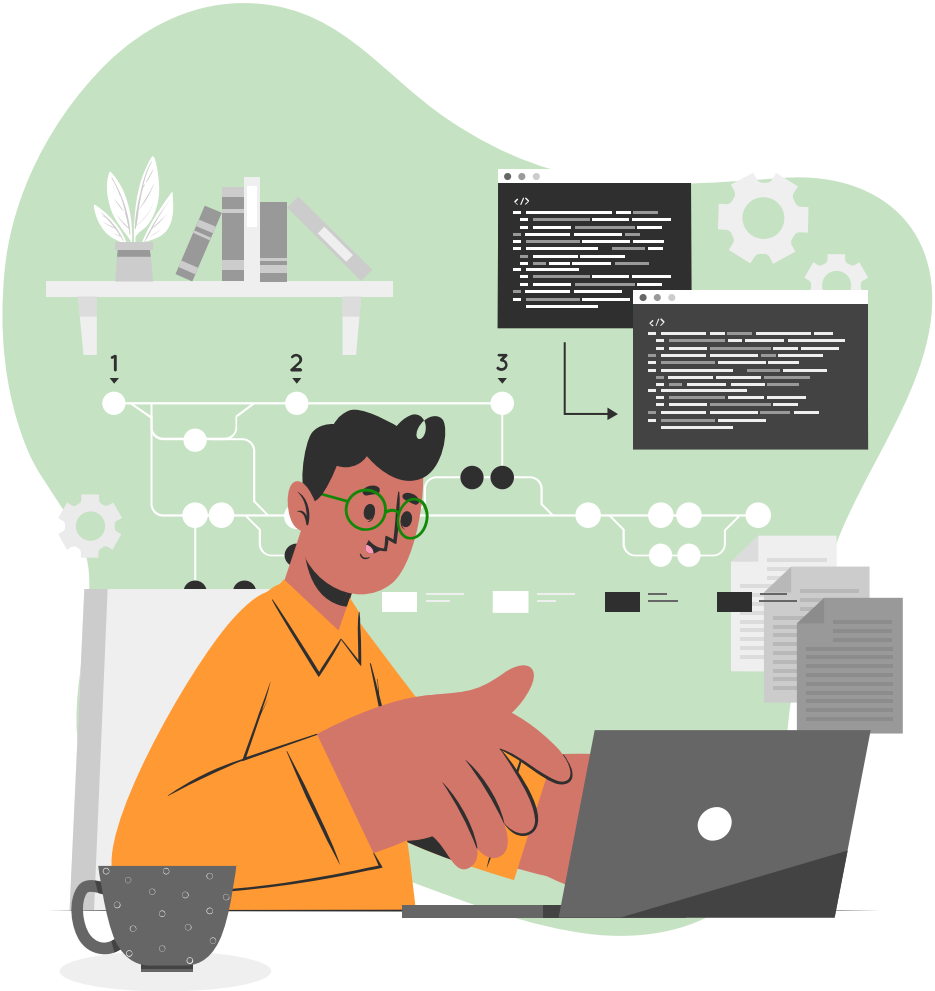
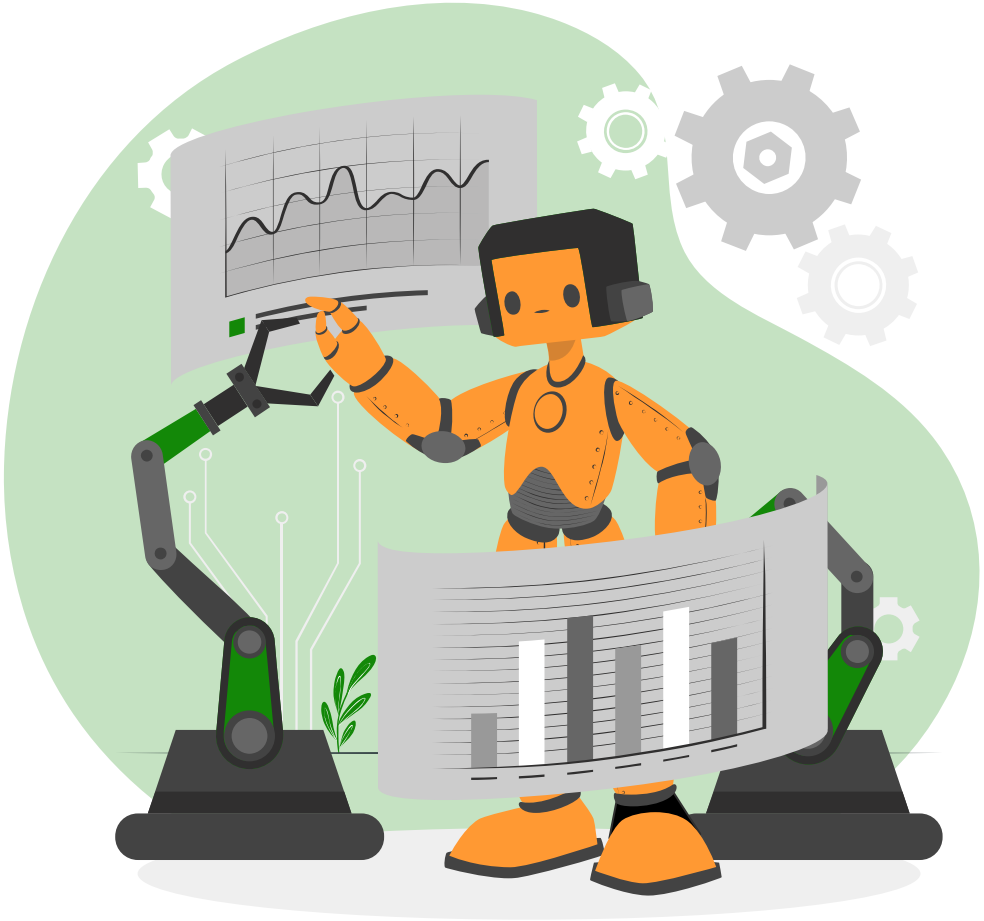


SentAIment Analysis: Sentiment Analysis with RNN and LSTM

Duvan Cuero
Alejandra Díaz

TABLE OF CONTENTS



01

KEY INSIGHTS

Relevant concepts to understand the project

...

RNN MODEL

The Vanilla RNN model for sentiment analysis consists of:

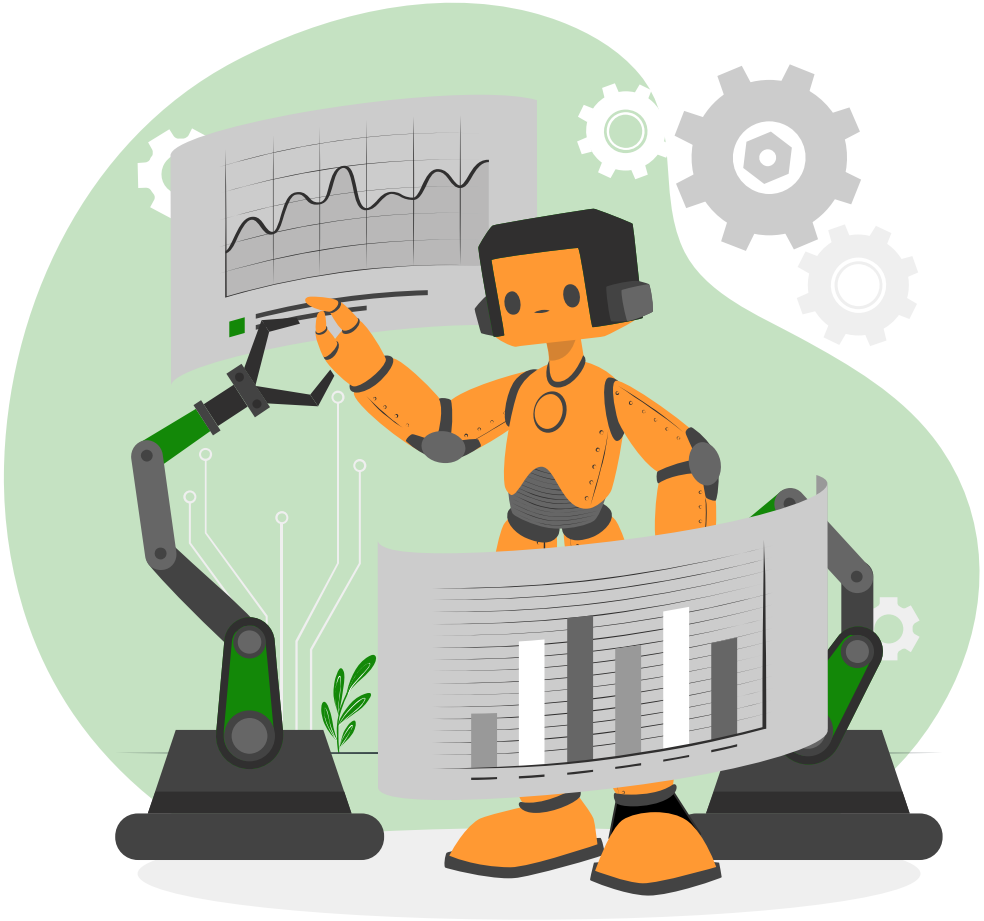
- Embedding Layer: Converts words into vectors with a dimension of 50.
- SimpleRNN Layer: Contains 64 units, capturing sequential patterns.
- Dropout Layer: Applied with a dropout rate of 0.5 to prevent overfitting.
- Dense Layer: Single dense layer with a sigmoid activation function for binary classification. .

LSTM MODEL

The Long-Short Term Memory model for sentiment analysis consists of:

- Embedding Layer: Converts words into vectors with a dimension of 32.
- LSTM Layer: Contains 64 units, allowing the model to capture long-term dependencies.
- Dense Layer: Single dense layer with a sigmoid activation function for binary classification.

• • •



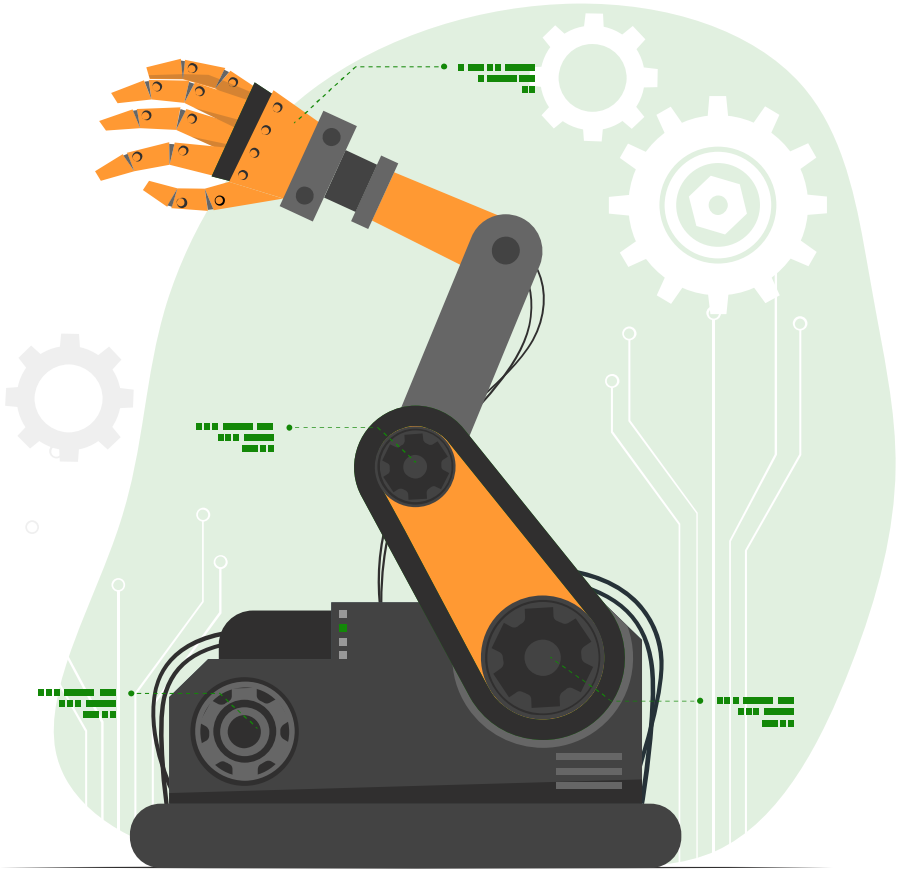
02

PROBLEM

Description of the problem that the project aims to solve

PROBLEM

This project aims to build a sentiment analysis model using supervised learning techniques with vanilla Recurrent Neural Networks (RNN) and Long Short-Term Memory networks (LSTM). The goal is to classify sentences as positive (labeled as 1) or negative (labeled as 0) based on their sentiment.



OBJECTIVES

1

Preprocessing of text data by tokenizing sentences, lowercasing text and removing stop words using NLTK

2

Implementation of DummyClassifier as a baseline model

3

Implementation of Recurrent Neural Networks sentiment analysis model

OBJECTIVES

4

Implementation of LSTM sentiment analysis model

5

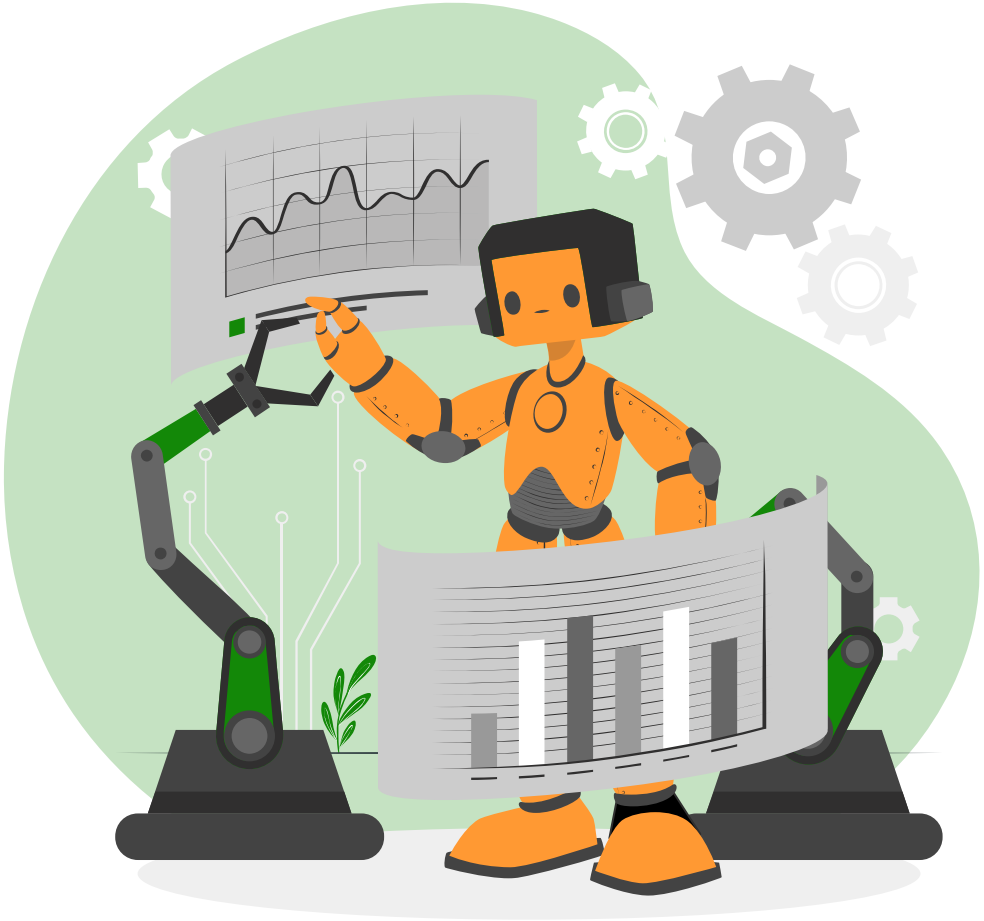
Hyperparameter tuning using GridSearchCV

6

Analysis of the resulting metrics that evaluate the performance of each model

7

Comparison of the performance between models



03

METHODOLOGY

Methodology used for the development of the project

DATA COLLECTION

Amazon Dataset

IMDb Dataset

Yelp Dataset

Each with 500 positive and 500 negative labeled sentences.

...

DATA DESCRIPTION

New Dataset

2748 entries

Variables

The sentence and its score (1 or 0)

Score distribution

Positive: 1386
Negative: 1362

Data cleaning

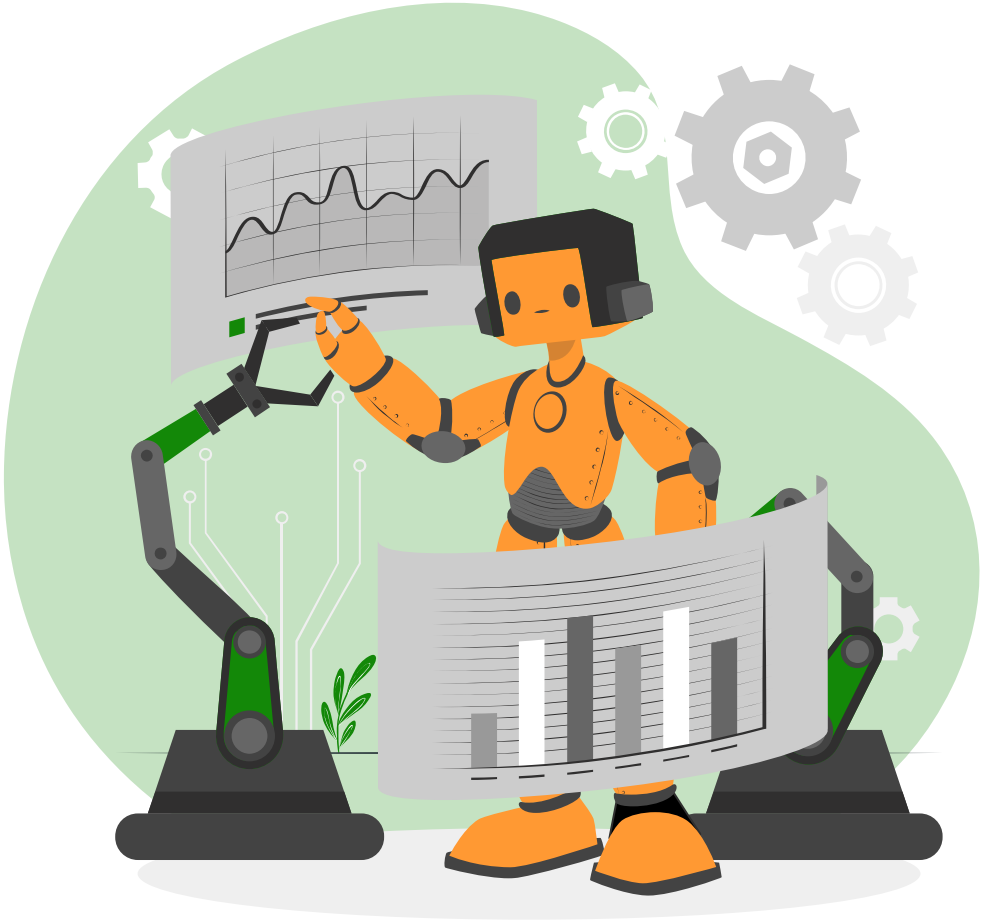
Remove duplicates (17)
No missing values
Rename columns

...

NEXT STEPS

TRAINING PROCEDURE

01	Tokenization and padding are applied to the input sequences.	
02	Grid search is conducted to optimize hyperparameters.	
03	The final model is defined, compiled, and trained on the training set.	
04	Training results are printed.	
05	Evaluation metrics are computed on the testing set.	



04

RESULTS

Results obtained from experimentation with various models

...

HYPERPARAMETERS

MODEL	BATCH_SIZE	EPOCHS	LOSS	OPTIMIZER
RNN	128	20	binary_cross entropy	rmsprop
LSTM	128	20	binary_cross entropy	rmsprop

*Obtained with GridSearchCV

METRICS OBTAINED

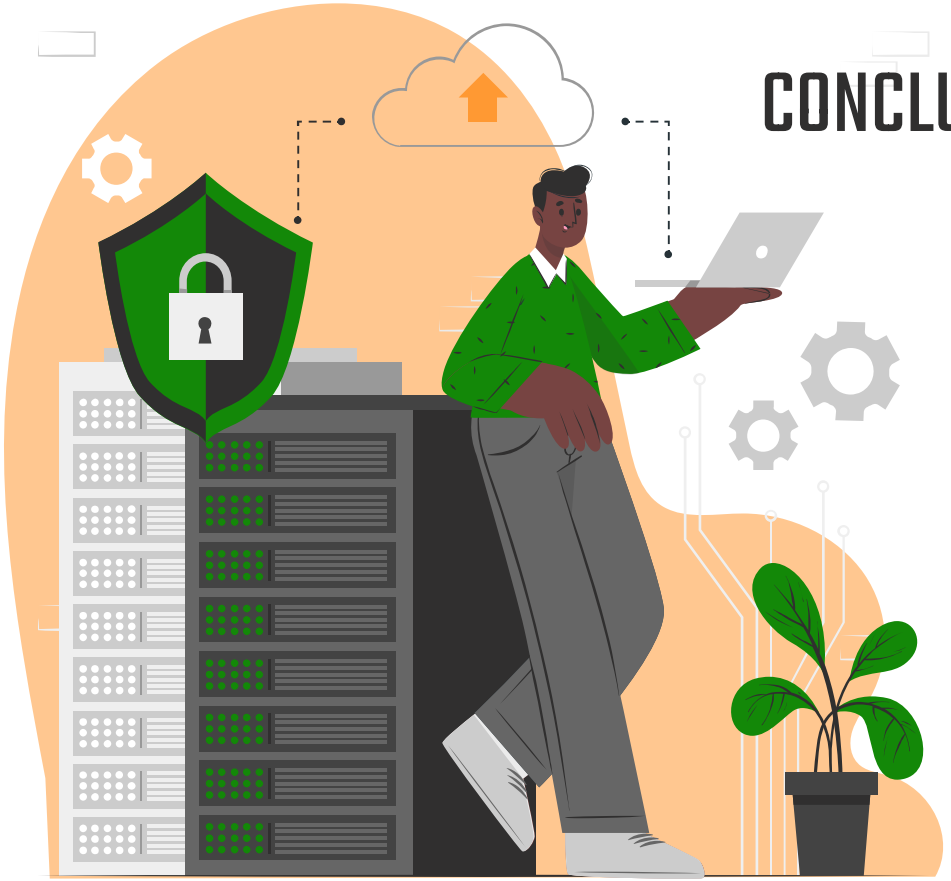
	DUMMY CLASSIFIER		RNN		LSTM	
	TRAIN	TEST	TRAIN	TEST	TRAIN	TEST
ACCURACY	0.5	0.51	0.95	0.79	0.93	0.79
PRECISION	0.25	0.25	0.94	0.76	0.94	0.80
RECALL	0.5	0.5	0.96	0.85	0.92	0.80
F1	0.33	0.34	0.95	0.80	0.93	0.80
KAPPA			0.89	0.57	0.86	0.59

CONCLUSIONS

RNN Model

- High training accuracy of approximately 95% for the training data, and 79% for the testing data, indicating effective learning from the training data.
- Precision, recall, and f1-score are around 95% for training data and 80% for testing data, suggesting a balanced performance between precision and recall.
- Slight overfitting.

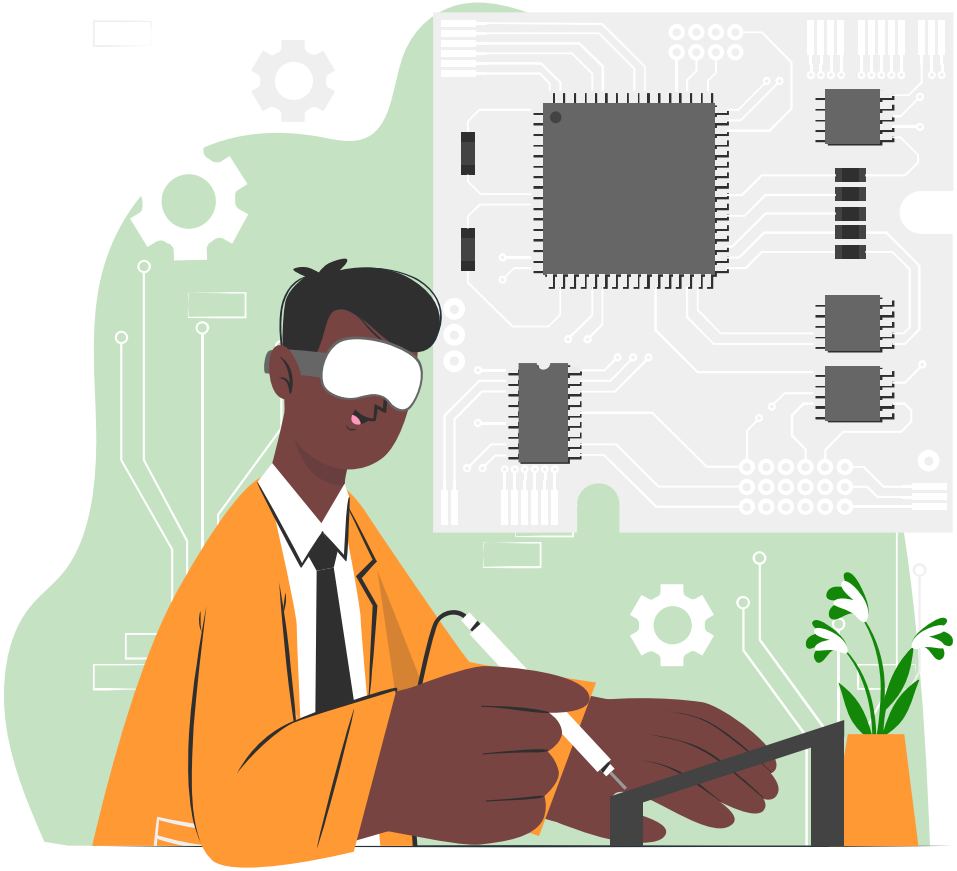
• • •



CONCLUSIONS

LSTM Model

- High training accuracy of approximately 93%, and testing accuracy of 79%, indicating effective learning.
- Precision, recall, and f1-score metrics are consistent with the Vanilla RNN.
- This model also presents a slight overfitting in relation to its results between training and testing data.



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Thanks slide	You must keep it so that proper credits for our design are given
Colors	All the colors used in this presentation
Icons and infographic resources	These can be used in the template, and their size and color can be edited
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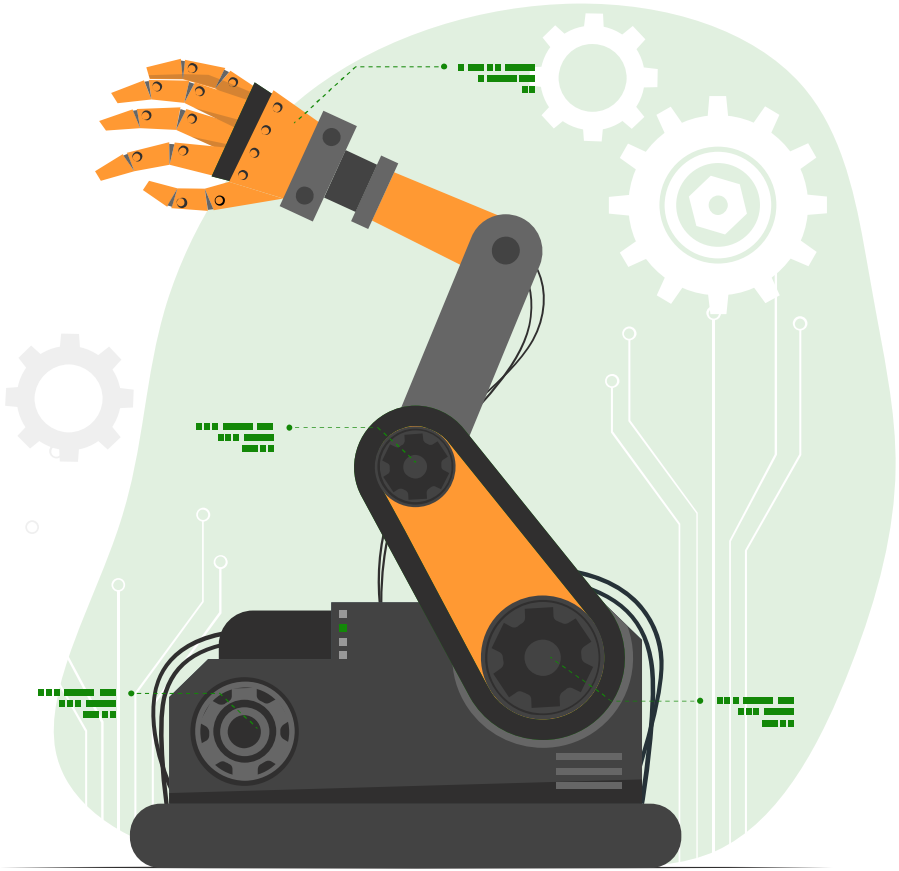
YOUR LOGO

ABOUT US

You can give a brief description of the topic you want to talk about here. For example, if you want to talk about Mercury, you can say that it's the smallest planet in the entire Solar System



OUR HISTORY

It's composed of hydrogen and helium

SATURN

2XXX

Venus is the second planet from the Sun

VENUS

2XXX

2XXX

JUPITER

Jupiter is the biggest planet of them all

2XXX

MERCURY

It's the closest planet to the Sun

OUR PHILOSOPHY

MERCURY

Mercury is the closest planet to the Sun and the smallest of them all

VENUS

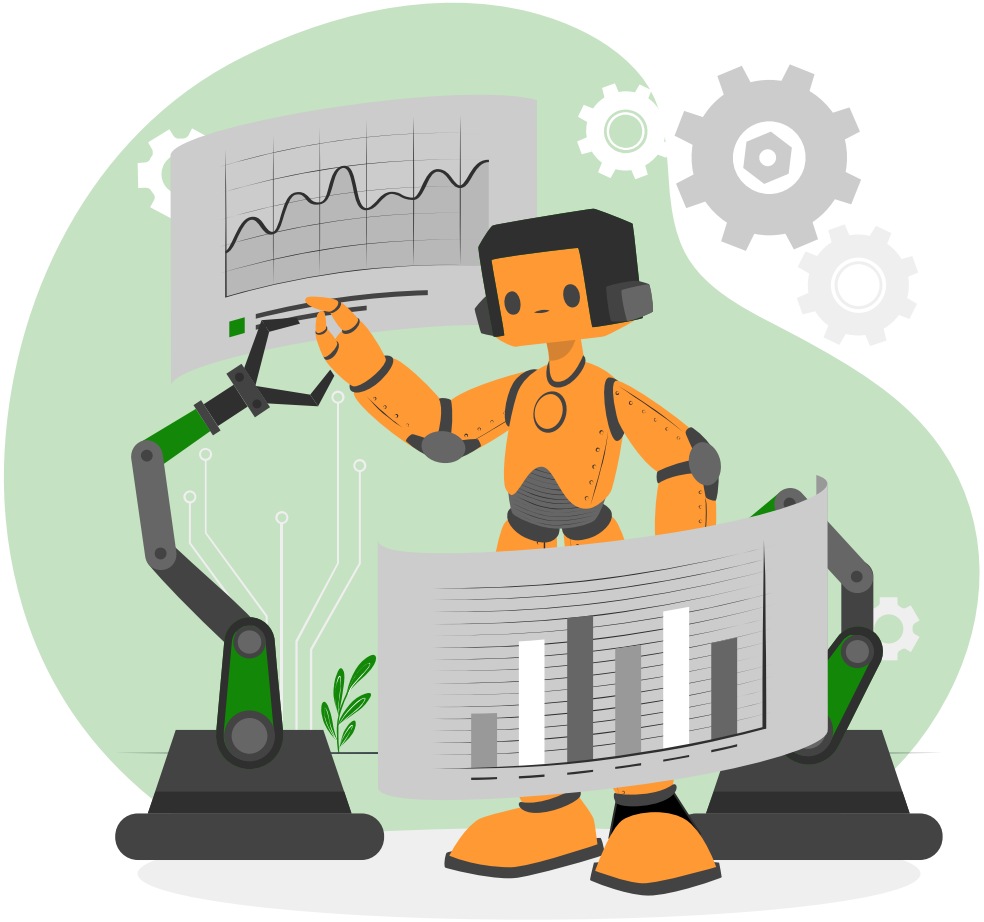
Venus has a beautiful name and is the second planet from the Sun

MARS

Despite being red, Mars is actually a cold place. It's full of iron oxide dust

"This is a quote, words full of wisdom that someone important said and can make the reader get inspired."

—SOMEONE FAMOUS



01

ABOUT OUR COMPANY

You can enter a subtitle here if you need it


A PICTURE IS WORTH A THOUSAND WORDS

A PICTURE ALWAYS REINFORCES THE CONCEPT

Images reveal large amounts of data, so remember: use an image instead of a long text. Your audience will appreciate it

OUR SERVICES

MERCURY

It's the closest planet to the Sun

VENUS

Venus is the second planet from the Sun

MARS

Mars is actually a very cold place

JUPITER

Jupiter is the biggest planet of them all

SATURN

It's composed of hydrogen and helium

NEPTUNE

Neptune is far away from Earth

• • •

BEST SELLERS

MERCURY

It's the closest planet to the Sun

VENUS

Venus is the second planet from the Sun

JUPITER

Jupiter is the biggest planet of them all

SATURN

It's composed of hydrogen and helium

OUR STRENGTHS

LOYALTY

Despite being red, Mars is a cold place

RELIABILITY

Saturn is a gas giant and has several rings

COMMITMENT

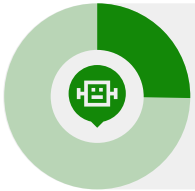
Venus is the second planet from the Sun

EFFICIENCY

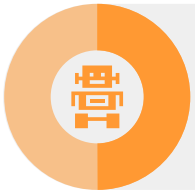
Jupiter is the biggest planet of them all

TARGET

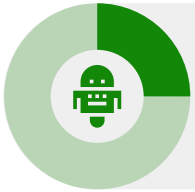
GENDER



25%
MEN

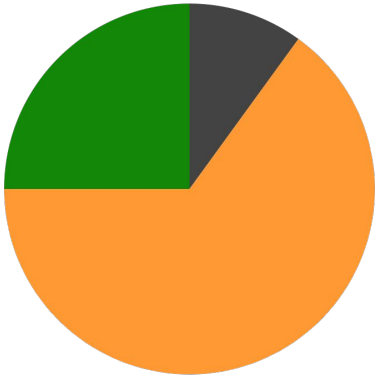


50%
WOMEN



25%
OTHER

AGE



Elderly Adults Teens

Follow the link in the graph to modify its data and then paste the new one here. **For more info, click here**

INTERESTS

2/10

3/10

5/10

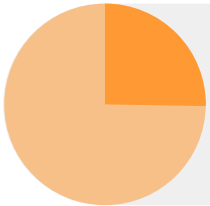
7/10

9/10

AWESOME WORDS

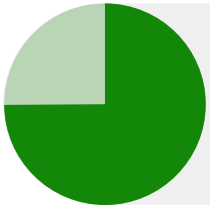
...

OUR NUMBERS



25%

Despite being red, Mars is a cold place



75%

Saturn is a gas giant and has several rings

45 SHOPS

Retailers

• • •

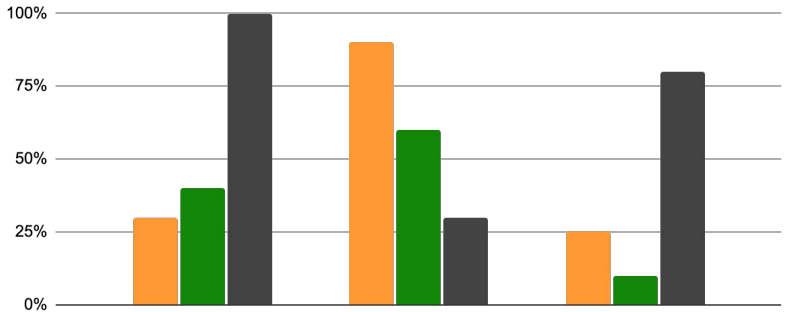
77 UNITS

Inventory

• • •

$100,000,000

BUDGET



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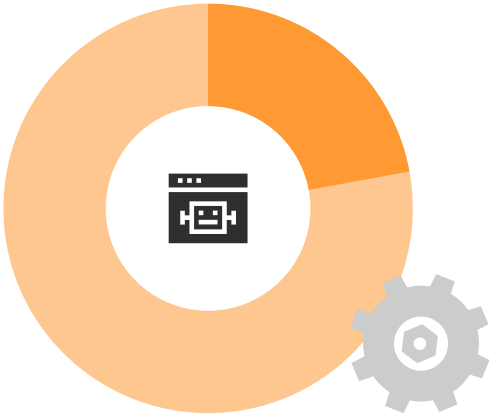
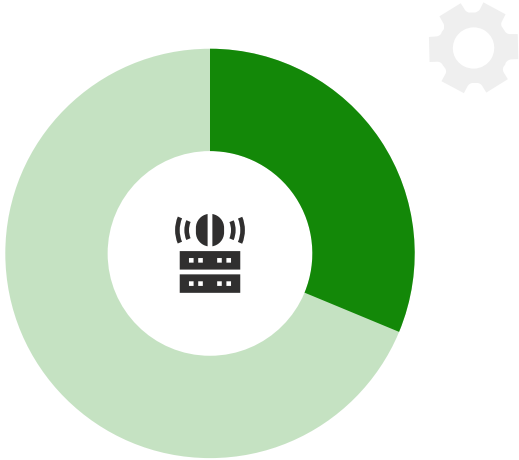


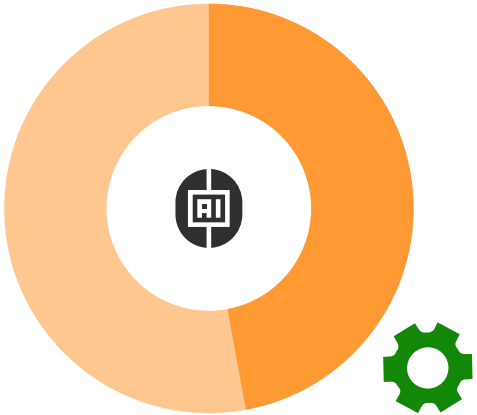
23%

Venus is the second planet from the Sun



30%

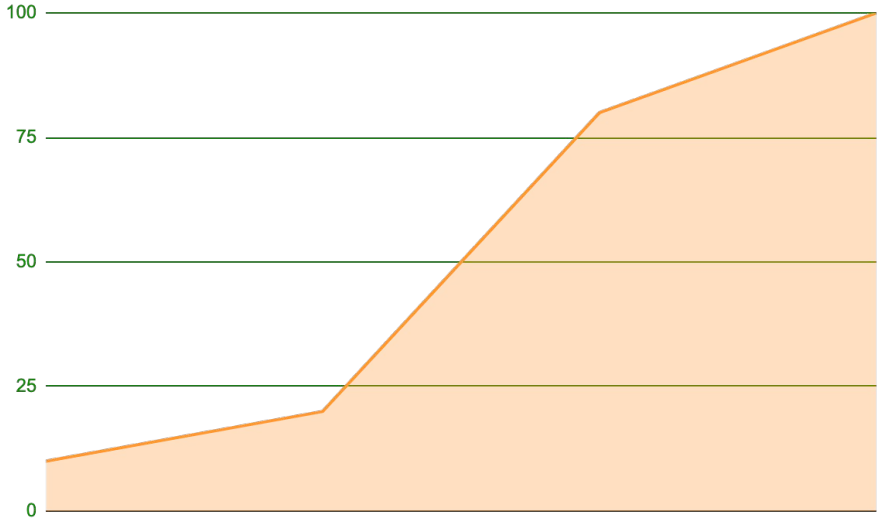
Saturn is a gas giant and has several rings



47%

Jupiter is the biggest planet of them all

OUR GROWTH



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$450,900

Expected income for 2XXX

10,000

New customers next year

• • •

OUR NEXT PROJECT

PROJECT SCHEDULE

01	MERCURY	Mercury is the closest planet to the Sun	
02	JUPITER	Jupiter is the biggest planet of them all	
03	VENUS	Venus is the second planet from the Sun	
04	SATURN	It's composed of hydrogen and helium	

CUSTOMER TESTIMONIALS

SARAH WILLIAMS

"Mercury is the closest planet to the Sun and the smallest one in the Solar System—it's only a bit larger than the Moon"

• • •

JOANNE MASON

"Venus has a beautiful name and is the second planet from the Sun. It's hot and has a poisonous atmosphere"

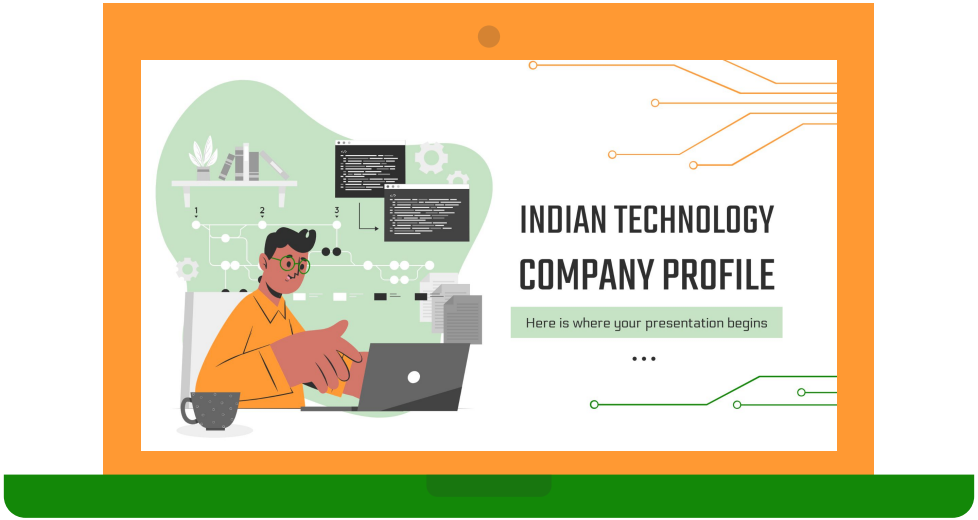
• • •

AWARDS

Do you know what helps you make your point crystal clear?
Lists like this one:

- They're simple
- You can organize your ideas clearly
- You'll never forget to buy milk!

And the most important thing: the audience won't miss the point of your presentation



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