



CS2306A

# Sentiment Analysis on Tesla Review

Prepared For  
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Presented By  
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# Introduction

Tesla was founded in the year 2003 by a group of engineers that has become a global icon in the automotive industry. Tesla designs and manufactures electric vehicles, solar panels and solar roof tiles and other related products and services. The company's relentless pursuit of innovation and commitment to sustainable transportation has revolutionized the way people view on Electric Vehicles (EV).

# Problem Statement

The problem statement for this project is to understand and analyze the sentiment expressed on Tesla reviews and gain insights into customer sentiment towards the company. This project aims to address these challenges by applying sentiment analysis techniques to Tesla reviews, quantifying sentiment, identifying factors influencing sentiment, and providing actionable insights for Tesla's decision-making and customer experience enhancements.

# Summary of Study

- This study focuses on sentiment analysis of Tesla reviews to gain insights into customer sentiment towards the company. By applying sentiment analysis techniques to a diverse dataset of Tesla reviews, the study aims to quantify sentiment, identify key drivers of sentiment, and provide actionable insights. The study addresses the challenges of manually analyzing a large volume of customer reviews, quantifying sentiment objectively, and transforming sentiment analysis results into meaningful recommendations. Through the analysis, the study aims to uncover customer sentiment, highlight areas for improvement, and inform strategic decision-making within Tesla.



# Modelling

The process of building a predictive model that can accurately classify or predict the sentiment expressed in a given text.

Write a business project or milestone here.

To helps Tesla assess brand perception, evaluate branding strategies, and take corrective actions if negative sentiments prevail.

Write a business project or milestone here.

# Objectives

## Objectives of this project

#1

to analyze a diverse range of customer reviews, the project aims to understand the sentiments, opinions, and attitudes expressed towards Tesla and its products.

#2

to assign sentiment scores to each review, quantifying the positive, negative, or neutral sentiment conveyed by customers.

#3

to identify specific aspects of Tesla's offerings that resonate positively or negatively with customers.

# Background Study

- Tesla founded in the year 2003 by Elon Musk has become prominent in the Electric Vehicle (EV) industry. Tesla famously known for its innovative products and commitment to sustainability. Customer reviews plays crucial role in shaping brand perception and driving consumer behavior. Therefore, specific sentiment analysis on Tesla reviews to gain insights into customer sentiment, identify areas for improvement, and inform strategic decision-making. This project aims to address this gap by applying sentiment analysis techniques to a diverse dataset of Tesla reviews and providing valuable insights for Tesla's management team.





# Literature Review

This section of the project can establish a foundation of existing knowledge, highlight the significance of the project, and provide a basis for the methodology and analysis conducted in the study.

# Sentiment Analysis



1

Process of analyzing textual data to understand the sentiment express within it.



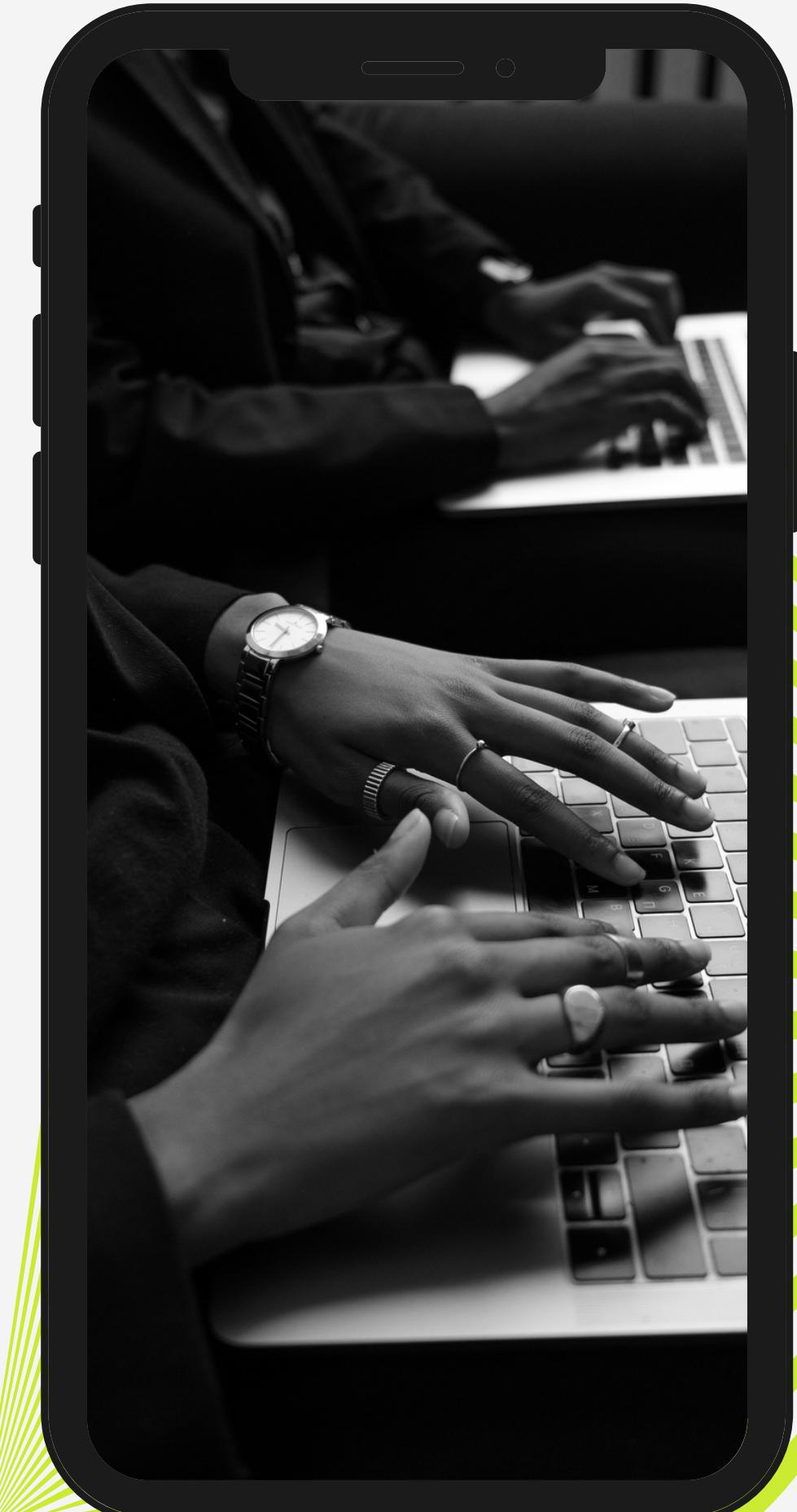
2

Usually it is whether positive or negative



2

Typically involve NLP, machine learning, and text mining methods



# Methodology

describes how this experiment is being conducted in order to achieve the objectives.



# Business Understanding



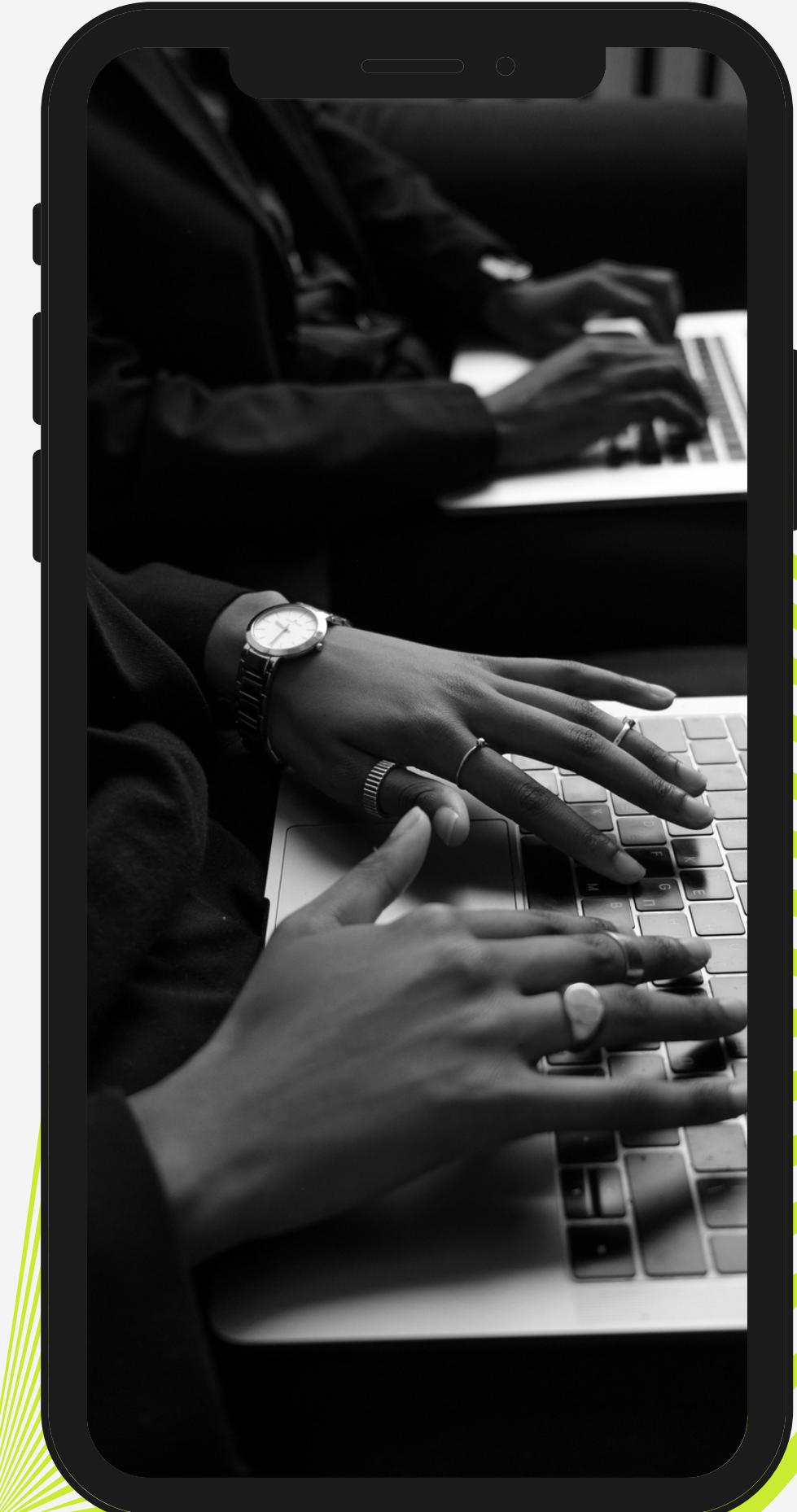
Stakeholders: Tesla

Data Sources: Online platform

Business Objective: Understand customer sentiments

Sentiment Categories: Positive and Negative

Success Metrics: Sentiment Accuracy



# Data Understanding



## 1 - Web Scraping

Sources:

Tesla Motors -<https://www.trustpilot.com/review/www.teslamotors.com>  
Tesla - <https://www.trustpilot.com/review/tesla.com>

Attributes acquired:

- User - Username of the reviewer.
- Review Title - Review Headline from user in text form
- Review - Review from user in text form
- Rating - 1-2 (Negative) , 3-5 ( Positive)

```
for content in contents:  
    try:  
        review = content.find("p", class_="typography_body-l__KUYFJ typography_appearance-default__AYY17 typography_color-black__5LYEn").text  
    except AttributeError:  
        review = "none"  
  
    name = content.find("span", class_="typography_heading-xxs__QKBS8 typography_appearance-default__AYY17").text  
    ratings = content.find("div", class_="star-rating_starRating_4rrcf star-rating_medium__iN6Ty").img["alt"]  
    rating = ratings[6]  
    reviewtitle = content.find("h2", class_="typography_heading-s__f7029 typography_appearance-default__AYY17").text  
    sheet.append([name,reviewtitle, review, rating])  
    row+=1
```

Total Observations acquired:

Training: 1252 samples

Testing: 50 samples

# website page #1

 Trustpilot

[Categories](#) [Blog](#) [Log in](#) [For businesses](#)

**Tesla**   [www.teslamotors.com](#) [Write a review](#)

**Ash** 7 reviews  3 days ago

 Shocking customer service and delivery

Shocking customer service and delivery service. Cancelled delivery 3 times for my vehicle. Paid £131k and the service is shocking. Offered me £100 for cancelled delivery and then want me to jump hoops to give them proof of travel.

Then offered me 100 free super change miles when I have already got 3 years free superchange on my vehicle.

After waiting 2.5 years for this car I hope I can get better service aftersales but I doubt this and now regretting the purchase now

Date of experience: July 11, 2023

 Useful 

**MIX MEDIA** 1 review  3 days ago

 Don't by a Tesla is absolutely garbage

Don't by a Tesla is absolutely garbage, I bought 2018 22000 miles on it from tesla used cars section, I took it many times to their service location because of problems in the screen.they fixed it right still have same problems now they asking for 4000 dollars to fix it . I drove my Honda accord for over 230kmiles and still rolling like a clock.

Date of experience: July 06, 2023

 Useful 1 

**The Trustpilot Experience** 

- We're open to all
- We champion verified reviews
- We fight fake reviews
- We encourage constructive feedback
- We verify companies and reviewers
- We advocate against bias

[Take a closer look](#)

# website page #2

 Trustpilot

[Categories](#) [Blog](#) [Log in](#) [For businesses](#)

**Tesla**   [www.teslamotors.com](#) [Write a review](#)

**Eitan** 15 reviews  Updated Jan 30, 2018

 Super service in Aarhus

Had my S 85 for almost 4 years now.

Got super service with a big smile every time.

Very generous of them making everything inc the best loaners for free.

The "Salg afdeling" staff were also very helpful & friendly , when i wanted to demonstrate the new models to my friends.

Love you people. :-) Keep on doing your superb work

Date of experience: January 30, 2018

 Useful 1 

**Pott Pat** 1 review  Dec 12, 2017

 Great Worker amazing car

Great Worker, Great service, amazing car.  
i love the new EVs

Date of experience: December 11, 2017

 Useful 1 

# Tesla Review Dataset

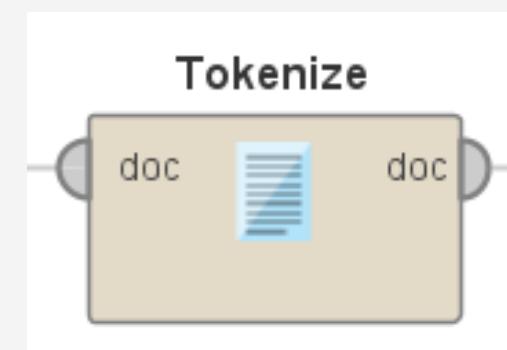
	A	B	C	D
1	Name	Review Title	Review	rating
2	Delwar Hussain	Smooth collection, poor trade-in process	Ordering online and collection experience was very quick and smooth, and the	3
3	Prof. Dr. Luigi Pavone	TESLA SCAM	BEWARE TESLA SCAM HONEST HARD-WORKERS PEOPLE!!Tesla required \$250	1
4	Ian Hinett	Dreadful customer service	Dreadful customer service. Recently ordered a bike rack for my model 3. Total	1
5	Adam	Two stars is being generous	Two stars is being very, very generous. In the 3,000 miles I have owned this car	2
6	Another Irate customer	Consistently poor customer service!	If there is one thing that is true about Tesla customer service it is consistently	1
7	Ian Hinett	Return order no. #9M637JKMPC	Have been trying to return a product for over a week. Bought a bike rack from	1
8	Madhav	Poor service from Tesla Australia	I booked tesla in Nov 2022 and I am still waiting.. I referred a friend and he bo	1
9	Chris Garvin	ZERO is a more realistic score	Not only is their product beyond useless and fails regularly but their Customer	1
10	Jason	Complete joke	Complete joke. Ordered a Model Y LR mid May apparently for immediate deliv	1
11	Joe Walker	The best electric car you can currently...	The best electric car you can currently get.	5
12	S.B.	Used Prices in Free Fall.	When I test-drove a Y in April 2022, I was told by the Chester Sales Staff that t	1
13	Devesh	1 star is being generous	1 star is being generous. The car is 6 months old, the infotainment system has	1
14	Jamie Rodger	Better than expected	Ownership of my Tesla over the last year has been completely fine. The car ha	5
15	Phillip Horsley	The Order and Delivery was a mess but car exceeded expectations	Purchased a used inventory Tesla Model 3 in March 23 via the website. It was	3
16	David Clark	Owned more than 20 cars in my lifetime	Owned more than 20 cars in my lifetime. Now, I am the proud owner of the Te	5
17	Bob	Third class customer service	Third class customer service Takes about 1 hour 30 minutes to talk to someone	1
18	Rob N	Model 3 Long Range steering vibration...	Model 3 Long Range strange vibration through steering on day of collection. R	1
19	Ryan Davids	Mass production concerns over quality Don't Buy	Car was way over priced and had a ton of issues off the line that I had to spend	1
20	John Bannen	Elon Musk has turned Twitter into GOP fake news platform	Elon Musk has turned Twitter into a fake news Mecca for GOP customers.Usin	1
21	Aric Rippin	I recently bought the Tesla and I am...	I recently bought the Tesla and I am absolutely thrilled with it! It is a fantastic	5
22	Steveb_online	I have a M3LR. NEVER AGAIN. Tesla cars and Customer Service suck	I have a M3LR bought new a year ago. In that time it has completely failed twi	1
23	Michael	CCS upgrade destroyed model X	Purchased the CCS upgrade. But after the 'upgrade' my car could no longer cha	1
24	Sharon Tams	Online Sales Issues re: Charging Connectors	I bought a wall connector and pedestal as I didn't know which one I needed. T	1
25	TomD	Nonexistent Service	Like so many others the service experience of Tesla here in New Zealand/Aote	1
26	John Hamill	Dreadful experience buying a Tesla.	From ordering a car to taking delivery from Tesla in the UK is a complete night	1
27	Olu Olateju	I recently just bought a Tesla - AVIOD!	I recently just bought a Tesla, I stupidly bought all the functions i.e FSD (a big sc	1
28	Cello	Lost its way	It used to be a customer-focused company but sadly lost its way.The user inter	1
29	SR Henfield	Tesla Nice car Lousy Customer Service	Very disappointed when spending £51K on a car just handed the key and pointe	1

# Data Preparation



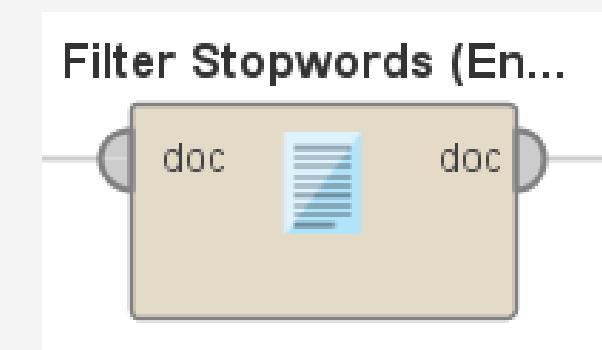
## 1st - Tokenization

Process of breaking down a sequence of text into smaller units



## 2nd - Stopwords

Removed words that do not carry significant meaning and are considered noise or distractions.



## 3rd - Token by Length

To filter out or analyze specific types of text based on their length. Example word is 'argh' and 'aaa'

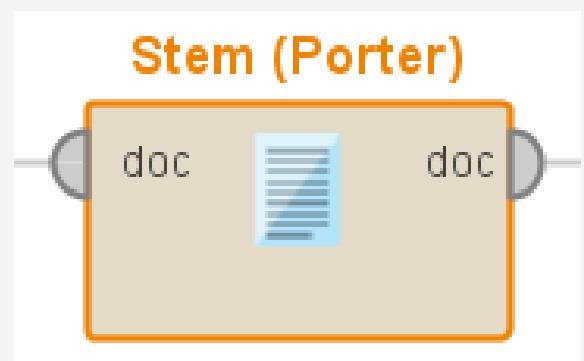
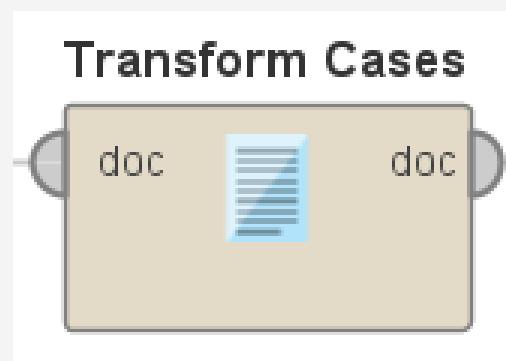


# Data Preparation



## 4th - Transform Cases

Converting all the letters in a text to their small letter form. Because in NLP it will consider the same words with different cases as a different word.

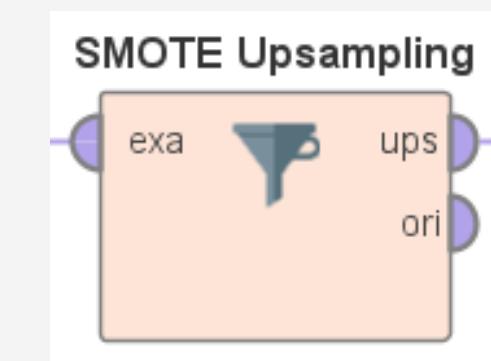


## 5th - Stem (Porter)

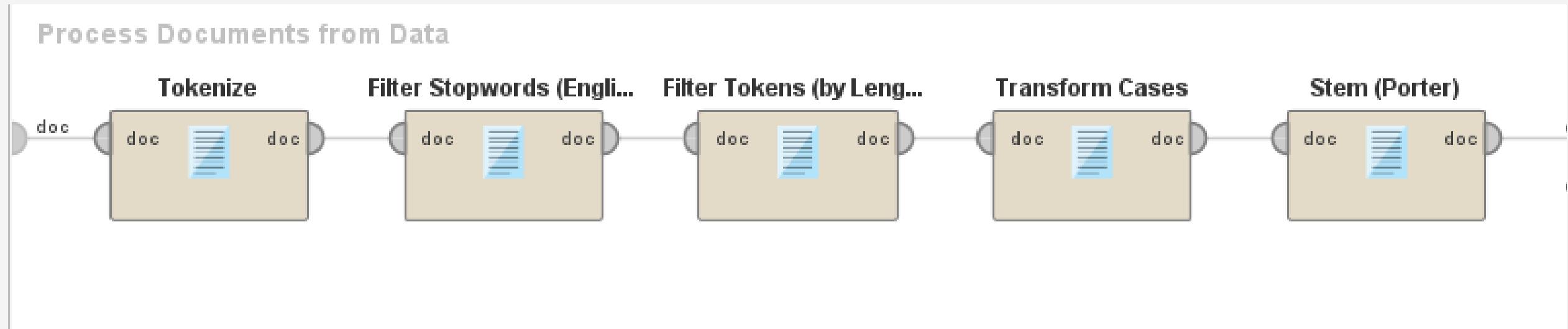
Reduces words to their base form. It helps analyze and compare words by removing affixes like plurals or verb endings.

## 6th - SMOTE Upsampling

Used to address class imbalance. It creates new synthetic samples by randomly selecting a minority class (positive), finding its nearest neighbors and creating new instances.



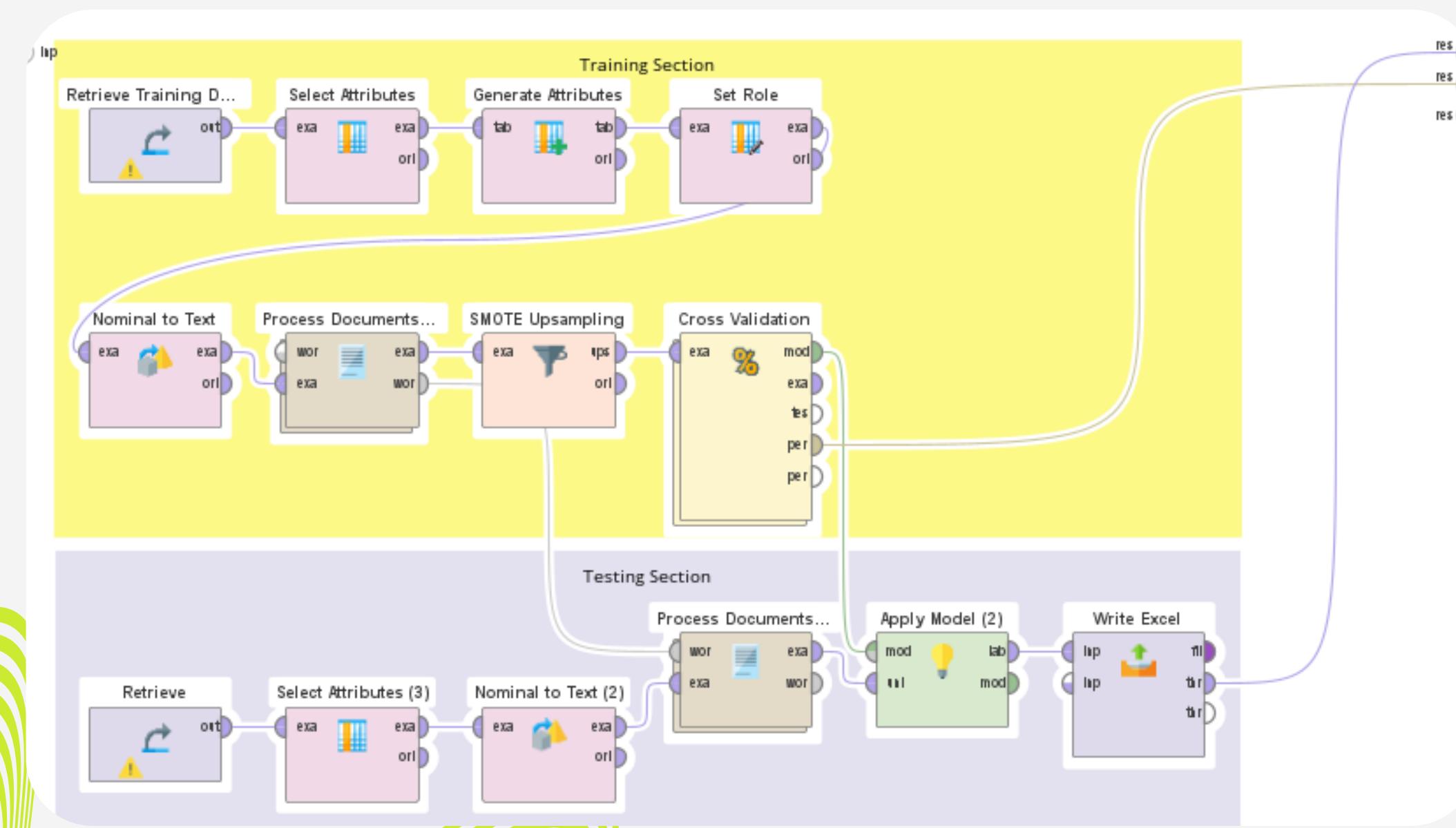
# Data Preparation Design



# Modelling

The process of building a predictive model that can accurately classify or predict the sentiment expressed in a given text.

# Rapid Miner Process Design



# Deep Learning

accuracy: 94.72% +/- 2.43% (micro average: 94.72%)

	true negative	true positive	class precision
pred. negative	898	42	95.53%
pred. positive	59	915	93.94%
class recall	93.83%	95.61%	

# Naive Baiyes

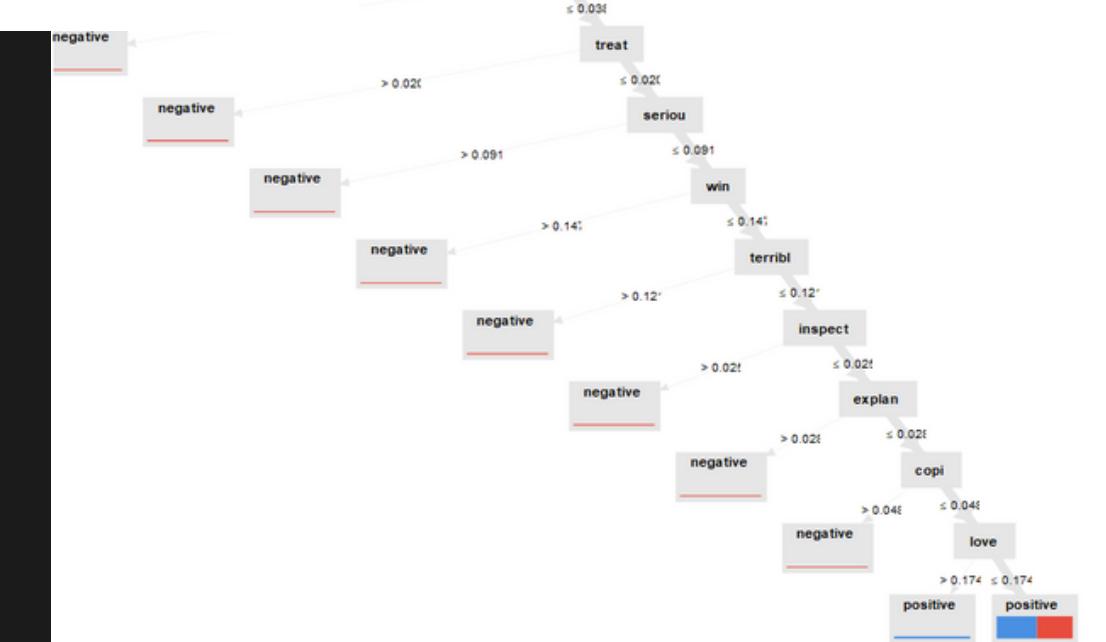
accuracy: 96.08% +/- 1.24% (micro average: 96.08%)

	true positive	true negative	class precision
pred. positive	934	52	94.73%
pred. negative	23	905	97.52%
class recall	97.60%	94.57%	

# Random Forest

accuracy: 88.87% +/- 2.22% (micro average: 88.87%)

	true positive	true negative	class precision
pred. positive	917	173	84.13%
pred. negative	40	784	95.15%
class recall	95.82%	81.92%	



# Decision Tree

accuracy: 78.63% +/- 3.05% (micro average: 78.63%)

	true positive	true negative	class precision
pred. positive	563	15	97.40%
pred. negative	394	942	70.51%
class recall	58.83%	98.43%	

# Evaluation



## Naive Bayes

Based on the performance, NB has the best with 96.08% accuracy.

This model will be applied to the test data that consists of 53 reviews and the sentiment of the review will be predicted by the model.

Amazing business leading the way into the future.  
Buying my Telsa was the best thing I ever did (sorry wife and children, you are next on the list) :o)  
I'm a very happy Tesla customer. Very easy, smooth order process, professional delivery, great car and very friendly personnel!

Example of reviews in the test data



# Testing Result

Name	confidence	confidence	prediction(rating)
Sarajane Thompson	0.00	1.00	negative
Saundra Cahill	1.00	0.00	positive
Sawon Saha	1.00	0.00	positive
Scott	0.00	1.00	negative
Scott Typman	1.00	0.00	positive
Sean Pryce	0.00	1.00	negative
Sebastian R	1.00	0.00	positive
Shahin Shariat	0.00	1.00	negative
SHAIROSE KARA	0.00	1.00	negative
Sharon Tams	0.00	1.00	negative
Shaun	1.00	0.00	positive
Shivanand Biradar	0.00	1.00	negative
Shm	0.00	1.00	negative
SimmyONE	0.00	1.00	negative
Simon Calvert	0.00	1.00	negative
Simon King	0.00	1.00	negative
soman malikzada	0.00	1.00	negative
Spencer P	1.00	0.00	positive
SPL North Wales	0.00	1.00	negative
SR Henfield	0.00	1.00	negative
stan cutcliffe	0.00	1.00	negative
Stella Lane	1.00	0.00	positive
Steph Brooks	0.00	1.00	negative
Steve Tizzane	0.00	1.00	negative
Steveb_online	0.00	1.00	negative
Steven Morris	0.00	1.00	negative
Stuart	0.00	1.00	negative

Input sets:

Scott Typman      Amazing business leading the way into the future.

Saundra Cahill      bought a tesla since the early beginning continue to buy every car they release bright future for tesla

Steven Morris      Bought some roof bars with a faulty cover on one of the corners. Emailed Tesla boutique EMEA for a replacement, but they don't reply. Cowboys.

# Word Cloud Visualization

## Word Cloud for Negative Sentiments



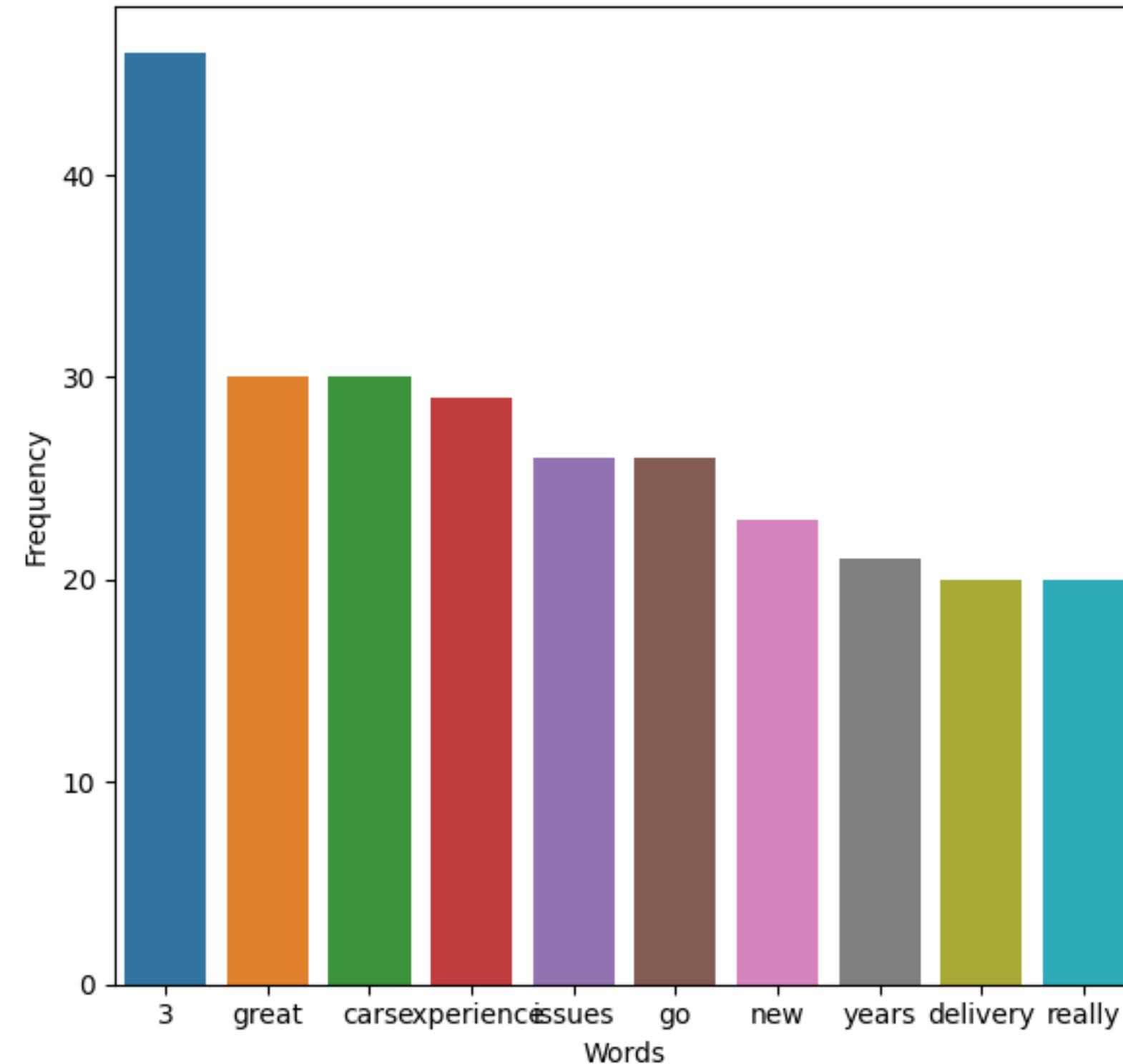
# Word Cloud Visualization

## Word Cloud for Positive Sentiments

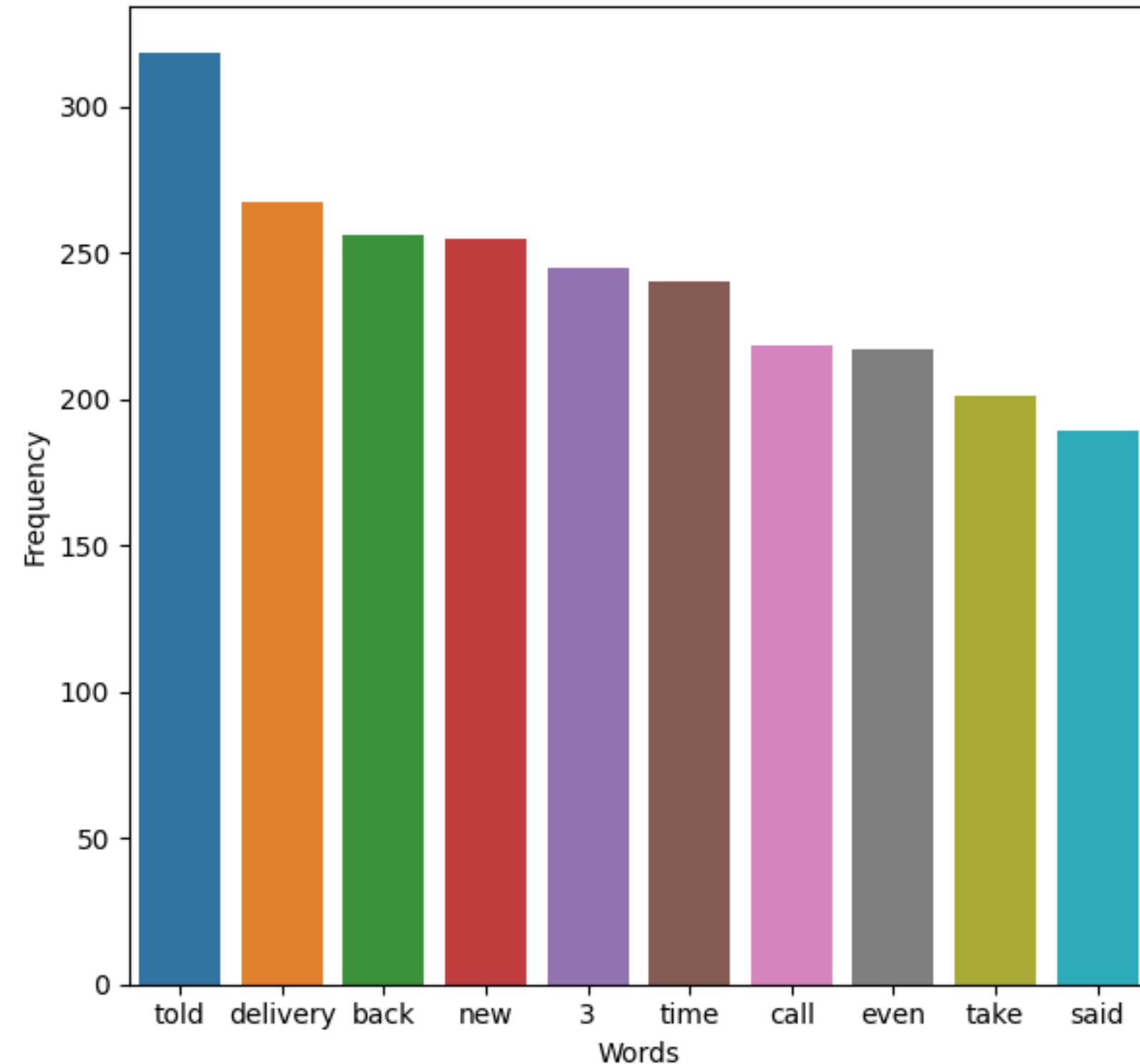


# Word Comparison

Most Common Words in Positive Reviews



Most Common Words in Negative Reviews



# Conclusion

In conclusion, with a total of 1302 scrapped data points and employing Naive Bayes modeling, our sentiment analysis project on Tesla reviews achieved an impressive accuracy of 96.08%. This outcome highlights the effectiveness of the approach and its potential to provide valuable insights into customer sentiments and perceptions. The high accuracy ensures that the sentiments expressed by customers are reliably categorized into positive, or negative categories, enabling Tesla's marketing team, customer support representatives, and decision-makers to make data-driven decisions and better understand customer feedback. This successful implementation lays a strong foundation for further analysis and enhances Tesla's ability to respond to customer needs and preferences, ultimately contributing to improved customer satisfaction and brand reputation.