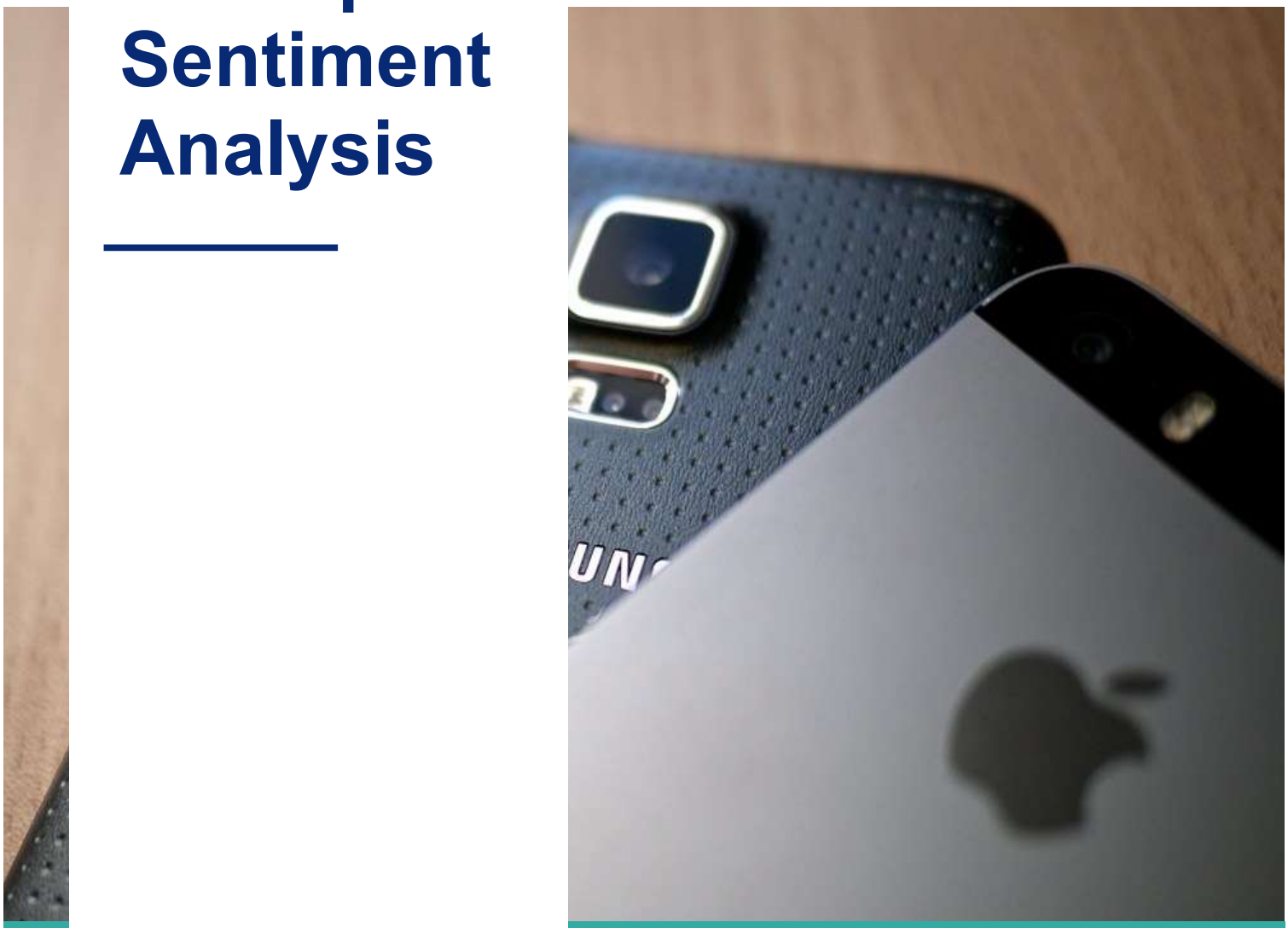
Smartphone Sentiment Analysis



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Alert! Analytics
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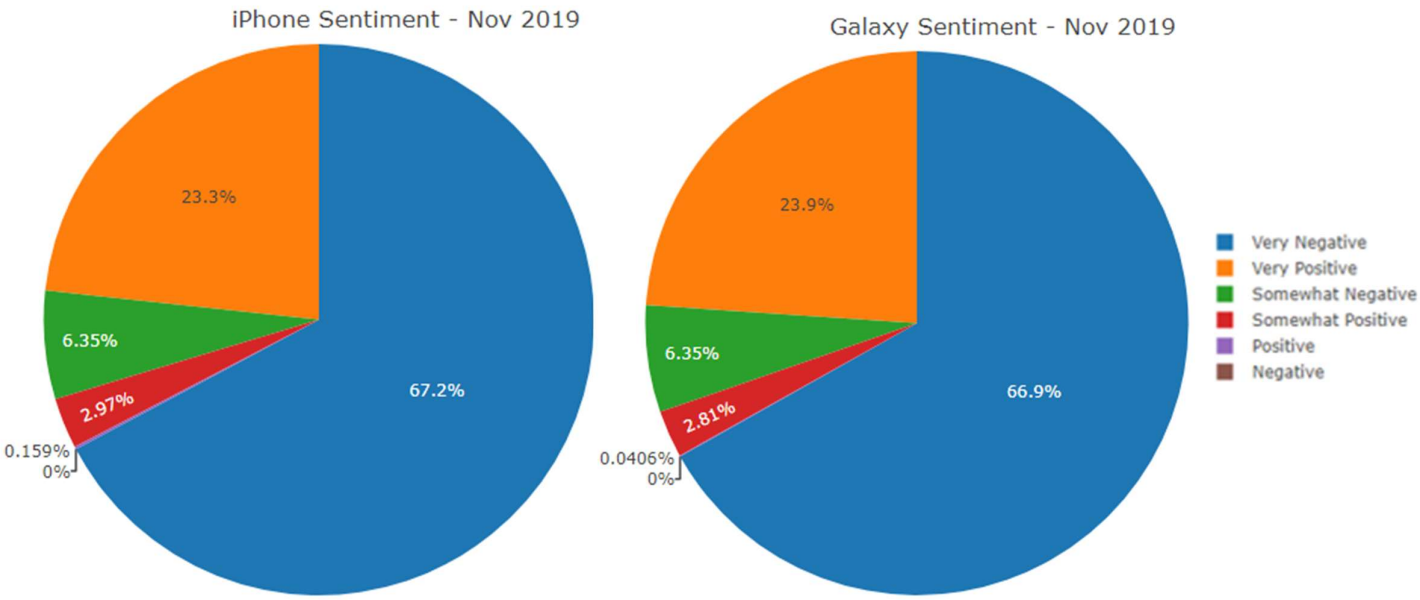
Overview

Helio, a smart phone and tablet app developer, requested our company, Alert! Analytics, to perform a sentiment analysis toward public opinions to different cellphone brands, at the end the scope was reduced to analyze sentiments towards iPhone and Samsung Galaxy phones.
Helio plans to create a remote reporting health solution for the government, but it will only develop the app for one smartphone type.

We examined the positive and negative sentiments toward these devices on the web and share our findings in this report.

Findings

After analyzing 59,139 websites, the research found that during the month of November 2019, prior thanksgiving, the general opinion towards both handsets was mostly negative, as seen below:



The predictions are showing that the general public has very strong positions, either the love or hate the headset. Even though we found that there are more negative opinions towards both brands, it doesn't mean that choosing either will be terrible, since we believe that many of these negative sentiments are due to the smartphones steep price.

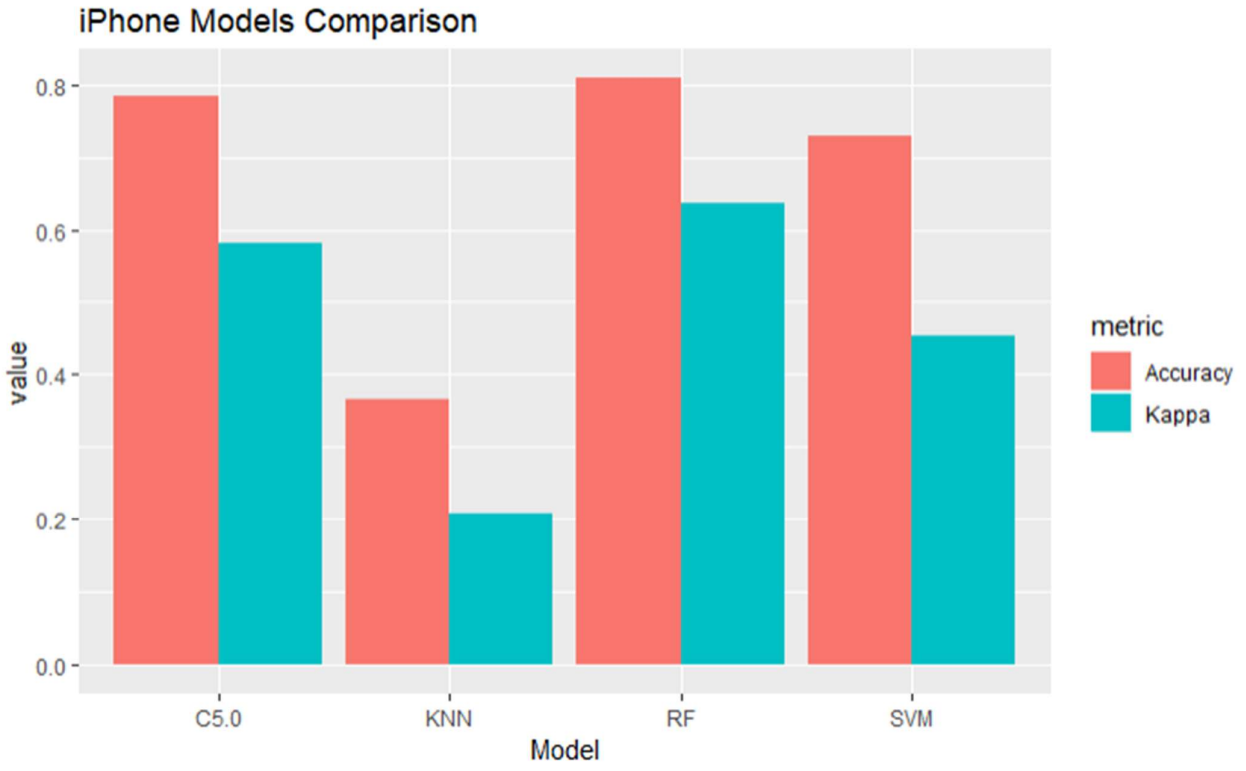
Confidence

The best machine learning models showed the following confidence:

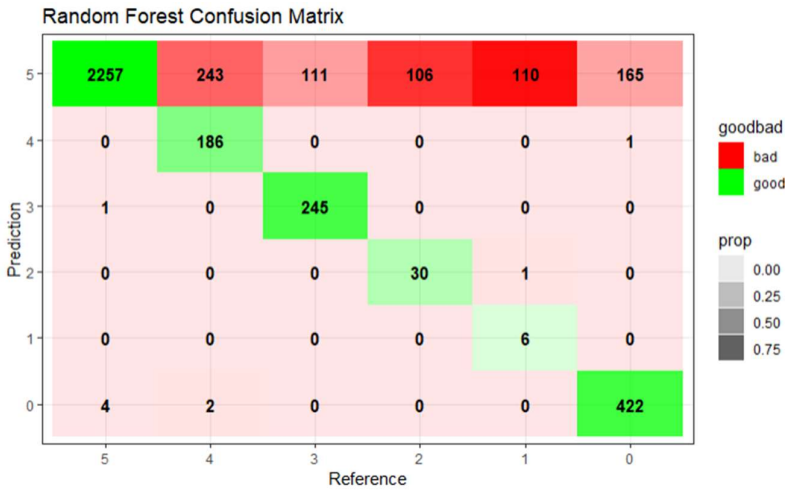
Model	Accuracy	Kappa
iPhone	0.8087404	0.6354706
Galaxy	0.8041850	0.6152908

iPhone confidence analysis

Four different machine learning models were tested, with these results:



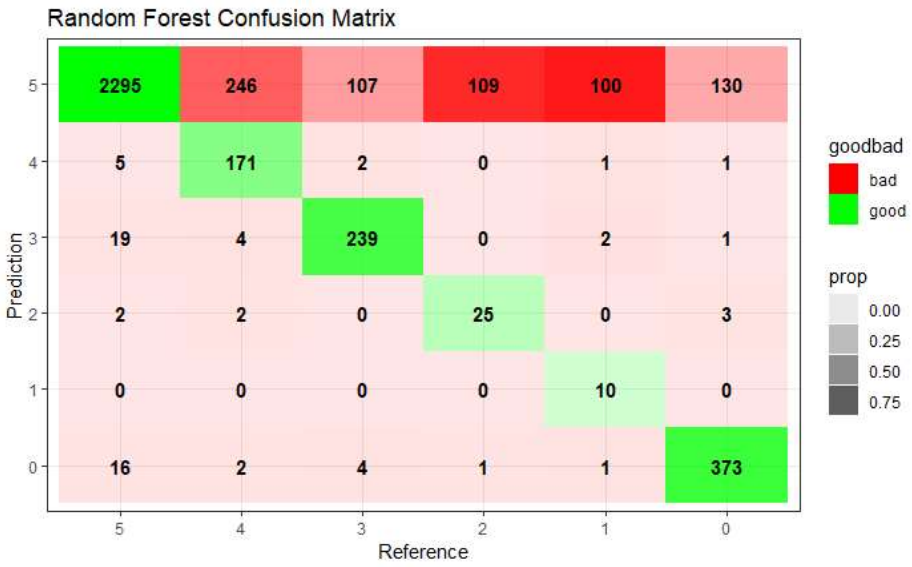
In the case of the **iPhone**, the accuracy and kappa shown by the **Random Forest** model were highest. It also showed the best-balanced accuracy on the confusion matrix analysis. However, caution should be taken since all the models tend to classify occurrences to the "Very Positive (5)" class, as seen in confusion matrix diagram.



Galaxy confidence analysis

Four different machine learning models were tested, with these results:

In the case of the **Galaxy** phones, the accuracy shown by the **Random Forest** model were the highest. As well, it seems the most errors are present when classifying the “Very Positive” (5) sentiment.



Implications Section

Both smartphones came with very similar results during the analysis, which means that Helios should be confident that choosing either will not cause an issue. It doesn't really matter which one gets chosen, since both brands have people that love them or hate's them. Helios should not be concerned about this.

The decision should be made balancing other factors as well, like cost of development of the solution + deployment, long term support for the manufacturers, etc.

It is our opinion, the iPhone smartphone will be a better choice, since we tested several models and we got more consistent results by analyzing how different variables correlate, in regard to user opinions to different elements, like performance, camera and ease of use.

Methodology

Our team create two sets of labeled data, one with attitudes regarding iPhone, and the other one with attitudes regarding the Galaxy smartphone. We have used these datasets to train two models, and classified the data collected from thousands of websites on the month of December 2019, in order to gather statistics about the feelings for either smartphone.

The labeled datasets categorized sentiments in 5 categories:

Category	*0*	*1*	*2*	*3*	*4*	*5*
Sentiment	**Very Negative**	**Negative**	**Somewhat Negative**	**Somewhat Positive**	**Positive**	**Very Positive**

We trained and compared 4 different machine learning models to gather the sentiments over the data found on the web. We have used two different metrics to measure confidence: Accuracy and Kappa.
For the iPhone we selected a Random Forest model, using a Recursive Feature Elimination technique for feature selection, and for the Galaxy we selected the Random Forest model with all features.
We predicted the sentiment for both the iPhone and Galaxy smartphones, from **59,139** observations taken from the web on **November 11th, 2019**.