



Smarten Working with Sentiment Analysis

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Disclaimer

This document is intended to support administrators, technology managers or developers using and implementing Smarten. The business needs of each organization will vary and this document is expected to provide guidelines and not rules for making any decisions related to Smarten. The overall performance of Smarten depends on many factors, including but not limited to hardware configuration and network throughput.

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1 Introduction

Sentiment Analysis helps users understand the underlying sentiment (positive, negative, or neutral) for the target textual data and obtain beneficial information about the overall sentiment for the relevant data as well as provide insight into context-based sentiment and variation in sentiment over a period of time.

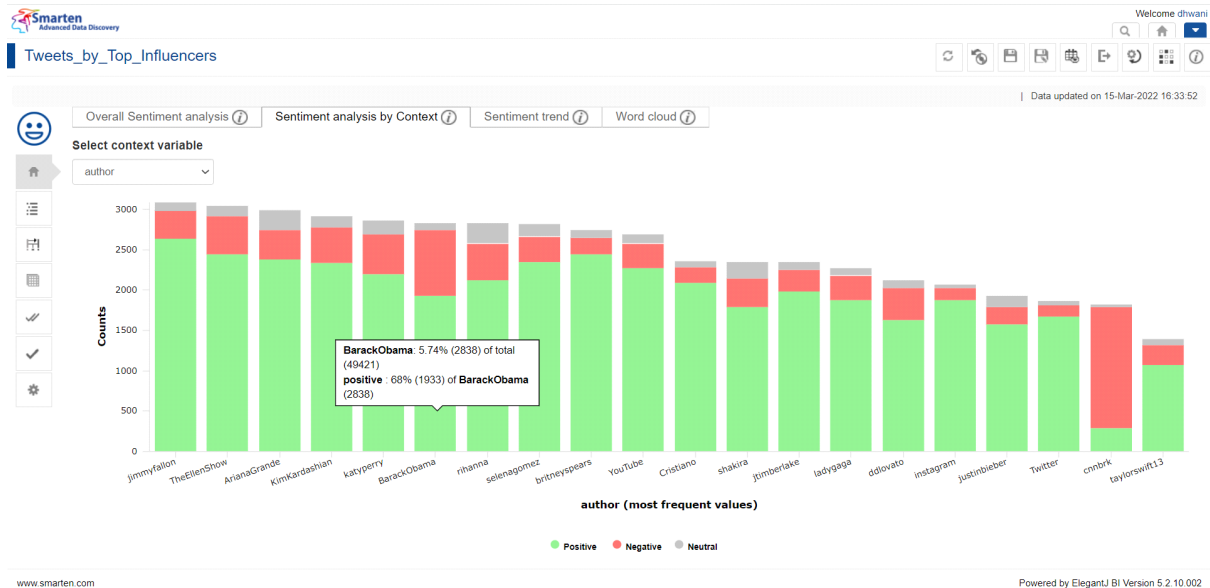
For example, by analyzing sentiment for a product based upon reviews by its users, one can identify the overall sentiment considering all relevant factors and analyze whether the user reviews are positive or negative about the product. Moreover, we can also perform contextual sentiment analysis for this use case, which has an important role while recognizing target text sentiment based upon some specific context. For instance, if you only want to analyze product reviews for a particular category, e.g., mobile devices, you can use context filters to filter and analyze feedback for only this particular context. Additionally, analyzing how the trend varies for user sentiment over a period of time provides noteworthy insights upon time-based sentiment analysis and henceforth predicts future trends in user sentiment.

2 How it can help

From understanding users' sentiment for a product or a brand to extracting sentiment and review reputation from social media posts, such as tweets and comments; from recognizing movie reviews from the box office to understanding sentiment from news headlines or inshorts news; from tracking customer sentiment over time to evaluating employee surveys to discover their feedback for the company, sentiment analysis has shown its utility over a wide range of domains and industries.



SENTIMENT ANALYSIS—OBTAIN OVERALL DISTRIBUTION OF SENTIMENT FOR FINANCIAL NEWS DATA



SENTIMENT ANALYSIS—OBTAIN SENTIMENT DISTRIBUTION FOR TWEETS CORRESPONDING TO EVERY AUTHOR

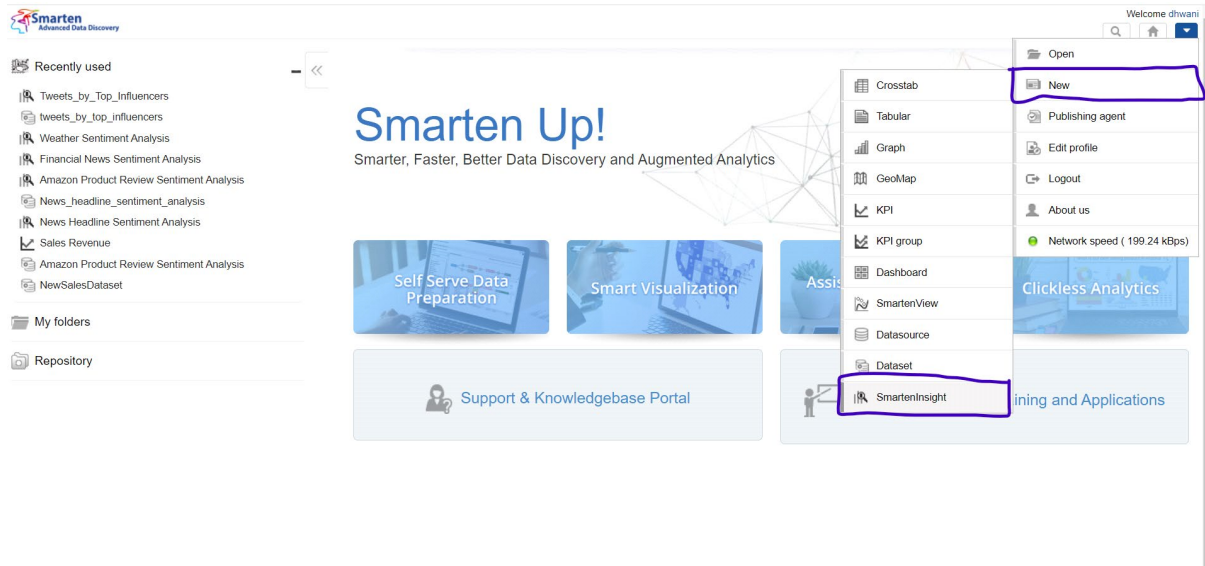


SENTIMENT ANALYSIS—OBTAIN A WORD CLOUD EXPRESSING TOP KEYWORDS INDICATING WEATHER DATA SENTIMENT

3 Creating Sentiment Analysis using Smarten

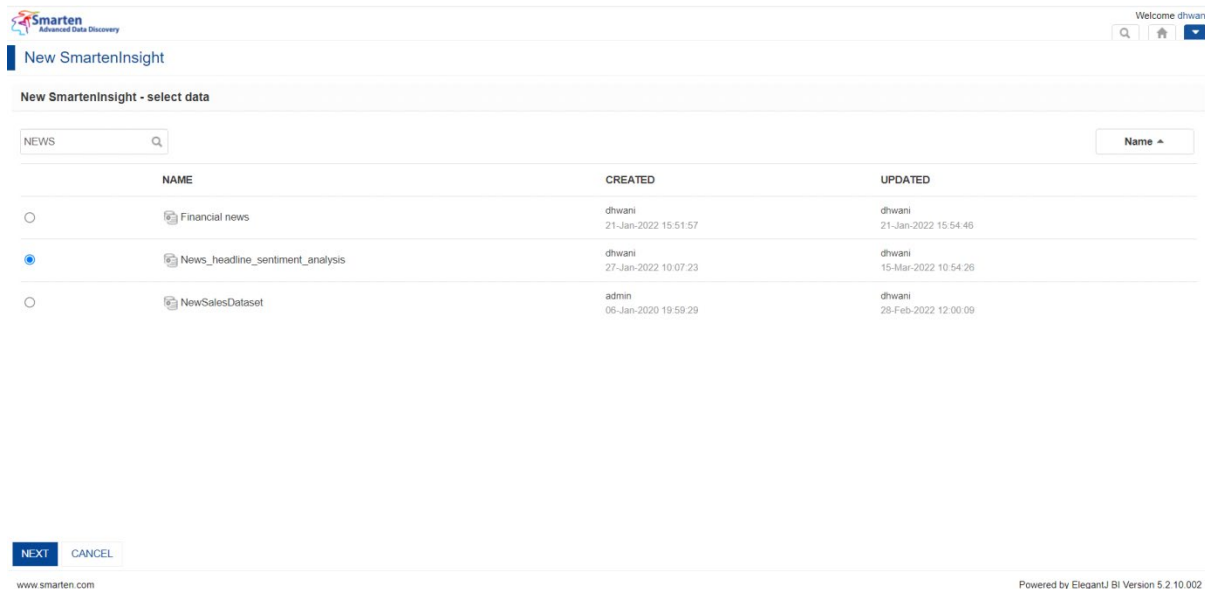
For an overview and an easy-to-grasp interpretation of Sentiment Analysis using Smarten Insight, only a few simple steps are required, as follows:

3.1 Create a new Smarten Insight



SENTIMENT ANALYSIS—CREATING A FRESH, NEW SMARTEN INSIGHT

3.2 Select Dataset to analyze sentiment



SENTIMENT ANALYSIS—SELECT DATASET TO ANALYZE SENTIMENT AND CLICK “NEXT”

3.3 Perform sampling and filtering if required

Smarten Advanced Data Discovery

Welcome dhvani

New SmartenInsight

New SmartenInsight - Sampling and filtering

Do you want to run model on sample data?

☐ Yes (Sample data)

☒ No (Full data)

Do you want to apply filters on dataset?

☐ Yes

☒ No

☐ Select all data

NEXT CANCEL BACK

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SENTIMENT ANALYSIS—PERFORM SAMPLING AND FILTERING OPTIONS AND CLICK “NEXT”

3.4 Handle Outliers and Missing Values if required

Smarten Advanced Data Discovery

Welcome dhvani

New SmartenInsight

New SmartenInsight - data cleaning

Do you want to handle outliers in the dataset?

☐ Yes

☒ No

Handle missing values in the dataset

☒ Remove

☐ Replace

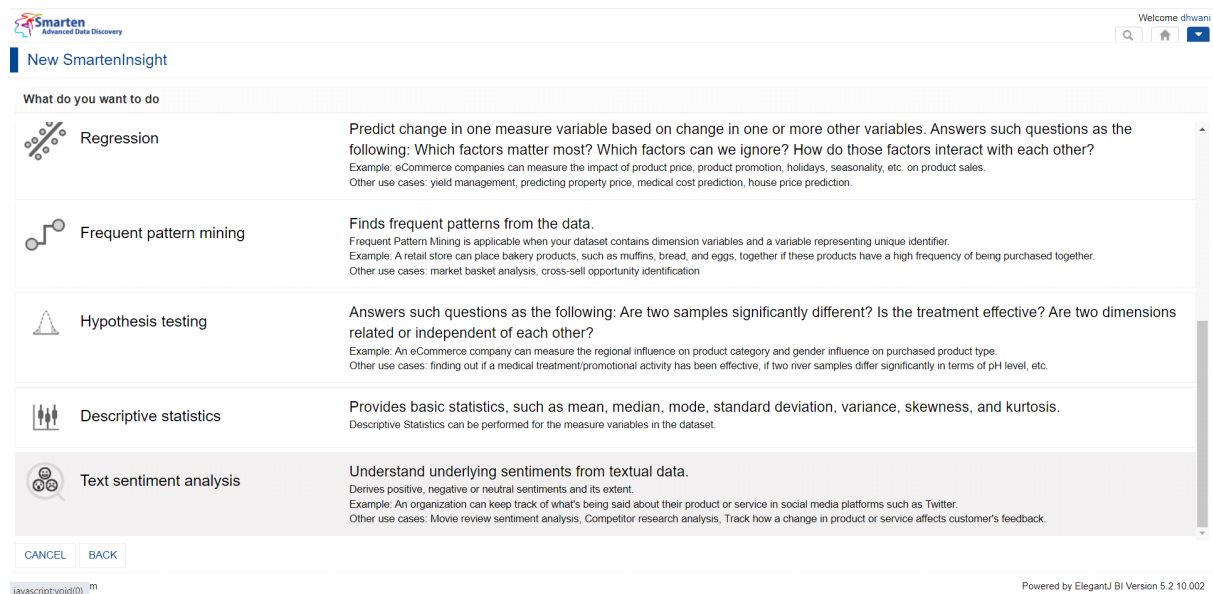
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SENTIMENT ANALYSIS—HANDLE OUTLIERS AND MISSING VALUES IF NEEDED AND CLICK “NEXT”

3.5 Perform Text Sentiment Analysis to understand underlying sentiment from textual data








Smarten Advanced Data Discovery

Welcome dhvani

New SmartenInsight

What do you want to do

	Regression	Predict change in one measure variable based on change in one or more other variables. Answers such questions as the following: Which factors matter most? Which factors can we ignore? How do those factors interact with each other? Example: eCommerce companies can measure the impact of product price, product promotion, holidays, seasonality, etc. on product sales. Other use cases: yield management, predicting property price, medical cost prediction, house price prediction.
	Frequent pattern mining	Finds frequent patterns from the data. Frequent Pattern Mining is applicable when your dataset contains dimension variables and a variable representing unique identifier. Example: A retail store can place bakery products, such as muffins, bread, and eggs, together if these products have a high frequency of being purchased together. Other use cases: market basket analysis, cross-sell opportunity identification
	Hypothesis testing	Answers such questions as the following: Are two samples significantly different? Is the treatment effective? Are two dimensions related or independent of each other? Example: An eCommerce company can measure the regional influence on product category and gender influence on purchased product type. Other use cases: finding out if a medical treatment/promotional activity has been effective, if two river samples differ significantly in terms of pH level, etc.
	Descriptive statistics	Provides basic statistics, such as mean, median, mode, standard deviation, variance, skewness, and kurtosis. Descriptive Statistics can be performed for the measure variables in the dataset.
	Text sentiment analysis	Understand underlying sentiments from textual data. Derives positive, negative or neutral sentiments and its extent. Example: An organization can keep track of what's being said about their product or service in social media platforms such as Twitter. Other use cases: Movie review sentiment analysis, Competitor research analysis, Track how a change in product or service affects customer's feedback.

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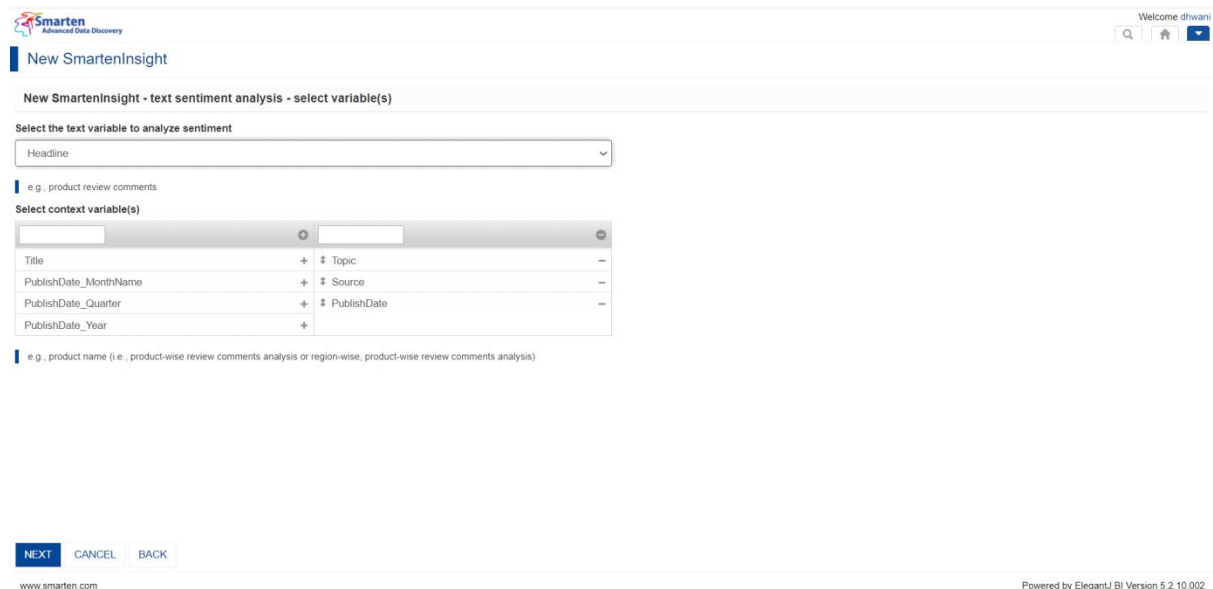
javascriptvoid(0) m

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SENTIMENT ANALYSIS—CHOOSE TEXT SENTIMENT ANALYSIS OPTION

3.6 Select variables to perform sentiment analysis

This step might take some time until you land on the sentiment analysis model hence created!



Smarten Advanced Data Discovery

Welcome dhvani

New SmartenInsight

New SmartenInsight - text sentiment analysis - select variable(s)

Select the text variable to analyze sentiment

Headline

e.g., product review comments

Select context variable(s)

	+	\$	Topic	-
Title	+	\$	Source	-
PublishDate_MonthName	+	\$	PublishDate	-
PublishDate_Quarter	+			
PublishDate_Year	+			

e.g., product name (i.e., product-wise review comments analysis or region-wise, product-wise review comments analysis)

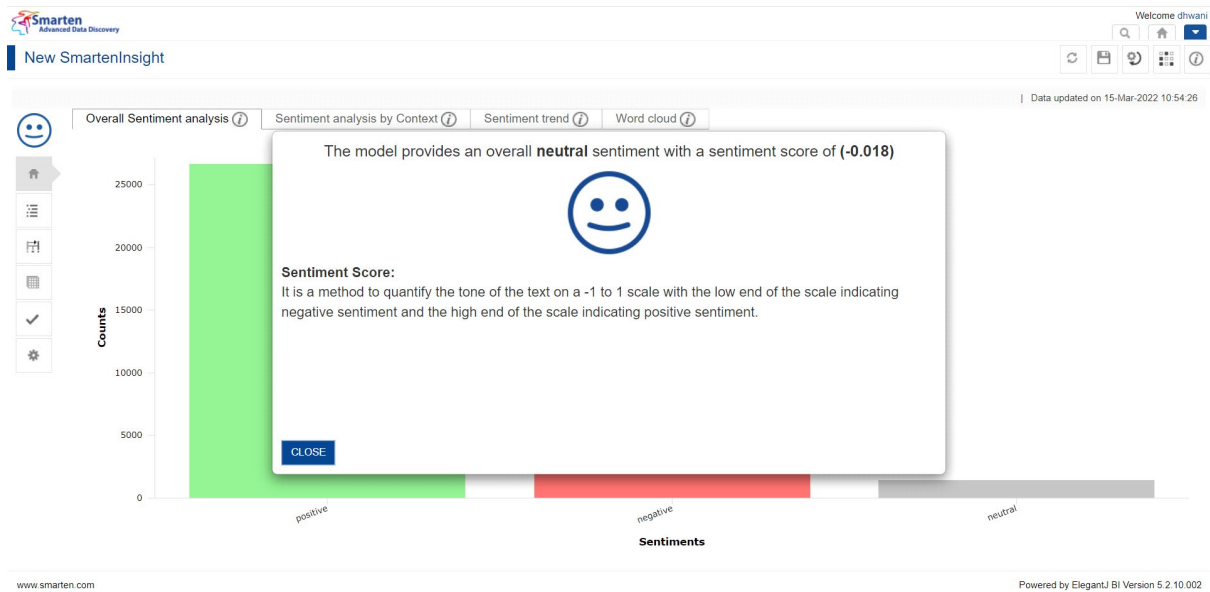
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SENTIMENT ANALYSIS—SELECT VARIABLES FOR TEXT SENTIMENT ANALYSIS AND CLICK “NEXT”

3.7 Sentiment analysis model is ready to use



SENTIMENT ANALYSIS—MODEL GENERATED AND READY TO USE

4 Sentiment Analysis Components

4.1 Overall Sentiment Analysis

This plot is used to visually analyze how the frequency of each sentiment response, i.e., positive, negative, or neutral, is distributed. For instance, the plot below shows how the sentiment values, i.e., positive, negative, or neutral, are distributed across the overall news headlines dataset.



SENTIMENT ANALYSIS—OVERALL SENTIMENT ANALYSIS CONSIDERING ENTIRE DATASET

4.2 Sentiment Analysis by Context

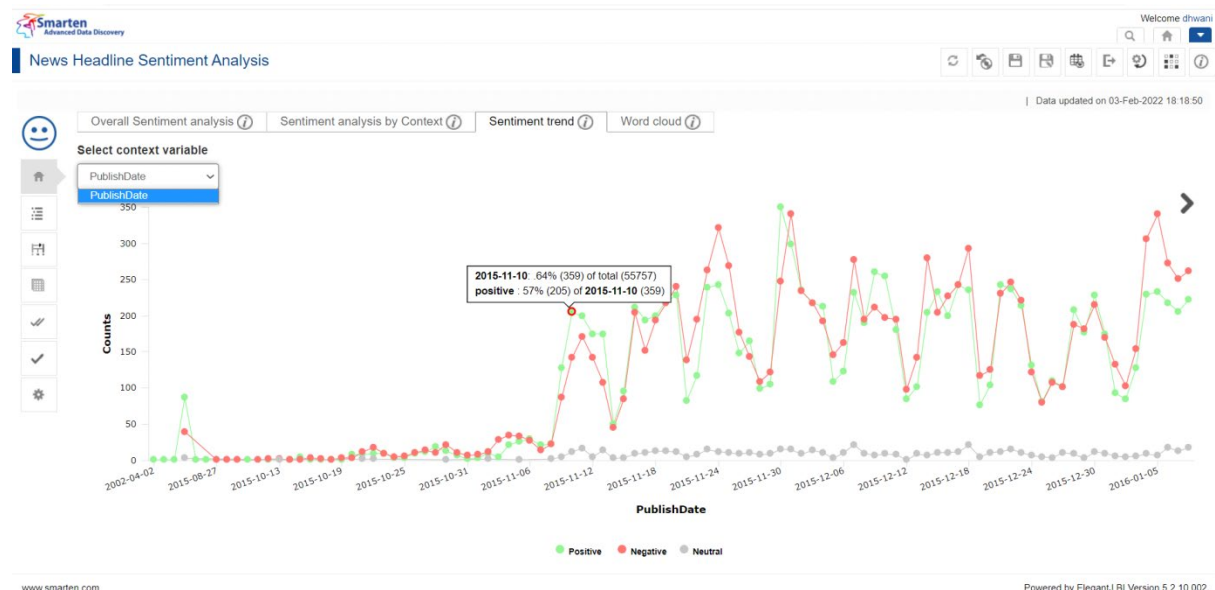
This plot is used to visually analyze how the frequency of each sentiment response, i.e., positive, negative, or neutral, is distributed based upon the context variable(s). For instance, the plot below shows how the sentiment values, i.e., positive, negative, or neutral, for news headlines are distributed based upon the Topic.



SENTIMENT ANALYSIS—SENTIMENT ANALYSIS BASED UPON SELECTED CONTEXT VARIABLE

4.3 Sentiment Trend

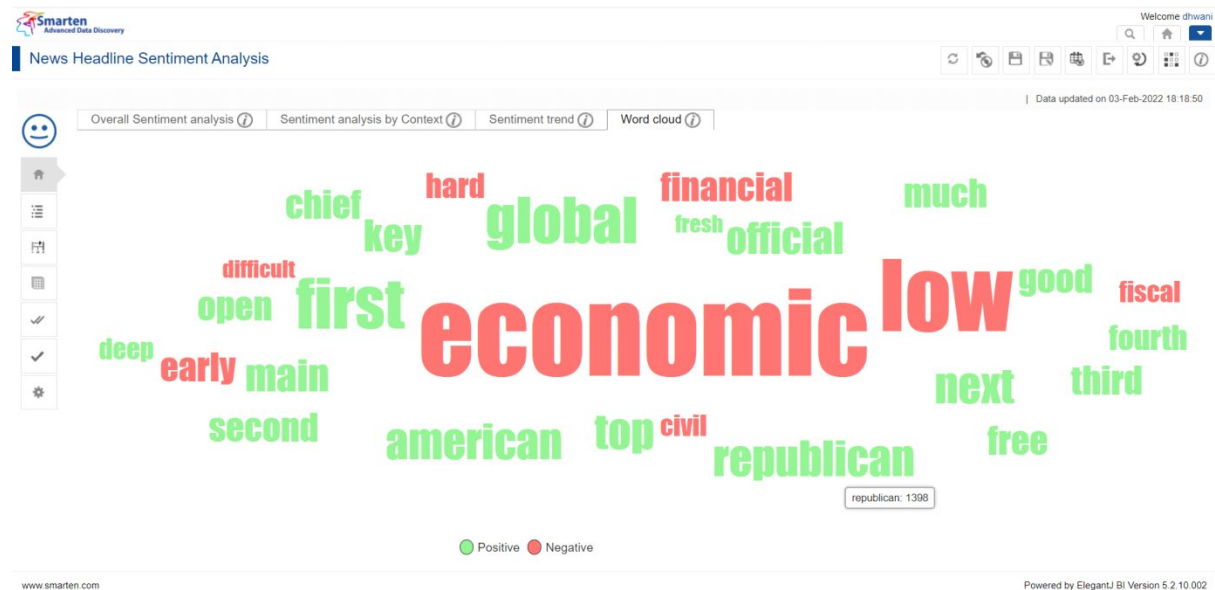
This plot is used to visually analyze the sentiment trend based upon the selected time dimension. For instance, the plot below shows how the trend for sentiment values, i.e., positive, negative, or neutral, for news headlines varied over the news published date.



SENTIMENT ANALYSIS—SENTIMENT TREND FOR POSITIVE, NEGATIVE, AND NEUTRAL SENTIMENT OVER A PERIOD OF TIME

4.4 Word Cloud

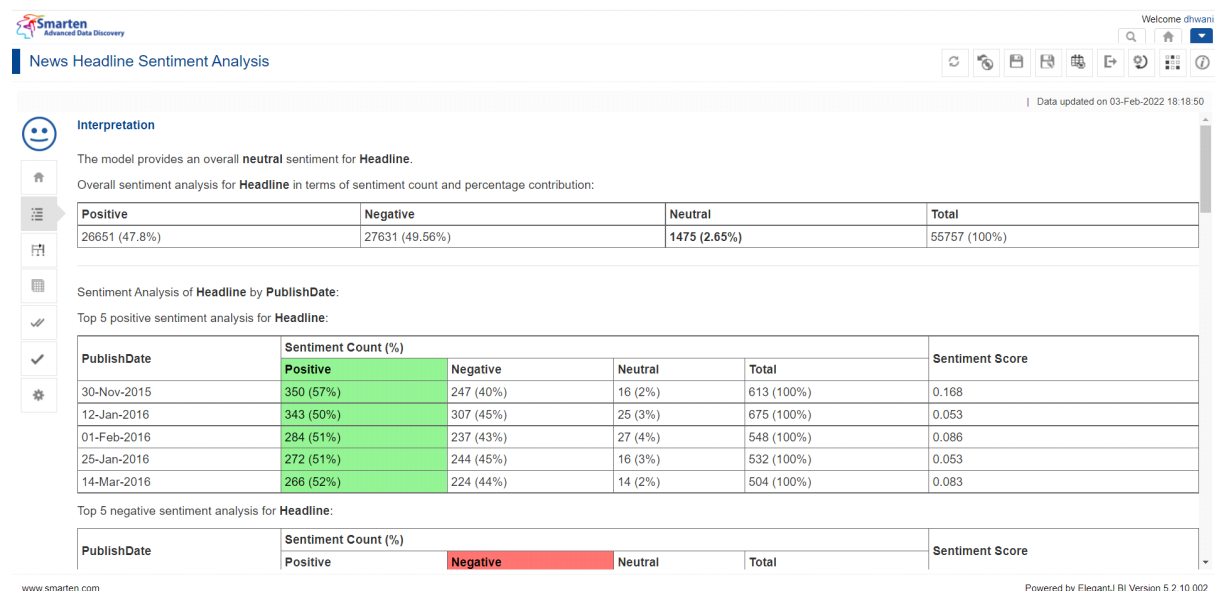
The word cloud displays the top keywords with positive and negative sentiment, with the color representing the nature of sentiment and word size representing its weight.



SENTIMENT ANALYSIS—SENTIMENT WORD CLOUD

4.5 Interpretation

This component provides interpretation of sentiment insights in simple natural language.



SENTIMENT ANALYSIS—INTERPRETATION FROM INPUT DATA

4.6 Model Summary

This component provides a technical model summary to analyze the sentiment for news headlines.

The screenshot shows the Smarten Advanced Data Discovery interface. The top navigation bar includes the Smarten logo, a search bar, and a user profile. The main header is "News Headline Sentiment Analysis". The left sidebar contains icons for Home, Datasets, Models, and Settings. The main content area is titled "Model summary" and displays the following information:

- Model summary:** The model provides an overall **neutral** sentiment with a sentiment score of **(-0.018)**.
- Sentiment target variable:** **Headline**
- Sentiment context variable(s):** **Source, Topic, PublishDate**
- Total number of records to analyze sentiment:** **55757 (100%)**
- Total number of records with Positive sentiment:** **26651 (47.8%)**
- Total number of records with Negative sentiment:** **27631 (49.56%)**
- Total number of records with Neutral sentiment:** **1475 (2.65%)**
- Sentence Encoder:** Universal Sentence Encoder
- Architecture:** DAN (Deep Averaging Architecture)
- Training Model:** Tensorflow Hub
- Sentiment Analysis Approach:** SentimentDL Approach (a deep learning approach for multi-class sentiment analysis)
- Pre-Processing:**
 - [Sentence Encoding] Detect the sentences from the text
 - [Normalization] Remove all punctuations and dirty characters from text
 - [Tokenization] Extract useful Keywords to examine the sentiments
 - [Lemmatization] Lemmatize the Keywords to obtain corresponding base dictionary word
 - [Stop Words Cleansing] Remove stopwords (i.e. a, the, is, are, this etc.) from the sentence
- Terminologies:**
- Sentiment Score:** It is a method to quantify the tone of the text on a -1 to 1 scale with the low end of the scale indicating negative sentiment and the high end of the scale indicating positive sentiment.

The footer of the interface shows "www.smartent.com" on the left and "Powered by ElegantJ BI Version 5.2.10.002" on the right.

SENTIMENT ANALYSIS—MODEL SUMMARY

4.7 Data

This component displays the chosen dataset for sentiment analysis along with a sentiment label and sentiment support corresponding to each record.

Smarten Advanced Data Discovery

Welcome dhvani

News Headline Sentiment Analysis

Data updated on 03-Feb-2022 18:18:50

Data

Source	Topic	PublishDate	sentiments	sentiment_support
tical rally on Thursday.	obama	2016-01-14	positive	1
tarted with the new Windows 10 device. Once you do that, Windows 10 will g...	microsoft	2016-01-16	positive	1
atically increased the	microsoft	2016-02-09	positive	1
8, 2016. Photo: PMO.	microsoft	2016-01-18	positive	1
ons are complicated but "not	economy	2015-12-04	negative	1
US and global economic	economy	2016-01-03	positive	1
sed on upstart ride-for-hire	economy	2016-03-17	negative	1
omy is likely to remain there for the foreseeable future, according to The Conf...	economy	2015-11-09	negative	0.812
unpredictable""for U.S	economy	2015-11-12	positive	0.924
na's slowing economy and	economy	2016-02-25	negative	1
ing levels of bias in speech and deeds	obama	2016-02-03	negative	1
on the right and left are ramping up for a protracted fight, and the President w...	obama	2015-03-01	negative	1
s such as social media,	economy	2016-03-07	positive	1
ers and central bankers from the world's	economy	2016-02-28	positive	0.617
ase telephone service should be extended to cover the Internet. The discount...	obama	2016-03-09	positive	0.956
aging the economy, adding it	economy	2016-03-20	negative	0.701

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SENTIMENT ANALYSIS—DATA TAB WITH SENTIMENT LABEL AND SENTIMENT SUPPORT

4.8 Mass Apply

This component enables predicting sentiment for multiple records from the SmartenInsight model for the data available in a CSV file or dataset created using Smarten. You can map the columns available in the file with the columns used to generate SmartenInsight. The system will predict the sentiment label as well as display sentiment support for provided data and generate the result. A user can export this result in CSV format for further use.

Smarten Advanced Data Discovery

Welcome dhvani

News Headline Sentiment Analysis

Data updated on 03-Feb-2022 18:18:50

Mass apply

Mass apply - column mapping

Model dataset (training)	Source file (testing)
Headline	Headline
Source	Source
Topic	Topic
PublishDate	PublishDate

You may lose some data during datatype transformation

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SENTIMENT ANALYSIS—MAP COLUMNS FOR MASS APPLY

Smarten Advanced Data Discovery

Welcome dhvani

News Headline Sentiment Analysis

Data updated on 03-Feb-2022 18:18:50

Mass apply

Mass apply - output

Source	Topic	PublishDate	sentiments	sentiment_support
on March 30. That's around the same time Facebook's Oculus will begin shipping t...	microsoft	2015-03-01	positive	1
where the country should go from here.	obama	2016-01-10	positive	0.984
peg after Microsoft said it would	microsoft	2016-03-14	negative	0.96
year proposals unlikely to be	obama	2016-02-09	negative	1
bles. It has done little for the real economy. The rules of the market need to be re...	The Guardian	2016-02-08	positive	0.924
released a new offshore drilling plan for federal waters off Alaska with some poten...	Anchorage Daily News	2016-03-15	negative	1
here to stay. And it is growing.	Forbes	2016-03-21	positive	0.961
ie Sandy in 2012, Time magazine	Daily Caller	2016-02-05	positive	0.739
tories and here in Belgium,	Hyperallergic	2016-02-17	positive	1
phones that will bring together Skype's calling, messaging and video features.	ZDNet	2016-03-24	positive	1
mmate Vanessa Mendoza looks	Palestine Herald Press	2016-03-04	positive	1
ise in Washington, Friday, March 4,	U.S. News & World Report	2016-03-04	positive	1
'percent. Despite this, the	Caixin Media	2015-12-24	positive	0.689
resident Barack Obama's State of	NJ.com	2016-01-12	negative	1

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SENTIMENT ANALYSIS—MASS APPLY SCREEN TO VALIDATE THE MODEL

4.9 Single Apply

This component enables predicting the sentiment label and sentiment support corresponding to the data entered by the user in real time to validate the model.

Smarten Advanced Data Discovery

Welcome dhvani

News Headline Sentiment Analysis

Data updated on 03-Feb-2022 18:18:50

Apply the model

Headline

If you needed more proof that Republicans are totally irrational when it comes to President Obama and his actions, look no further.

negative

95.19%

Sentiment Score

APPLY

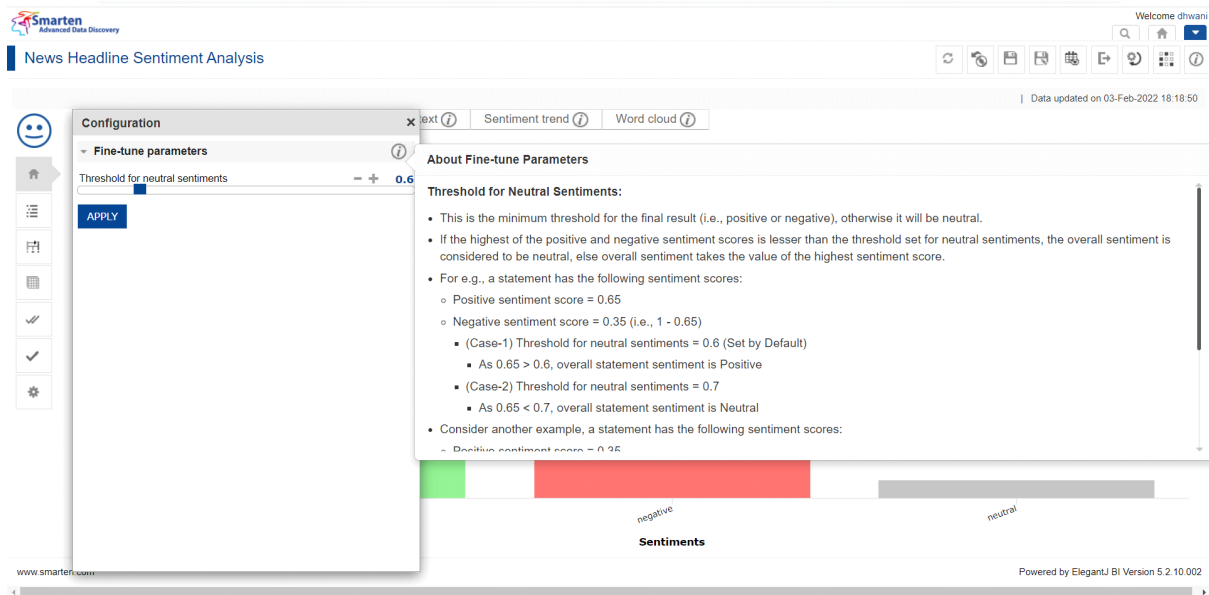
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SENTIMENT ANALYSIS—SINGLE APPLY SCREEN TO VALIDATE THE MODEL

4.10 Configuration

This component provides flexibility to users to select the threshold for neutral sentiment as needed. By default, it is set to 0.6, and the values can range from 0.5 to 1. The higher the threshold set for neutral sentiment, the better the chance to obtain neutral sentiment for the content.



SENTIMENT ANALYSIS—CONFIGURATION FOR FINE-TUNING THRESHOLD FOR NEUTRAL SENTIMENT

5 Product and Support Information

Find more information about Smarten and its features at www.smartent.com

Support: support@smartent.com

Sales: sales@smartent.com

Feedback & Suggestions: support@smartent.com

Support & Knowledgebase Portal: support.smartent.com