Analyzing Global Perceptions of the British Royal Family Following the Queen's Passing

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Introduction

After Elizabeth II, Queen of the United Kingdom passed away in 2022, many people took to Twitter to express their sentiment towards the Queen and the British Royal Family. Using "Tweets" obtained from Twitter's web API in the weeks following the Queen's passing, the team performed a sentiment analysis on global perceptions of the British Royal Family using unique data preprocessing, Machine Learning (ML), and data visualization techniques.

Twitter Data

The team sourced data from the Twitter web API, in the form of "Tweets". When calling the API, keywords and "hashtags" – such as #QueenElizabeth and #RoyalFamily – were used as query parameters to retrieve Tweets pertaining to the British Royal Family, which resulted in the collection of over 1,000,000 Tweets.

"I give you Prince Harry and Princess Meghan Markle with a beautiful kiss as a timeline cleanser... This is real love… #HarryandMeghan #MeghanMarkle" – Twitter User

Text Data Preprocessing

Dealing with text data requires a large amount of pre-processing work to get it into a digestible format for ML algorithms. This includes, but is not limited to, removing non-alphanumeric characters (such as emoticon symbols), web-links, "stop-words", performing stemming and lemmatization, then feature engineering, such as Term Frequency Inverse Document Frequency (TF IDF) and count vectorization.

Machine Learning Model Results

We split hand-labeled ground truth (classifying tweets as *positive, negative,* or *neutral* sentiment) into Train and Test splits for model training and performance evaluation, respectively. The *majority vote ensemble* of each trained model resulted in the best performance and was used to label all data in our data set.

Metrics/Models	Accuracy	Precision - Macro	Recall - Macro	F1 Score - Macro
Count Vec + ANN (Neural Network)	0.71	0.69	0.70	0.69
Count Vec + XGBoost	0.65	0.66	0.64	0.65
TFIDF + Naïve Bayes	0.64	0.65	0.63	0.64
TFIDF + SVM	0.67	0.70	0.65	0.67
Ensemble	0.83	0.81	0.84	0.82

Sentiment Classifications

The result of the team's modeling work was a large collection of *positive, negative* and *neutral* sentiment classified tweets, which we further analyzed by studying the sentiment towards each Royal Family member (Figure 1), sentiment expressed by country (Figure 2), and how sentiment changed over time (Figure 3).
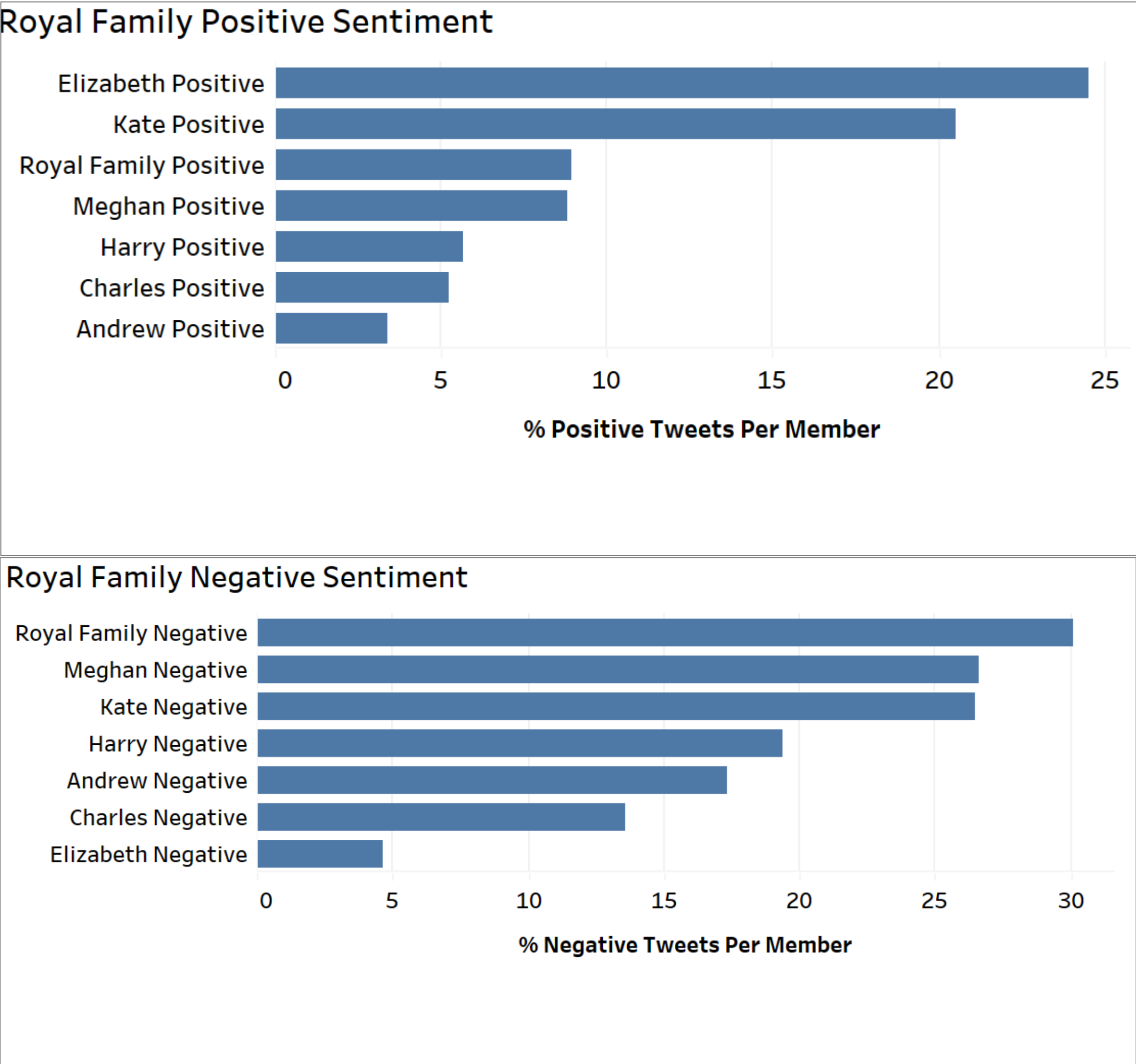

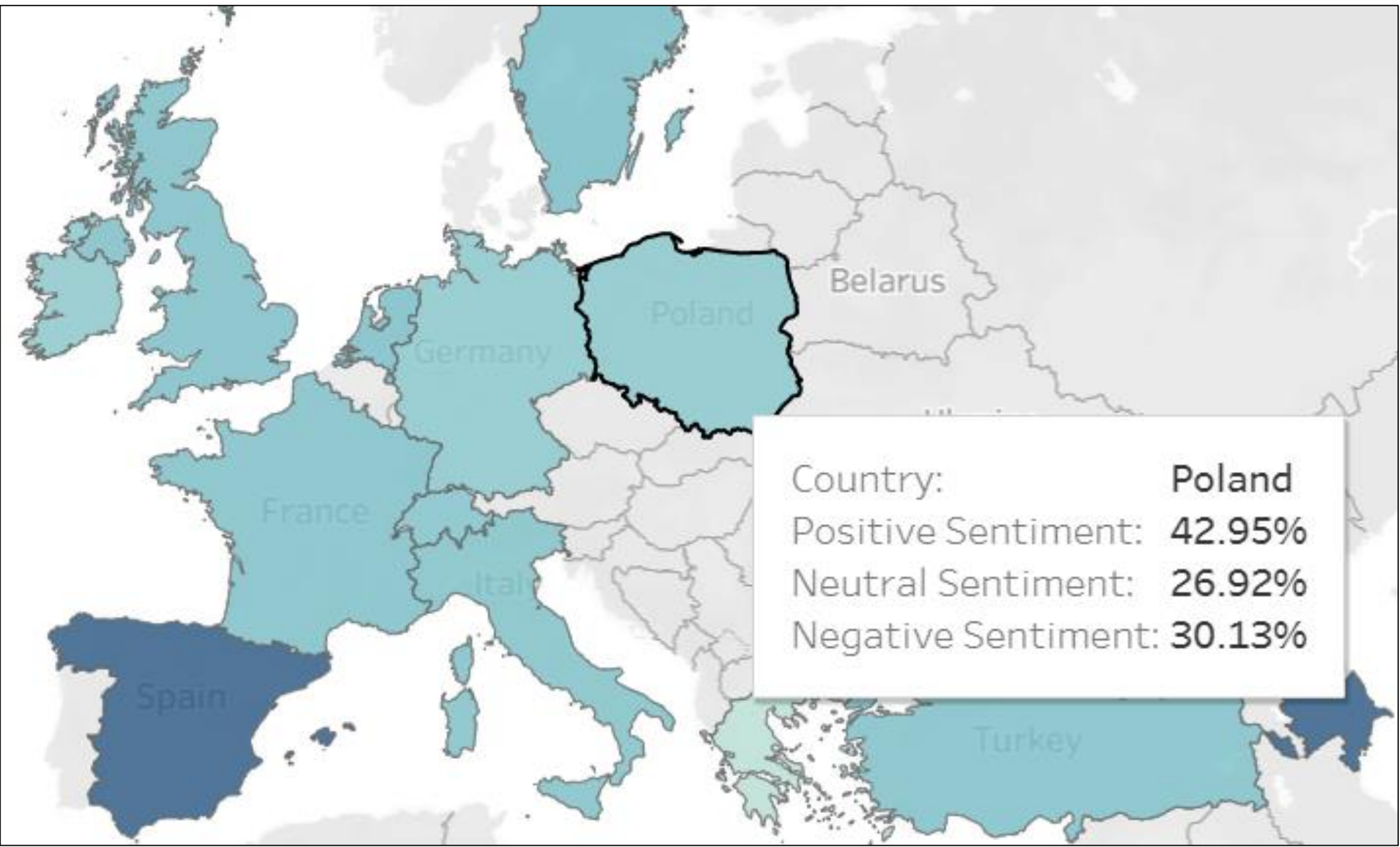*Figure 1: Percent Positive & Negative Sentiment Tweets per Member*
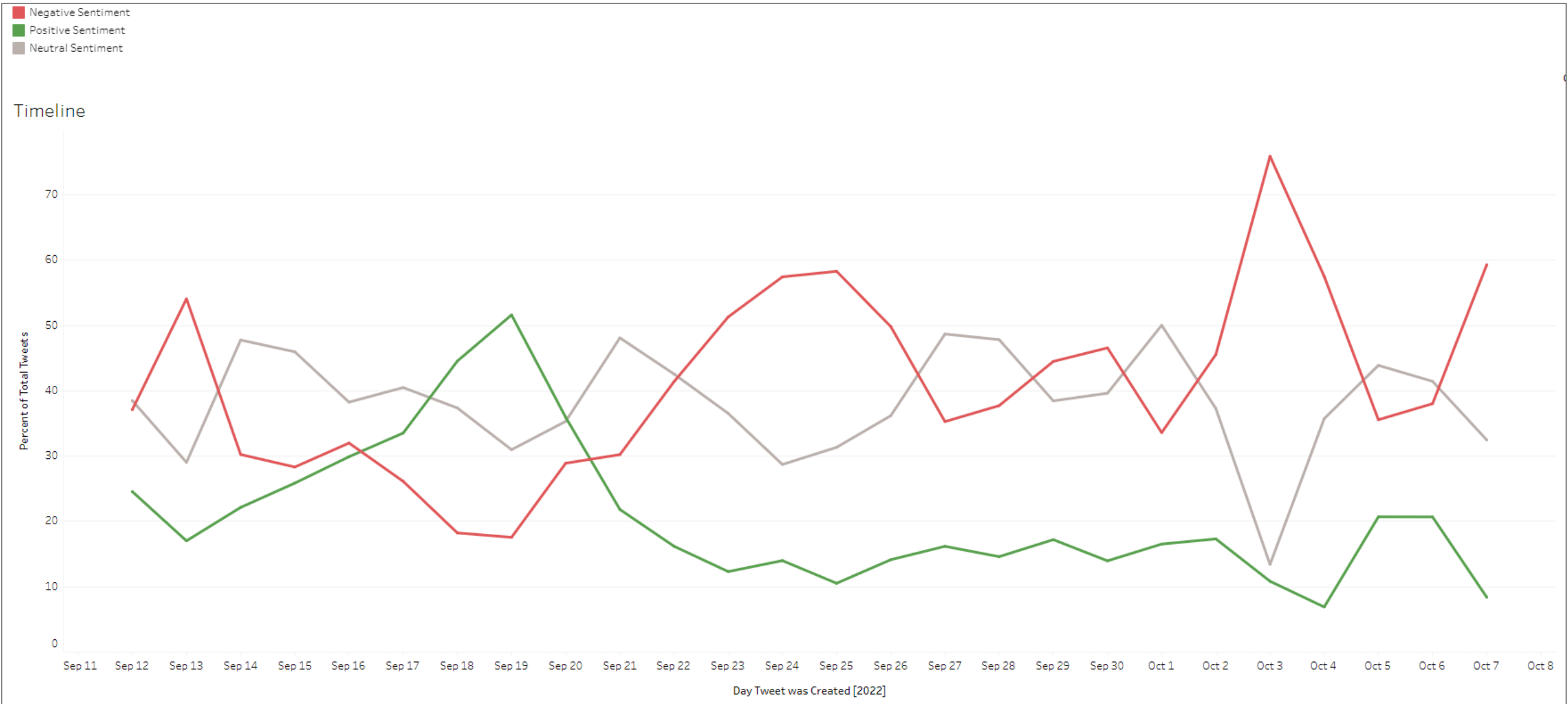

Figure 2: Choropleth Example of Sentiment by Country

Figure 3: Sentiment Expressed Over Time