GAME APPLICATION SUCCESS PREDICTION

MILESTONE 1 REPORT

Team ID: CS_43

TEAM MEMBERS DATA

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PREPROCESSING TECHNIQUES

- READING DATA

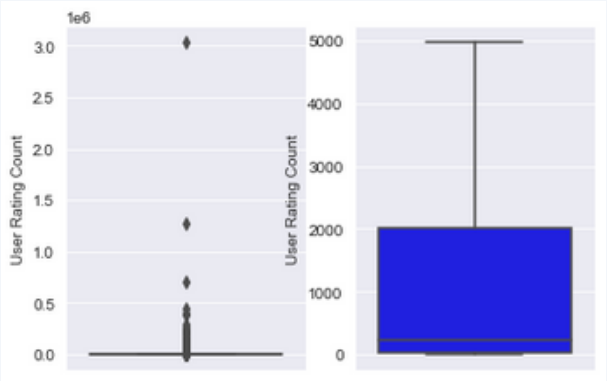
  First we read data and :
  - Drop all null rows.
  - Drop all duplicate rows.
  - Get input variables [**"URL"**, **"ID"**, **"Name"**, **"Subtitle"**, **"Icon URL"**, **"User Rating Count"**, **"Price"**, **"In-app Purchases"**, **"Description"**, **"Developer"**, **"Age Rating"**, **"Languages"**, **"Size"**, **"Primary Genre"**, **"Genres"**, **"Original Release Date"**, **"Current Version Release Date"**]
  - Drop columns from input variables:
    - [**"ID"**] because it contains unique values
  - Get output variable [**"Average User Rating"**]

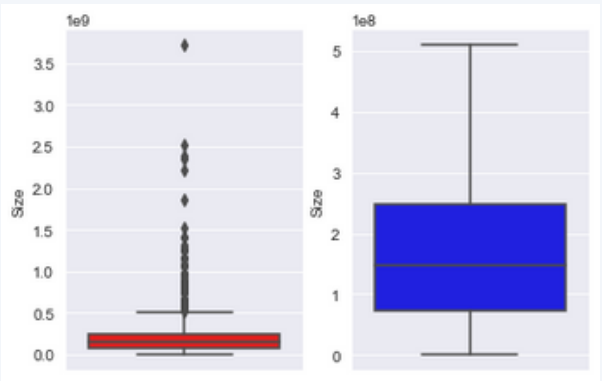
- TRAIN AND TEST SPLIT
  - split our data in 20% in testing and 80% in training
  - shuffle data
  - make random state = 10

- PREPROCESSING IN TRAIN DATA
  - ***Columns Analysis***
    - **In "Age Rating" :**
      - Remove "+" in values.
      - Convert values from **string** to **integer**.
    - **In "Languages" , "Genres" and "Primary Genre"** :
      - Get all **unique values** in each column :
        - **Languages** column has **122 unique Languages**.
        - **Genres** column has **40 unique Genres**.
        - **Primary Genre** column has **11 unique Primary Genre**.
    - **In "Original Release Date" and "Current Version Release Date"** :
      - Convert values from **string** to **date format**.
      - Convert **date format** to **integer**.

PREPROCESSING TECHNIQUES

- ***Columns Nulls***
  - Dealing with columns that contains **null values more than 50%**
    - **In "Subtitle"** :
      - **Drop column** because it contains null values more than 50%.
    - **In "In-app Purchases"** :
      - **Replace** all null values with "0" .
        - Assuming that any cell with null value does **not has any purchases**.
      - **Convert** datatype to **string** to split values in cell and replace them with it's **mean value**.
      - **Convert** datatype to **float** to get final result.
    - **In "Price"** :
      - **Replace** all null values with the most frequently value "0" .
    - **In "Languages"** :
      - **Replace** all null values with the most frequently value "EN" .
- ***Encoding***
  - **In "Price"** :
    - If value **greater than 0** then it will be **1**.
    - If value **less than or equal 0** it will be **no change**.
  - **In "Age Rating"** :
    - Map values by replacing value with its corresponding **integer value** :
      - Replace **4** by **1**.
      - Replace **9** by **2**.
      - Replace **12** by **3**.
      - Replace **17** by **4**.
- ***Outliers Detection & Removal***
  - **In "User Rating Count" and "Size"** :
    - Apply **IQR** to detect and handling outliers.
    - If value **greater than upper bound** it will be **equal upper bound**.
    - If value **less than lower bound** it will be **equal lower bound**.
    - If value **less than upper bound** and **greater than lower bound** it will be **no change**.





PREPROCESSING TECHNIQUES

- ***Dealing With Categories***
  - **In "Primary Genre" , "Genres" and "Languages"** :
    - Apply **one-hot encoding** to the columns.
    - **Replace** original columns by one-hot encoded columns.
    - **Drop** any column contain zeros more than 90%.

- PREPROCESSING IN TEST DATA
  - ***Columns Analysis***
    - **In "Age Rating" :**
      - Remove "+" in values.
      - Convert values from **string** to **integer**.
      - Map values by replacing value with its corresponding integer value :
        - Replace 4 by 1.
        - Replace 9 by 2.
        - Replace 12 by 3.
        - Replace 17 by 4.
    - **In "Original Release Date" and "Current Version Release Date"** :
      - Convert values from **string** to **date format**.
      - Convert **date format** to **integer**.
  - ***Columns Nulls***
    - Dealing with columns that contains null values more than 50%
      - **In "Subtitle"** :
        - Drop column because it contains null values more than 50%.
      - **In "In-app Purchases"** :
        - **Replace** all null values with "0" .
        - Assuming that any cell with null value does **not has any purchases**.
        - **Convert** datatype to **string** to split values in cell and replace them with it's **mean value**.
        - **Convert** datatype to **float** to get final result.
      - **In "Price"** :
        - Replace all null values with the most frequently value "0" .
      - **In "Languages"** :
        - Replace all null values with the most frequently value "EN" .

PREPROCESSING TECHNIQUES

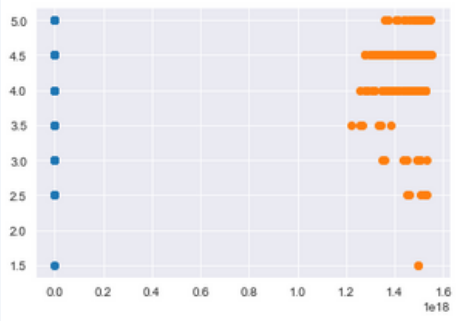
- *FEATURE TRANSFORMATION*
  - **In "URL"** :
    - Extract country name and rename column to "Country".
    - Drop "Country" column because there is **no unique values**.
  - **In "Icon URL"**
    - Extract colors and rename column to "Color".
  - **In "Name"** :
    - Tokenize name.
    - Apply part of speech tagging.
    - Filter out stop words and check if the word is a noun or verb and calculate it's frequency.
    - Get the 50 most frequent words.
    - Replace each word in the "Name" column with 1 if it matches one of the 50 most frequent words.
    - Rename column to "frequent words in Name".
  - **In "Description"** :
    - Convert text to lowercase.
    - Remove URLs, punctuations, stop words and special characters.
    - Remove frequently words that occur more than 2000 times (most frequently 14 word) in document.
    - Remove rare words in documents.
    - Extract game difficulty from "Description" column in "Game Difficulty" column.

- *CORRELATIONS*
  - Get correlation between input variables and output variable
  - Correlation value between two features:
    - "Size" and "Average User Rating" :
      - Correlation = -0.04
    - "Age Rating" and "Average User Rating" :
      - Correlation = 0.00
    - "In-app Purchases" and "Average User Rating" :
      - Correlation = -0.01
    - "Price" and "Average User Rating" :
      - Correlation = -0.08

PREPROCESSING TECHNIQUES

- FEATURE SELECTION
  - After Compute the **correlation** between **input variables** and **output variable** we get top features according to "Average User Rating" value if it greater than **0.1**
  - We get "User Rating Count" and "Original Release Date" as a **top features**

- LINEAR REGRESSION MODEL
  - ***TRAIN MODELS***
    - Accuracy Test = 0.011568518878795842
    - Mean Square Error Test = 0.29740971410321826
  - ***EVALUATE MODELS***
    - Accuracy Test = 0.014374589812016114
    - Mean Square Error Test = 0.3382383496767792
  - ***Train Models with the whole data set***
    - Accuracy Test = 0.01222150503429198
    - Mean Square Error Test = 0.3055913878508464



- Random Forest Model
  - *Train Models*
    - *Accuracy Test = 0.851311921957106*
    - *Mean Square Error Test = 0.851311921957106*

  - *Train Models with the whole data set*
    - *Accuracy Test = 0.08940913200299794*
    - *Mean Square Error Test = 0.3124886485661008*

- Lasso Regression Model
  - *Train Models*
    - *Accuracy Test = 0.011568518878795842*
    - *Mean Square Error Test = 0.29740971410321826*

  - *Train Models with the whole data set*
    - *Accuracy Test = 0.014374589812016114*
    - *Mean Square Error Test = 0.3382383496767792*

PREPROCESSING TECHNIQUES

- Ridge Regression Model
  - *Train Models*
    - *Accuracy Test = 0.0555160741402525*
    - *Mean Square Error Test = 0.2841863090463304 7*
  - *Train Models with the whole data set*
    - *Accuracy Test = -3.460474705487327*
    - *Mean Square Error Test = 1.53070688677892*