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UNIVERSITY OF GALWAY

J.E. CAIRNES SCHOOL OF BUSINESS & ECONOMICS

INDIVIDUAL ASSIGNMENT COVER PAGE

Title: Individual Assignment 2

Module Name and Code: Applied Customer Analytics MS5108

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Question1

Dataset: Latest Buoy reports for M6

Description: The dataset contains 26 hours of observations collected by the buoy in Ireland which is vital for Ireland's weather forecast. It contains information about the sea level pressure, wind direction, wind speed, dew point, wave height & period, sea temperature, and air temperature.

Source dataset: [Latest Buoy reports for M6 - Datasets - data.gov.ie]

Part A: Histogram R base graphics

The histogram is plotted for the numerical data column called sea pressure and below is the output,

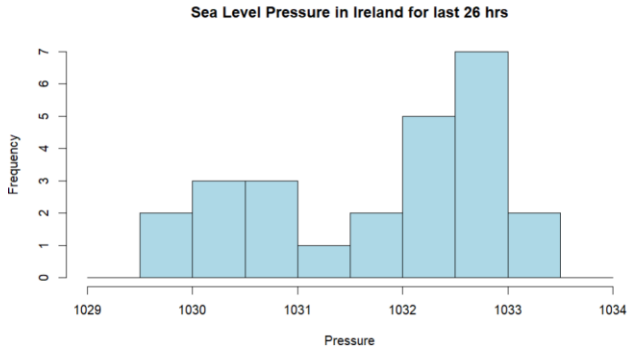


Figure 1 Histogram for Sea level pressure

Part B: Histogram GGPLOT2

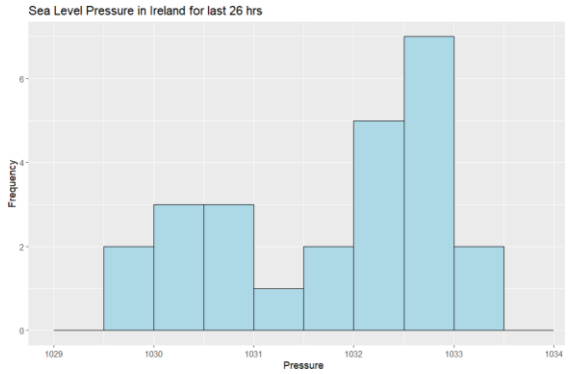


Figure 2 Histogram for Sea level pressure using GGPLOT2

Observation: The x-axis contains the range of values divided into bins and the y-axis shows the frequency or proportion of data points. The histogram does not have a bell-shaped curve, so it's not symmetrically distributed. From the output, we can see that in the last 26 hrs, the sea level pressure was within the range of 1029 and 1034 where is frequency is more at 1032 and 1033 compared to other points.

Part C: Scatterplot R base graphics

The scatterplot shows the graphical representation of two numerical data where the below plot contains x-axis denoting the independent variable (direction) and y-axis denoting the dependent variable (speed). The final scatterplot with car library adds box plots in the margins, a non-parametric regression smooth, smoothed conditional spread, outlier identification, and a regression line.

Based on the output we can see there is a negative correlation and shows weak clustering and relationship,

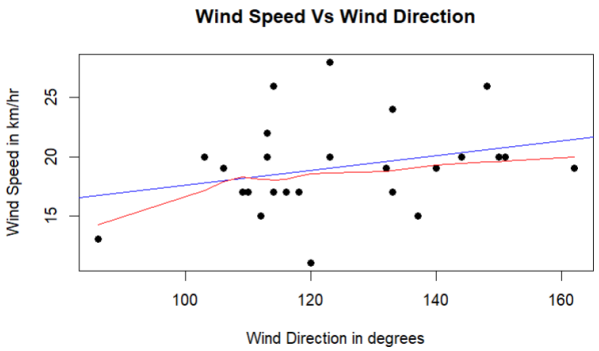


Figure 3: Basis scatterplot

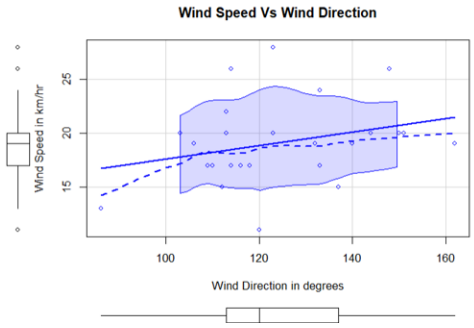


Figure 4: Enhanced scatterplot with regression line

Part D: Scatterplot using GGPLOT2

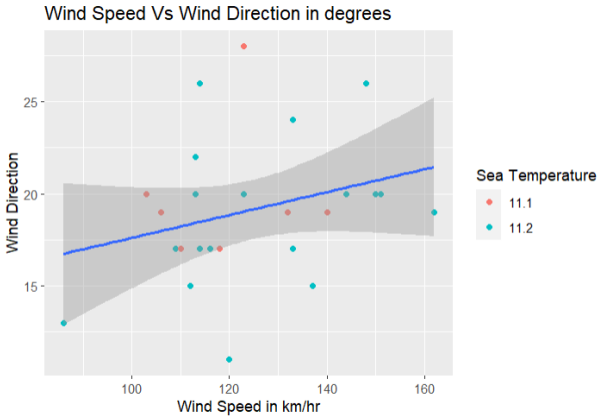


Figure 5: Scattplot using GGPLOT2 with Sea Temperature

Observation: The goem_point and geom_smooth was used to add the fitted points and from the plots, we can see the points are not in a straight line which indicated non-linearity, and also we have a couple of outliers. So, when the speed is within a range of 15-20, the wind is traveling in a direction of 110 degrees and above, and for the last 26 hrs, the sea temperature is 11.1 degree Celsius in most cases.

Question2

Part A: Time series plot using R base graphics

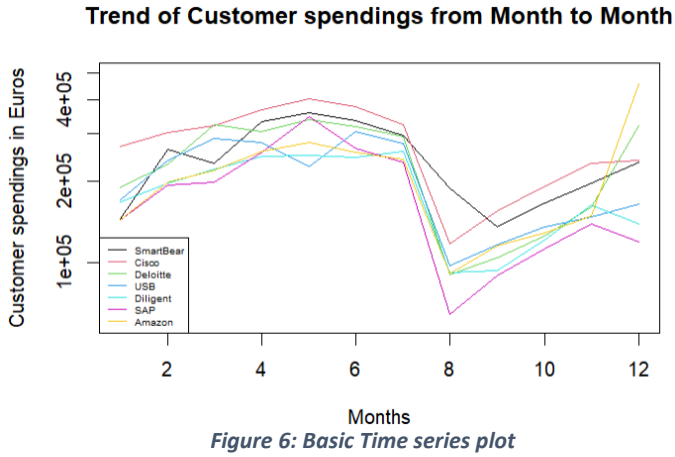


Figure 6: Basic Time series plot

The time series data set contains data about customer spending on different platforms. From the plot, we can see the spendings were almost linear for the first couple of months till July, with Cisco recording the maximum spending from January to July but in August there was a fall/dip in spending of all companies, with SAP at the lowest and again in December the spending went to peak with Amazon recording the highest spending compared to other companies.

Part B: Adding functionalities to the Time series plot

The geom_line and geom_point using ggplot are used to add more functionality to the plot in order to analyze the trend more professionally. Since in the previous graph, the y-axis was exponential, we converted the axis into a log scale for easy interpretation,

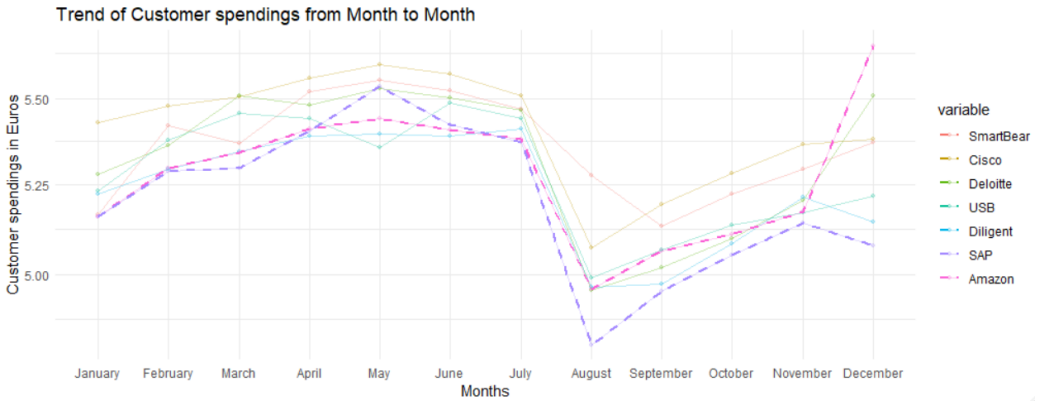


Figure 7: Time series plot using GGPLOT2

From the above, we can see spendings in August were very less for SAP and Amazon which is highlighted in "Violet" and "Pink" dashed lines respectively. But Amazon reached peak spending in December whereas SAP did not progress well. More Analysis can be performed using dygraphs as it is more interactive and enables filtering options. The below plot shows the spending for July-August month specifically,

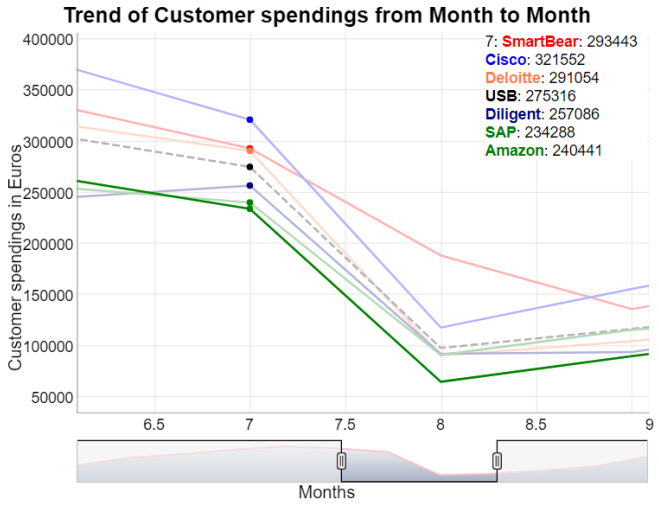


Figure 8: Advanced time series plot using DyGraph

Question3

Preprocessing dataset

The dataset contains 4757 tweets from different sources, and we need to perform preprocessing steps and clean up the dataset before performing any analysis,

1. The dataset is imported as CSV and converted into a corpus
2. Removing duplicates, NA values and converting all text to lowercase
3. Removing digits, hashtags, @ symbol, rt, special characters, blanks, whitespace
4. Removing stop words and punctuation.

Part A: Frequency plot of top25 words

Once the dataset is converted into a document term matrix, we use textstat_frequency for filtering the top 25 words and below is the output,

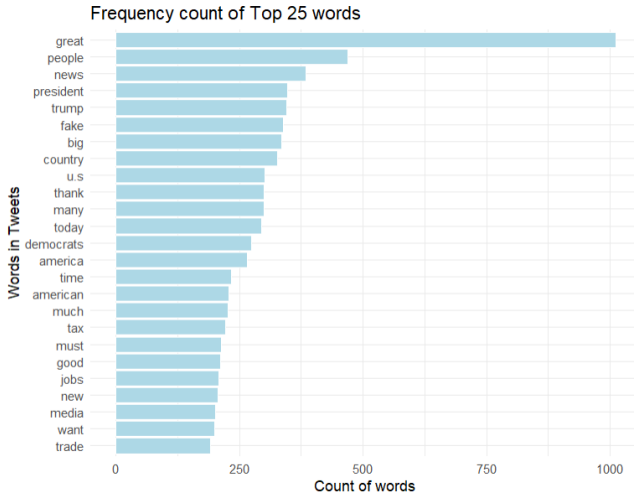


Figure 9: Frequency plot for Top 25 words used in Tweets

Based on the output we can see the top 25 words frequently used by Mr.XYZ in tweets and from which **'great'** has the highest count in usage.

Part B: Word Cloud of 40 common words

The word cloud is created and from the output, we can see the 40 most commonly used words. We can observe a variation in font size from large fonts to smaller fonts representing the usage based on size.

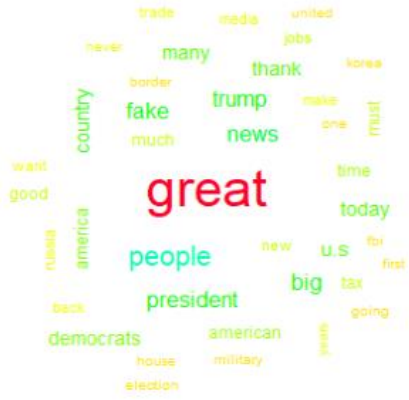


Figure 10: Wordcloud for 40 Common Words

Part C: Social media usage during breakfast time (6-10 AM)

The below plot shows the usage of social media by Mr.XYZ during breakfast time 6-10 AM,

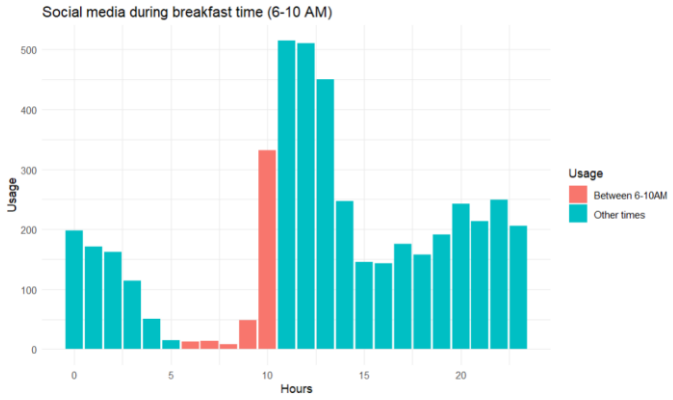


Figure 11: Geom Bar for Social Media usage

The plot shows that Mr.XYZ is not very active during early morning hours but the usage gradually increased after 9 AM and the usage reached a maximum after 10 AM, and then gradually decreased after 2 PM where the usage was fairly close from 3-11 pm.

Part D: Usage per month

The monthly usage of Mr.XYZ can we obtained by plotting a bar plot,

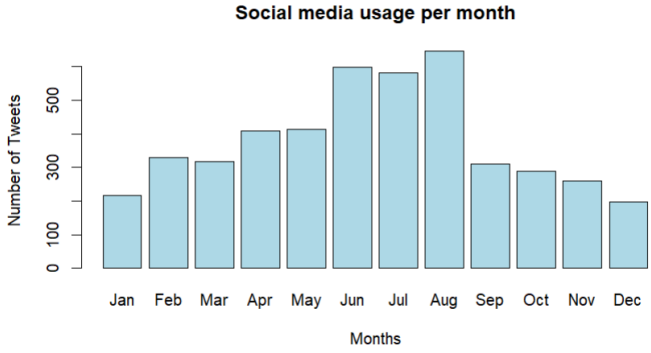


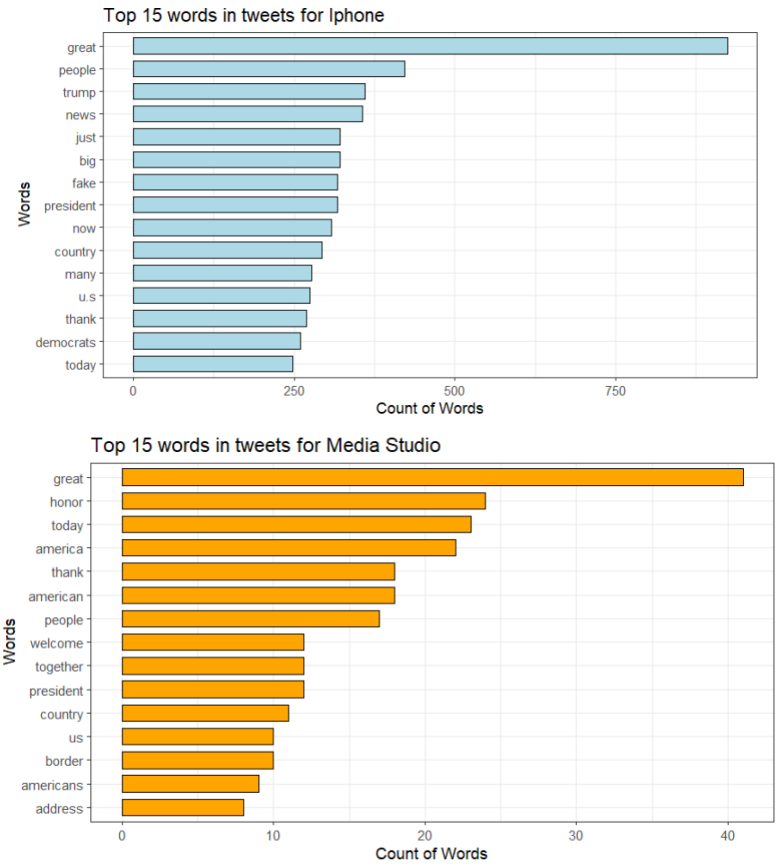
Figure 12: Bar graph for Month wise Social media usage

We can observe that social media usage gradually increased after April and reached a maximum during June, July, and August but usage was very less from September to December and was lowest during January and December.

Part E: Top-15 words for source='iPhone' and source='Media Studio

After filtering and removing stop words from the dataset, the unnest function is used to make one row for each word. And the GGPLOT is used to plot the top 15 words used in both the source and below are the outputs and we can infer that even though the usage of iPhone for tweeting is greater than Media Studio, the word **'great'** is the most frequently used word in the tweets from both sources. Most of the tweets are from iPhone and very few from Media studio.

Figure 13: Top 15 words used from Iphone and Media Studio



There are also some common words like **'great', 'president', 'country', and 'people'**, and adding to that we can also see words like **'Trump', 'Honor', 'Democrats', and 'America'** which show a pattern and the tweets might be regarding the election and it can be confirmed that it's from the same person.

Part F: Six words not used in the last six months of the data but were frequently used in the first six months

We are creating two functions called **last_six** which contains words tweeted in the last six months and **first_six** which contains words tweeted in the first six months,

We use a full join to map each word with its matching component and use filtering based on NA to figure out words not used in the last six months of the data but were frequently used in the first six months,

	word	Frequency
1	obamacare	33
2	americafirst	8
3	icymi	7
4	wh	7
5	notice	6
6	premiums	6

From the output, we can see the top 6 used in the first six months but not the last six months which are **'obamacare', 'americafirst', 'icymi', 'wh', 'notice', and ,'premiums'**.