**Course 3 Assignment Report**

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**Background**

Turtle Games is a games manufacturer and retailer, looking to do a review of their pricing, determine the product segments, identify the customer sentiments, and predict sales.

Turtle Games manufacture and sell their own products, as well as source and sell products manufactured by other companies. Their product range includes Lego, as well as board games, video games and toys. They have a global customer base and have a business objective of improving overall sales performance.

**Analytical Approach**

To help Turtle Games answer their business questions, I have carried out data analysis in Python and R, using the datasets provided (lego.csv, game\_reviews.csv, game\_sales.csv). The methods used include:

* Descriptive statistics
* Single and multiple linear regression in Python
* Natural language processing
* Multi-linear regression in R

**Visualisation and Insights**

Based on exploratory data analysis of the lego dataset we can see that:

* The dataset contains 12,261 observations and 7 variables
* All the data are numeric and there are no missing values
* The average age of players is 17 years old
* The average price is $65 (minimum $0 up to a maximum of $367). The rest of the descriptive statistics are presented below (Fig 1)

Graphical user interface, application, Word

Description automatically generated

Figure 1. Descriptive statistics of the lego dataset

In addition, it looks like there is a correlation between the count of lego pieces and the listed prices (Fig. 2 below)

Chart, scatter chart

Description automatically generated

Figure 2. Correlation between count of pieces and price.

**Patterns and Predictions**

The following sections present the results from the data analysis answering the main business questions.

1. **Predicting the prices to inform the sales performance.**

The multiple linear regression showed that the predicted price for a Lego set with 8000 pieces for 30 year olds is $793.

It also showed that when it comes to predictors of price changes, only the number of pieces is a statistically significant determinant of the change in price (p<0.05), not age (p>0.05).

1. **Understand customer satisfaction with the products.**

Generally the reviews received are positive with an average of 4.5 out of 5 rating. This is confirmed by the sentiment polarity histogram which is slightly skewed to the right (Fig 3 below).

Chart, histogram

Description automatically generated

Figure 3 Histogram of sentiment score polarity of the review texts

Top 20 most positive reviews:

|  |  |  |
| --- | --- | --- |
| **reviewText** | **summary** | **polarity** |
| Came in perfect condition. | Five Stars | 1 |
| Absolutely great pictures even before coloring! | Five Stars | 1 |
| Great! | Five Stars | 1 |
| Awesome book | Five Stars | 1 |
| Awesome gift | Five Stars | 1 |
| Great product! Arrived on time. | Five Stars | 1 |
| Great buy!! My granddaughter loves it!! | Five Stars | 1 |
| Great! | Five Stars | 1 |
| Great resource for BHIS care coordinators!! Works well with kids and teens on what it says it does!! | Perfect! | 1 |
| Great Seller!!! Happy with my purchase!!! 5 starrrr | Great for kids | 1 |
| Excellent activity for teaching self-management skills! | Five Stars | 1 |
| Great game...I use it a lot! | Five Stars | 1 |
| Great therapy tool! | Five Stars | 1 |
| Perfect, just what I ordered!! | Five Stars | 1 |
| Wonderful product | Five Stars | 1 |
| Delightful product! | Five Stars | 1 |
| Great Easter gift for kids! | Great Easter gift for kids! | 1 |
| Wonderful for my grandson to learn the resurrection story. | Five Stars | 1 |
| These are great! | Cute letters | 1 |
| Perfect! | Aquire game | 1 |

Top 20 most negative reviews:

|  |  |  |
| --- | --- | --- |
| **reviewText** | **summary** | **polarity** |
| BOOO UNLES YOU ARE PATIENT KNOW HOW TO MEASURE I DIDN'T HAVE THE PATIENCE NEITHER DID MY DAUGHTER. BORING UNLESS YOU ARE A CRAFT PERSON WHICH I AM NOT. | BORING UNLESS YOU ARE A CRAFT PERSON WHICH I AM ... | -1 |
| Kids did not like it. Thought it was boring. | Not so much fun | -1 |
| some of the suggestions are disgusting | One Star | -1 |
| Awful. We did not receive what was advertised. We paid $30 for the boxes set with book. We got the elf in a bag without the book. | Not What Was Advertised | -1 |
| Going to be a crazy Christmas at our house this year!!!! | Five Stars | -1 |
| I do not under stand how you keep score or read the scoring. I i do not like that at all. I can never play score with anyone at all. I HATE THAT I CAN'T PLAY POINTS!!!... | What i do not under stand | -1 |
| Incomplete kit! Very disappointing! | INCOMPLETE KIT! | -0.975 |
| Was the elf on the shelf but it didn't have the DVD I was very disappointed | Three Stars | -0.975 |
| I haven't even taken it out of the box yet but it's already falling apart. I contacted customer service and never even got a response. I am very disappointed in this product. | Poor quality. Falling apart in multiple places. | -0.975 |
| It is not waterproof and is dangerous!! | One Star | -0.9375 |
| I hate the holidays bcuz of the Elf, he was disgusting, i hate him with my life, he doesnot leave the shelf alone. | I hate the holidays bcuz of the Elf | -0.8666667 |
| Cliche and stupid. I should not drink and Amazon.... | Hahaha. Ho Ho Ho. | -0.8 |
| Just stupid. | One Star | -0.8 |
| Family loves this game!!! | Well worth the purchase! | -0.78125 |
| My son obsessed!! | Five Stars | -0.78125 |
| The dog ate him. :( | Five Stars | -0.75 |
| Does not come with wire in the legs or arms...:( | Needs wire in arms and legs | -0.75 |
| I'd like to upload a photo of the condition of the game box...it looks like it's been used as a soccer ball! 2 corners of the box are smashed in and on is even ripped. How am I supposed to give this as a gift without it looking like I bought this on clearance? Very disappointed. | :( | -0.7375 |
| I like this product for my daughter. She is into the Bad Kitty book collection, so it was an added bonus. | Good Kitty | -0.7 |
| Ordered for my sons birthday, opened it up today to play and the board is damaged. Before we even take it out of the box the game is already falling apart. Very disappointed... | Damaged board out of box | -0.6875 |

1. Videos games: Turtle Games’ sales team has provided you with the information on the number of units of video games (in millions) sold in stores across Europe and North America. (Week 5 and Week 6)

What are the predicted sales (in millions) for the next financial year for each of the video games for stores based in Europe and North America?