentation based on the Loyalty Points to the system as well helping us continually monitor progress in engagement and identify patterns in an ongoing basis.

PERSONA	DESCRIPTION	AVG LOYALTY POINTS	SIZE (%)	PROPOSED TIER	RECOMMENDATIONS
Premium Buyers	High income customers who spend frequently	3988.24	17.8	VIP Rewards – Platinum	- Develop premium product lines - Create referral programs - Exclusive access
Regular Customers	Mid-market customers with consistent spending	1420.38	38.7	Mid-Tier Rewards – Gold	- Focus on upselling - Create bundle offers
Occasional Affluents	High income customers who spend occasionally	911.76	16.5	Entry-Level Rewards – Silver	- Develop targeted marketing campaigns - Create special occasion promotions - Implement personalized communication
Bargain Hunters	Budget-conscious customers who seek deals	971.94	13.4	Entry-Level Rewards – Basic	- Introduce tiered discounts - Create flash sales - Develop value-focused products
Basic Buyers	Low spending, price-sensitive customers	275.06	13.6	Entry-Level Rewards – Basic	- Create budget-friendly options - Use educational marketing

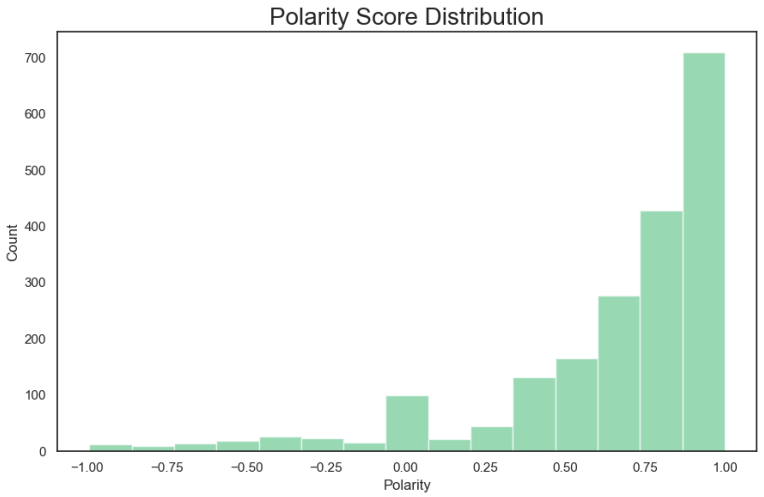
Cross-Segment Strategies:

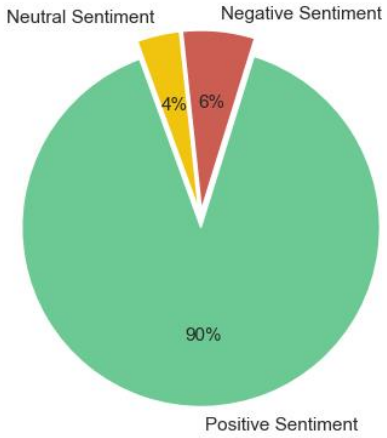
○ Personalized campaigns based on segment traits ○ Clear upgrade paths between segments with incentives ○ Monitor segment migration to evaluate strategy effectiveness

Sentiment Review - Overview

Text analytics can unlock a treasure trove of insights from customer reviews. Let's explore how we can elevate our understanding of customer sentiment and unlock the full potential of text analytics.

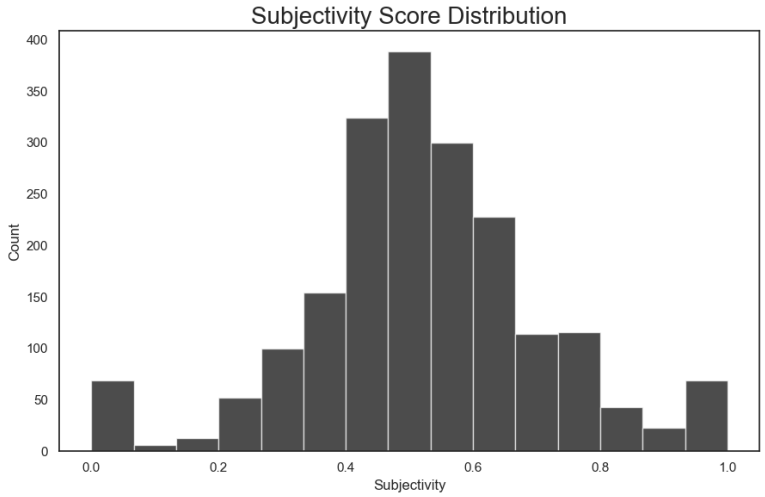
POLARITY

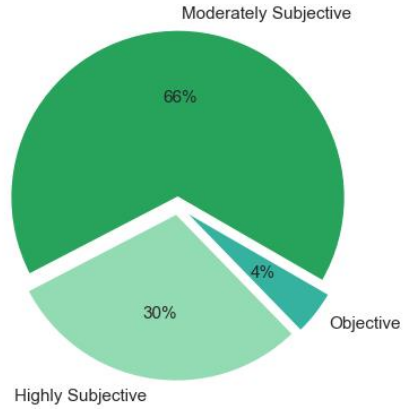




- Most customer reviews express positive sentiment towards Turtle Games products.
- This indicates overall customer satisfaction with the brand and its offerings.
- Analysing positive and negative sentiment feedback at a product / customer level can uncover helpful insights

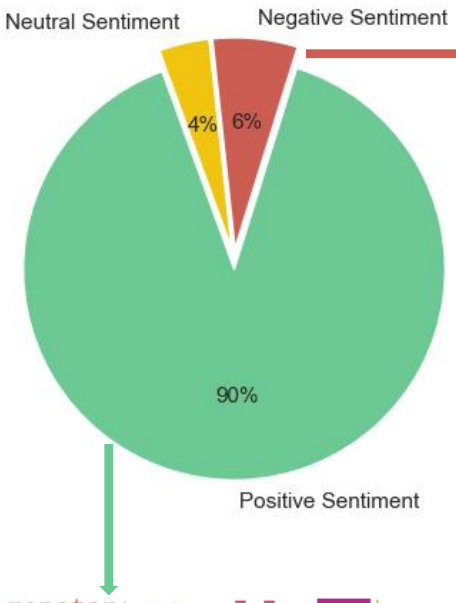
SUBJECTIVITY





- The Subjectivity scores highlight the quality of feedback being received.
- The review comments are mostly moderately subjective – opinions and insights.
- Very few reviews are completely factual (4%).

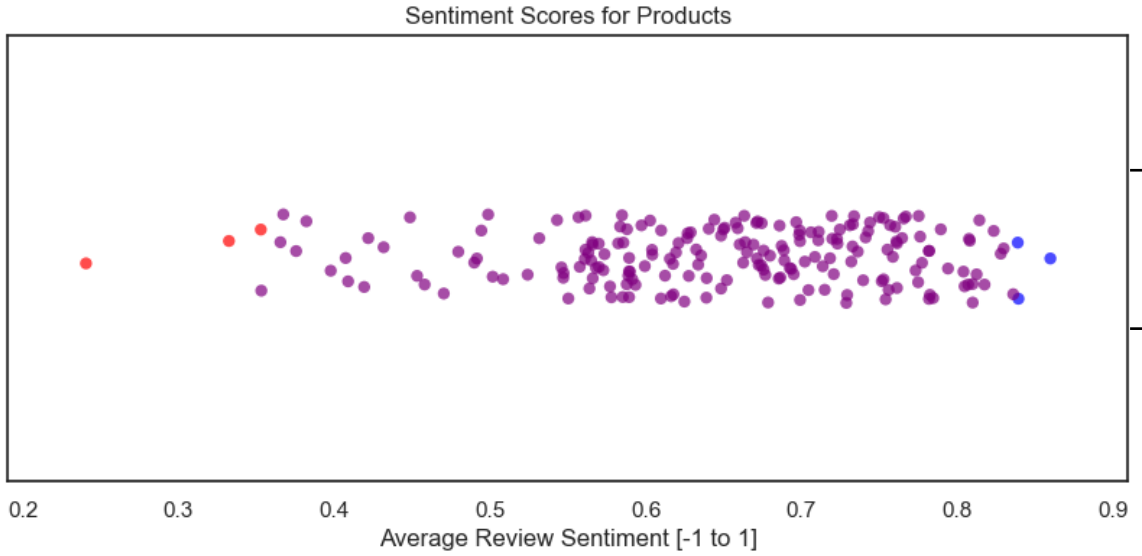
Sentiment Review – Insights



- Words like *anger*, *really*, *disappointed*, *boring*, and *problem* **indicate strong dissatisfaction and frustration** among customers.
- **Product or component quality and usability issues** indicated in words like *board, book, piece, instruction, glue, kit, part.*
- Words like *kid*, *child* could imply issues encountered during gameplay with children, possibly related to **age-appropriateness or complexity.**
- Words such as *difficult*, *time*, *make*, and *fall* may reflect frustrations with **gameplay mechanics, setup, or durability.**

- Words like *play, great, love, and fun* highlight customers' **enjoyment and satisfaction** with the games.
- Terms such as *tile, piece, cards, and set* suggest that the **physical components** of the games are well-received and **appreciated**.
- Words like *expansion, better, and new* indicate interest in **additional content, improvements, or updated versions**.
- Words such as *kid, children, and family* emphasize that the games are **enjoyed by families** and younger audiences, suggesting they meet expectations for these demographics.

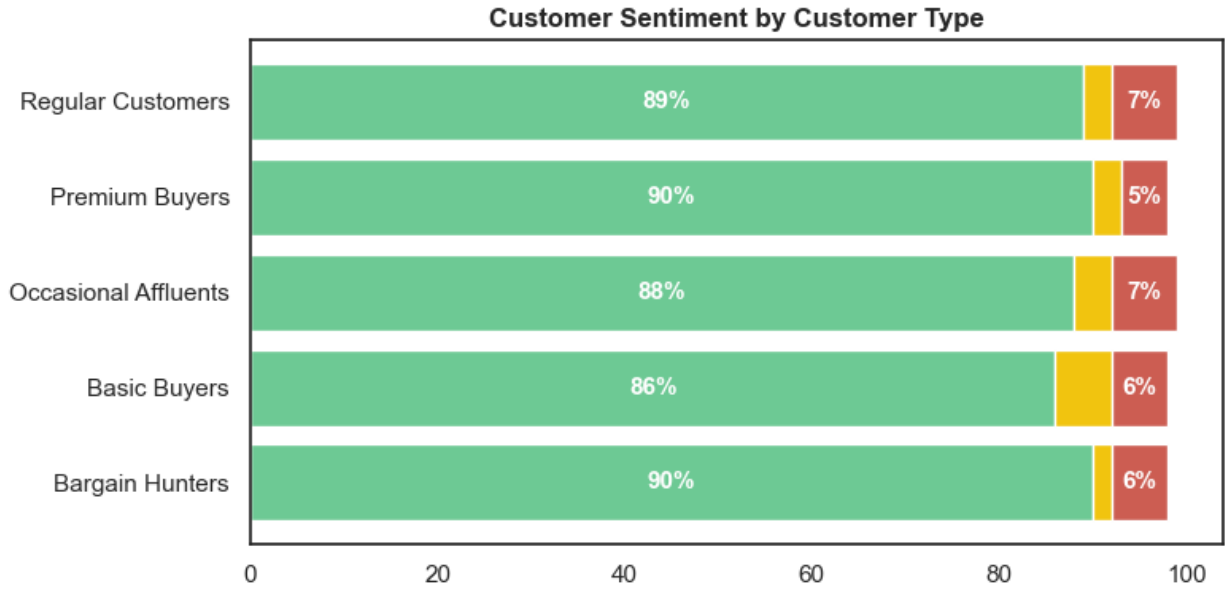
Product & Persona - Sentiment Review



Product ID	Avg. Polarity
4047	0.35
518	0.33
9597	0.24
6815	0.86
5493	0.84
2371	0.84

Product-wise Sentiment:

- All products show a positive sentiment with polarity scores above zero.
- Products with high positive reviews can reveal key strengths.
- Conversely, products with high negative reviews can indicate areas needing quality improvement and guide future product development strategies.



Customer-wise Sentiment:

- Customer persona wise average sentiments are similar across all patterns with 85-90% Positive sentiment.
- Basic Buyers have the least positive sentiment, probably indicates need for budget options with higher quality.
- Comprehensive cross-sectional analysis (Product Category + Customer Persona) could reveal product preferences along Customer Persona.

Recommendations

Loyalty Drivers and Statistical Significance:

- Key Findings: Spending, income, and age (despite some data issues) significantly predict loyalty. WLS model offers a robust prediction tool.
- Recommendations: Investigate younger customer engagement. Use the WLS model to predict loyalty and manage customer relationships. Validate and maintain the model. Cleanse age data.

Customer Segmentation:

- Key Findings: Decision Tree and K-Means confirm spending and income as key drivers. "Occasional Affluents" may not be utilizing loyalty benefits.
- Recommendations: Implement tailored loyalty programs for cluster segments identified. Offer tiered benefits and create clear upgrade paths. Monitor segment migration. Study purchase patterns of "Occasional Affluents."

Sentiment Analysis:

- Key Findings: Mostly positive reviews with moderate subjectivity. Game play, age appropriateness, and quality are key review areas. VADER model outperforms TEXTBLOB.
- Recommendations: Implement a feature-based rating system. Invest in fine-tuned NLP models. Conduct deeper product-level and segment-level sentiment analysis.

In essence:

- Loyalty: Use predictive model to enhance customer engagement and retention.
- Segmentation: Tailor loyalty programs based on spending and income segments for enhanced management.
- Sentiment: Improve review collection and leverage advanced NLP for deeper insights on customer feedback and improving product line.