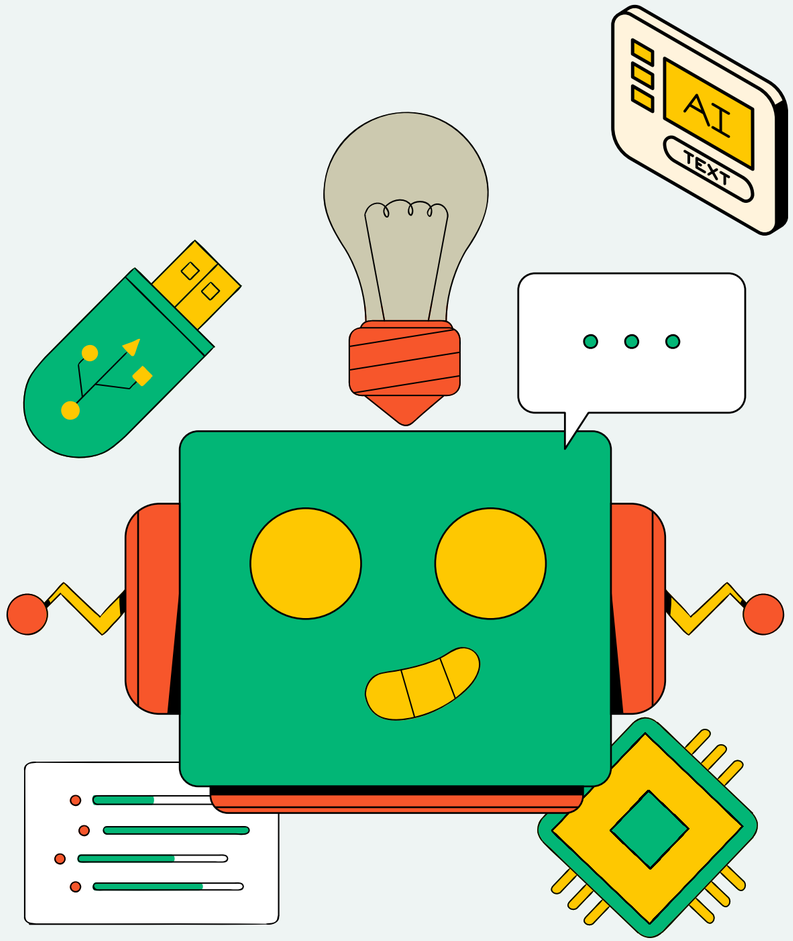
THYNK UNLIMITED

WE LEARN FOR THE FUTURE

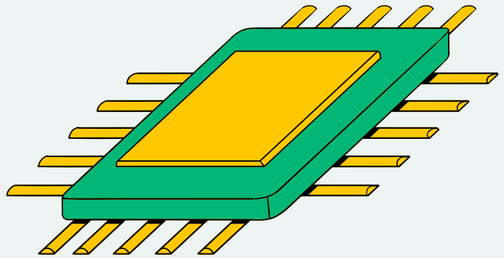


ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

PRESENTATION

PRESENTED BY:

CHAD GIBBONS



PRESENTATION OUTLINE

- Introduction
- What is Artifical Intelligence?
- Historical Context
- Key Concepts
- What is Machine Learning?
- Types of Machine Learning
- Role of Data in Machine Learning
- Case Studies
- Real World Applications
- Ethical Considerations
- Deployment and Integration
- Preparing for the Future
- Questions and Answers

INTRODUCTION

Imagine a world where machines can decipher languages, recognize faces, diagnose diseases, and even make predictions without explicit programming.

We will embark on a journey through the ever-evolving landscape of Artificial Intelligence and Machine Learning. We'll explore the core concepts, real-world applications, and the transformative potential of these technologies.

WHAT IS ARTIFICIAL INTELLIGENCE?

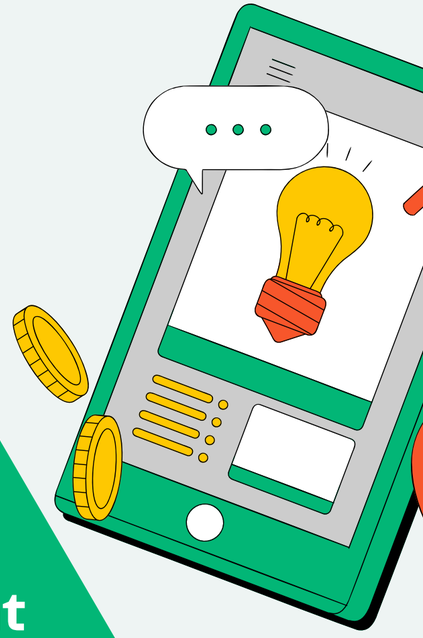
Artificial Intelligence is not just a buzzword; it's a transformative force that is reshaping industries, solving complex problems, and revolutionizing the way we live and work.

So, let's dive into the world of Artificial Intelligence, where machines become intelligent companions in our quest for progress and innovation.

HISTORICAL CONTEXT

- the birth of artificial intelligence
- the AI resurgence
- ethical & philosophical considerations

KEY CONCEPTS



natural language processing

neural networks

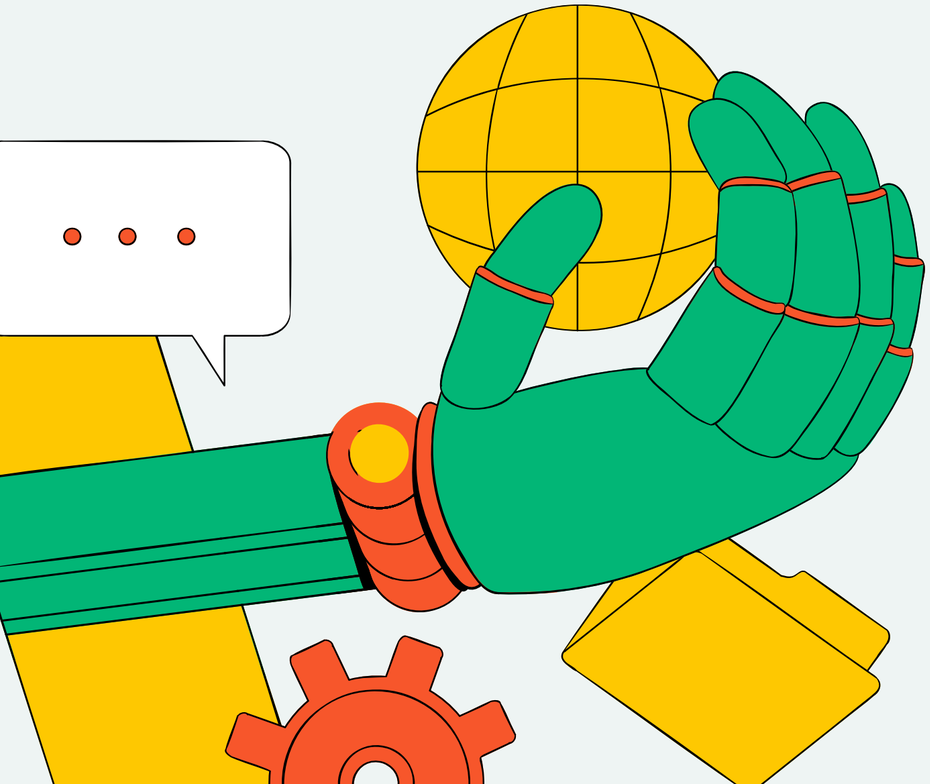
reinforcement learning

machine learning

computer vision

ethical AI

WHAT IS MACHINE LEARNING?



Machine learning is a subset of AI that focuses on the development of algorithms and models that enable computers to learn from and make predictions or decisions based on data.

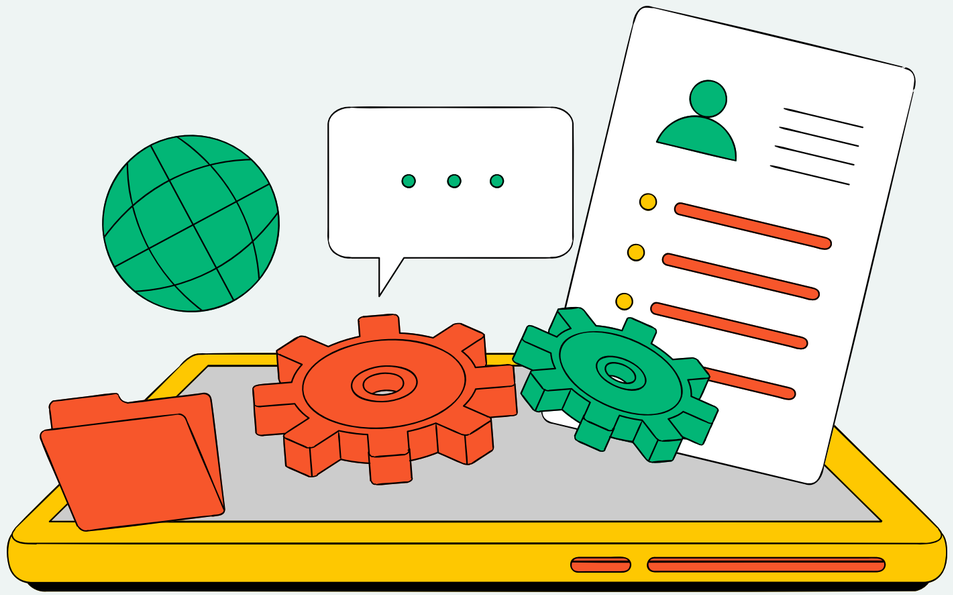
It's a key driver of AI applications, including natural language processing, image recognition, and recommendation systems.

TYPES OF MACHINE LEARNING?

Supervised Learning

Unsupervised Learning

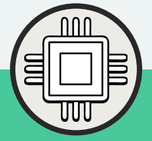
Reinforcement Learning



ROLES OF DATA IN MACHINE LEARNING?

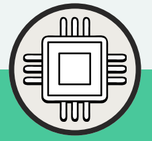
- Training Machine Learning Models
- Testing and Evaluation
- Future Engineering
- Anomaly Detection
- Data Augmentation

CASE STUDY SAMPLES



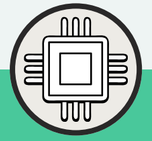
HEALTHCARE

Predicting Disease Outcomes



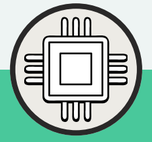
FINANCE

Algorithmic Securities Trading



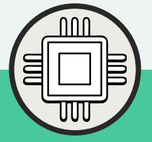
RETAIL

Personalized Recommendations & Cart Management



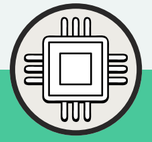
MANUFACTURING

Predictive Tools Maintenance



TRANSPORTATION

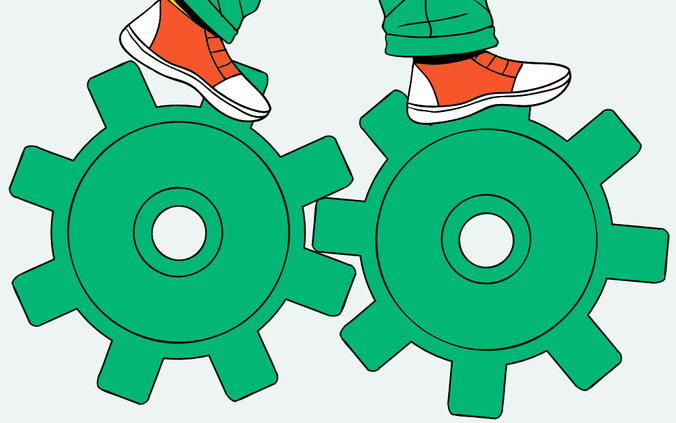
Autonomous Vehicles (Hybrid)



ENERGY

Energy Consumption Optimization

REAL WORLD APPLICATIONS



2025

Radiologists and healthcare professionals employed deep learning algorithms to analyze medical images such as X-rays, MRIs, and CT scans.

2030

An educational platform uses AI to provide personalized learning experiences for students as well as assessments suited to learnings.

2035

A smart grid system utilized AI to optimize energy consumption in urban areas. The system adjusted energy distribution to reduce waste and costs.

2040

By using natural language processing, the chatbot understood and responded to customer queries reducing response times.

ETHICAL CONSIDERATIONS

01

BIAS AND FAIRNESS

AI systems can inherit biases from their training data, which may result in unfair or discriminatory outcomes. Ethical AI requires addressing and mitigating bias to ensure that AI systems are fair and equitable for all individuals and groups.

02

DATA PROTECTION

AI often relies on large datasets, raising concerns about data privacy. Ethical AI practices involve protecting individuals' data and ensuring transparency about how data is collected, used, and stored.

03

AUTONOMY AND CONTROL

Ethical AI considers the degree of autonomy given to AI systems and the control mechanisms in place. Maintaining human oversight and control is important in critical decision-making processes.

DEPLOYMENT AND INTEGRATION

DATA PREPARATION

- Data collection, cleaning, and preprocessing
- Ensuring data quality and reliability
- Data labeling and annotation

MODEL DEVELOPMENT

- Selection of appropriate machine learning algorithms
- Model architecture and hyperparameter tuning
- Training process and validation

MODEL EVALUATION

- Cross-validation and testing on validation datasets
- Assessing model performance, including accuracy, precision and recall

PREPARING FOR THE FUTURE

Preparing for the future with artificial intelligence (AI) involves strategic thinking, adaptability, and a focus on harnessing the potential of AI to drive innovation and address societal challenges.

Here are some key steps and considerations for preparing for the future with AI:

- Education and Skills Development
- Data Management and Security
- Ethical and Responsible AI
- AI Integration and Talent
- Innovation and Culture

QUESTIONS AND ANSWERS

Your insights and questions are highly valuable to us, and we want to create an engaging and interactive session. Please feel free to send us your questions and concerns for clarifications.

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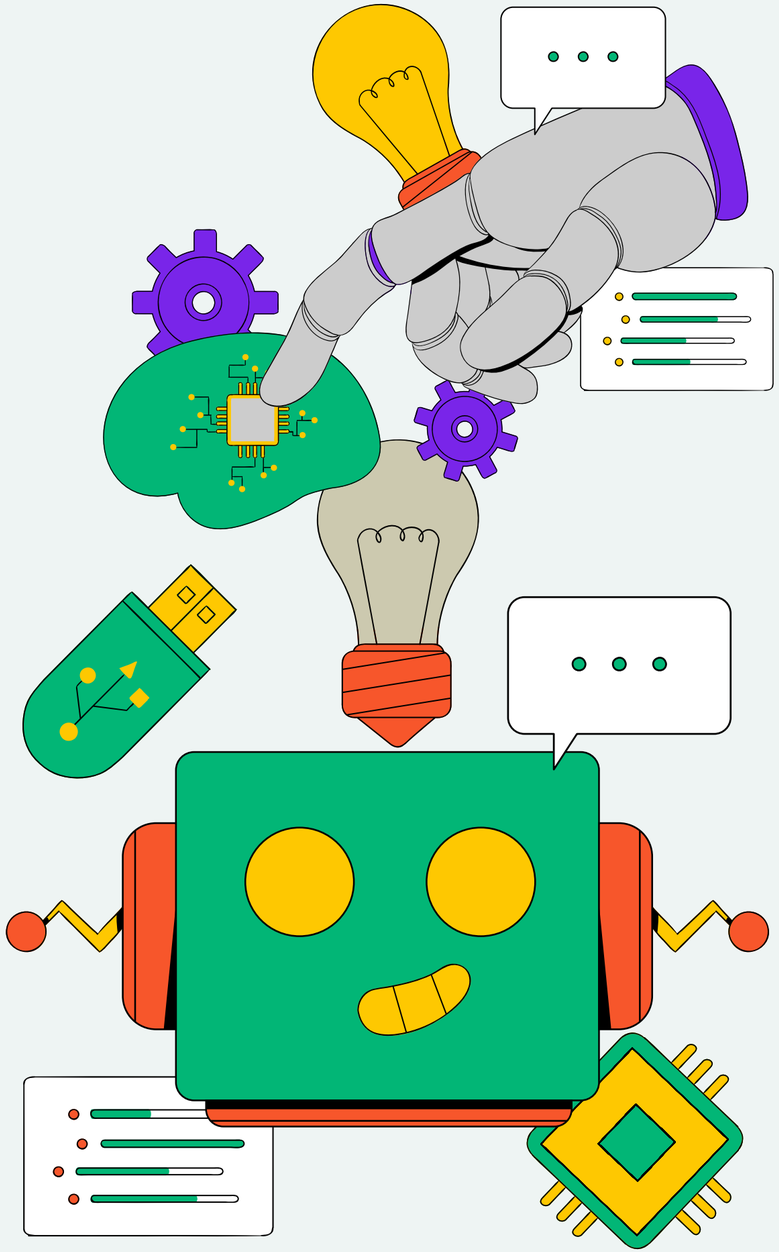

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D for a drumroll	M for mic drop
O for bubbles	Q for quiet
U for unveil	Any number from 0-9 for a timer

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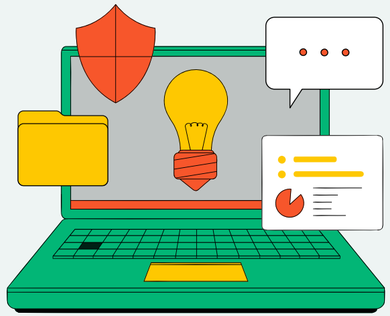

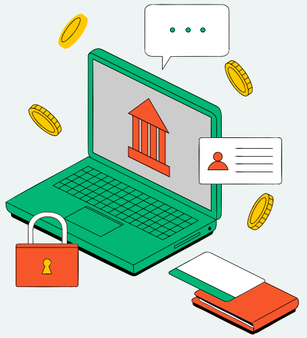

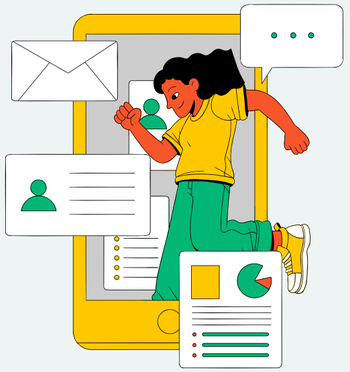



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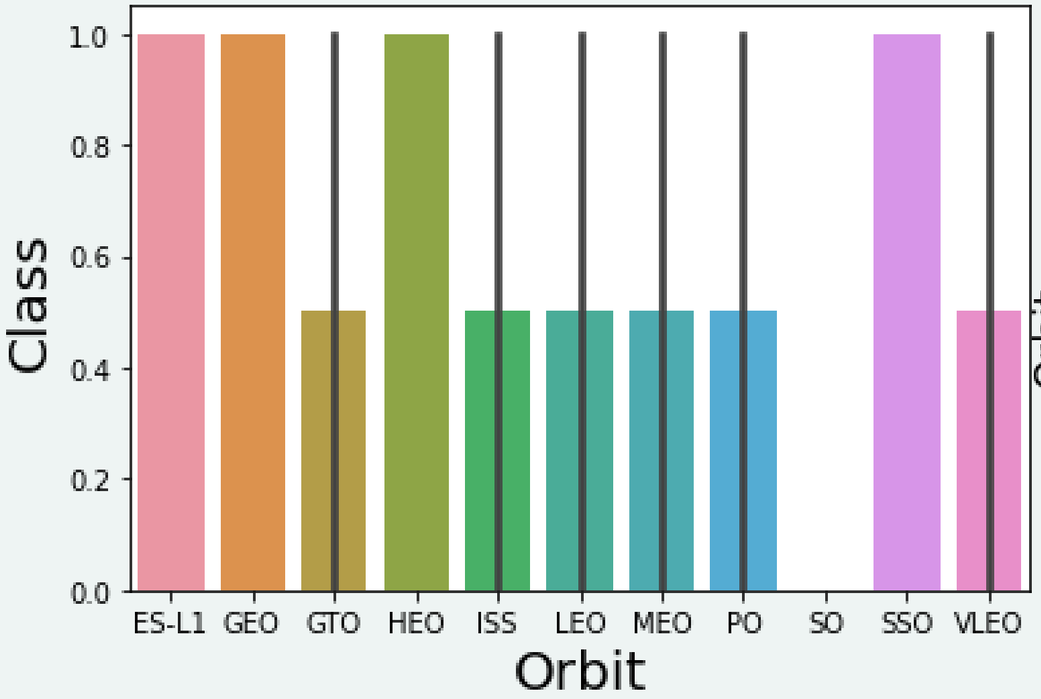
Once you're done, download your Canva Presentation in MP4 file format or get a link to your Talking Presentation and share it with others.
You can also record a video inside the editor! Go to 'Uploads' and click on 'Record yourself'.

In this project, data was collected from Kaggle and the NASA API, stored in structured formats. Initial inspection involved loading data into Pandas dataframes to check types and missing values. Data cleaning included imputing missing values, scaling, and outlier detection. Feature engineering created new variables, and one-hot encoding converted categorical data. Aggregation summed payload masses by year. Data from different sources was merged using common keys. The final dataset was validated for consistency and readiness for analysis. This process ensured a robust dataset, prepared for insightful analysis, and was documented with flowcharts, screenshots, and tables for clarity.

For EDA, we initially inspected the dataset for missing values, outliers, and distribution of variables using Pandas and Seaborn. Key patterns and trends were identified through statistical summaries and visualizations like histograms, box plots, and scatter plots. Interactive visual analytics employed Plotly for dynamic charts and dashboards, enabling detailed data exploration and user interaction. Folium was used for mapping geospatial data, providing insights into geographical trends. These tools facilitated a comprehensive understanding of the data, revealing underlying patterns and relationships crucial for subsequent predictive modeling and decision-making.

Predictive analysis methodology involves several key steps to develop and evaluate models for making predictions based on data. Initially, data is preprocessed by handling missing values, scaling features, and encoding categorical variables. Next, the dataset is split into training and testing sets for model training and evaluation, respectively. Various algorithms such as decision trees, SVM, or neural networks are selected based on the problem's nature. Hyperparameters are tuned using techniques like grid search or randomized search to optimize model performance. Cross-validation is employed to assess model robustness. Finally, metrics like accuracy, precision, recall, and F1-score evaluate model effectiveness in predicting outcomes.


Class
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0.8
0.6
0.4
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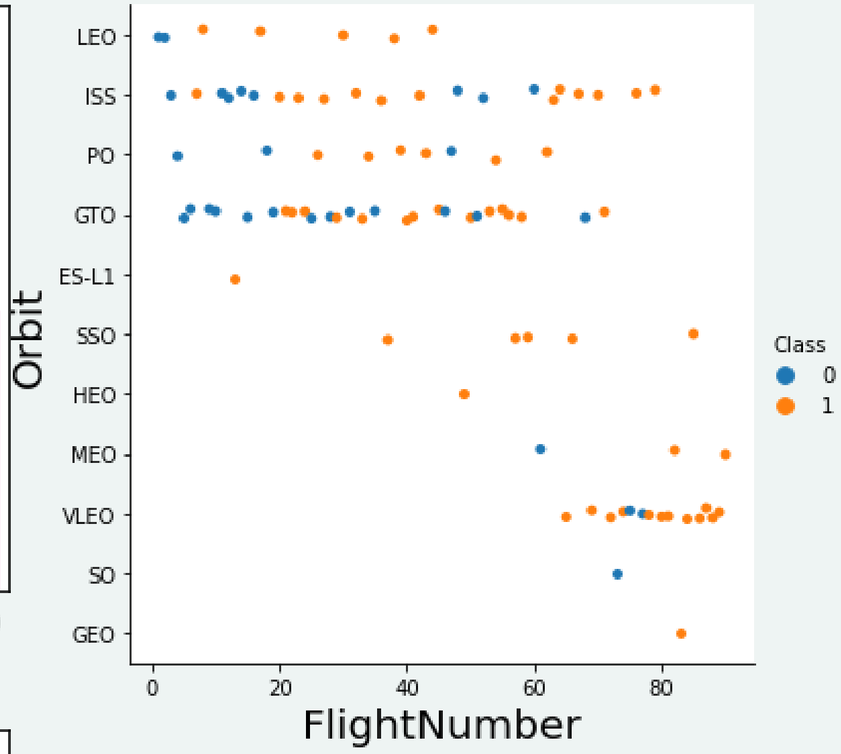
Orbit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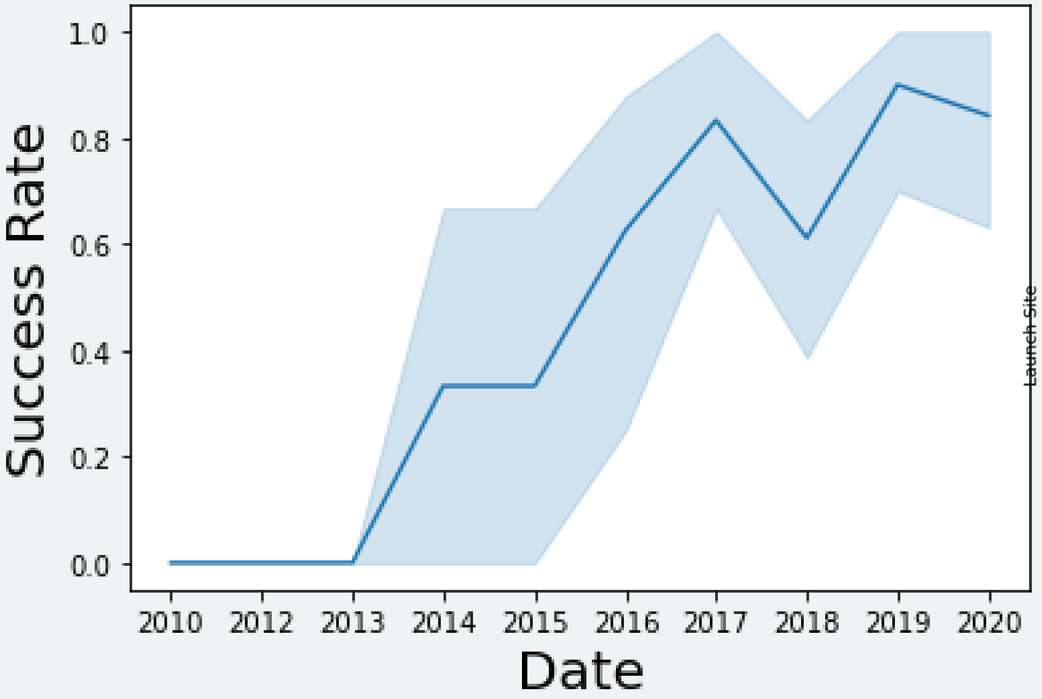
Success Rate
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0.8
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0.2
0.0
2010
2012
2013
2014
2015
2016
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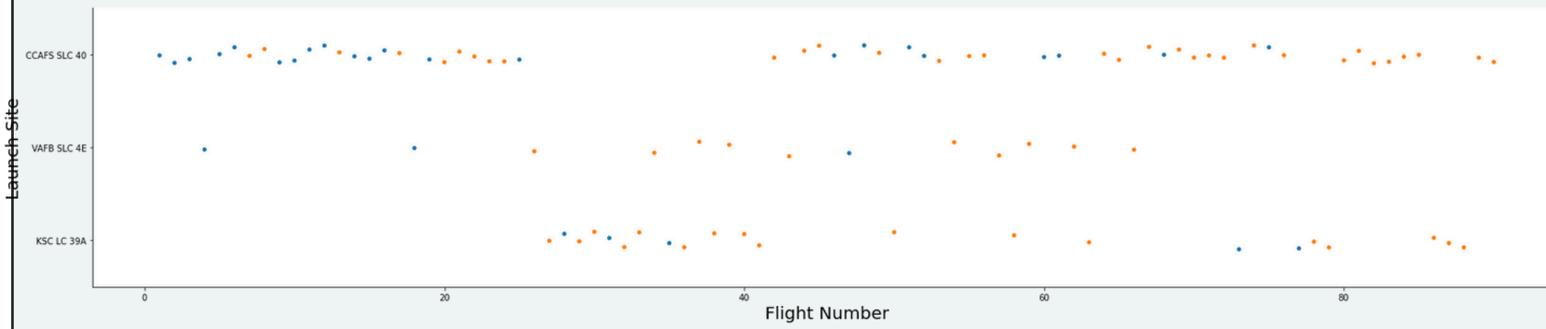
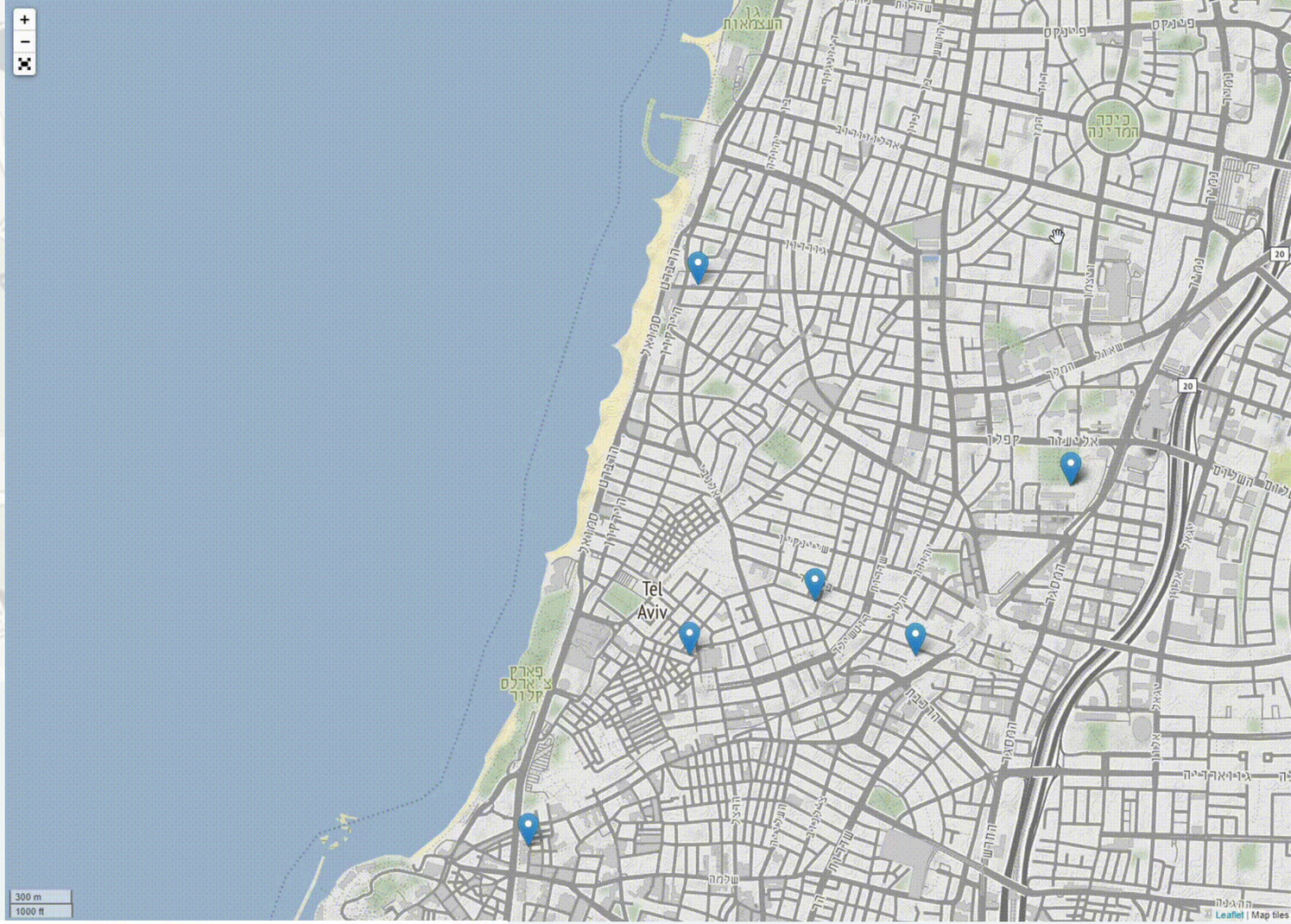
2018
2019
2020
Date


Launch Site
CCAFS SLC 40
VAFB SLC 4E
KSC LC 39A
0
20
40
60
80
Flight Number

```
mysql> select count(*) as num_of_players, year(joined) from fifa_sport group by 2 order by 1 desc;
+----------------+--------------+
| num_of_players | year(joined) |
+----------------+--------------+
|             51 |         2018 |
|             40 |         2017 |
|             31 |         2015 |
|             30 |         2016 |
|             21 |         2014 |
|             16 |         2013 |
|             11 |         2011 |
|              9 |         2012 |
|              6 |         2010 |
|              3 |         2009 |
|              2 |         2007 |
|              2 |         2008 |
+----------------+--------------+
12 rows in set (0.00 sec)
```

```
mysql> select name from fifa_sport where club = 'Paris Saint-Germain';
+-------------+
| name        |
+-------------+
| G. Buffon   |
| Marquinhos  |
| P. Kimpembe |
| A. Rabiot   |
| Dani Alves  |
| A. Areola   |
+-------------+
6 rows in set (0.00 sec)
```

```
select count(*) num_of_players, date(joined), club from fifa_sport where joined bet
1-01' and '2018-12-31' group by 2, 3 order by 1 desc;
----------+-------------+------------------------+
f_players | date(joined) | club                   |
----------+-------------+------------------------+
        2 | 2018-01-01   | GriEmio                |
        2 | 2018-07-01   | Liverpool              |
        2 | 2018-07-01   | Roma                   |
        1 | 2018-07-06   | Paris Saint-Germain    |
        1 | 2018-01-01   | Liverpool              |
        1 | 2018-07-16   | Vissel Kobe            |
        1 | 2018-07-19   | Liverpool              |
        1 | 2018-07-10   | Manchester City        |
        1 | 2018-01-22   | Manchester United      |
        1 | 2018-08-06   | FC Barcelona           |
        1 | 2018-01-01   | Atli©tico Madrid       |
        1 | 2018-07-01   | Inter                  |
        1 | 2018-03-23   | LA Galaxy              |
        1 | 2018-01-30   | Manchester City        |
        1 | 2018-07-13   | Real Betis             |
        1 | 2018-07-16   | Chelsea                |
        1 | 2018-08-17   | Borussia Dortmund      |
        1 | 2018-07-02   | Arsenal                |
        1 | 2018-01-01   | Atli©tico Mineiro      |
        1 | 2018-07-01   | Atli©tico Madrid       |
        1 | 2018-07-01   | FC Bayern Mi_nchen     |
        1 | 2018-08-31   | Sevilla FC             |
        1 | 2018-01-31   | Tottenham Hotspur      |
        1 | 2018-07-11   | Lazio                  |
        1 | 2018-01-22   | Arsenal                |
        1 | 2018-08-28   | Olympique de Marseille |
        1 | 2018-08-20   | Al Nassr               |
        1 | 2018-07-10   | Atli©tico Madrid       |
        1 | 2018-06-18   | Wolverhampton Wanderers |
        1 | 2018-07-01   | Borussia Dortmund      |
        1 | 2018-08-14   | Roma                   |
        1 | 2018-02-27   | Dalian YiFang FC       |
        1 | 2018-01-31   | Chelsea                |
        1 | 2018-07-01   | Sporting CP            |
        1 | 2018-01-01   | Fluminense             |
        1 | 2018-01-15   | Borussia Dortmund      |
        1 | 2018-07-05   | Napoli                 |
        1 | 2018-07-13   | Liverpool              |
        1 | 2018-08-09   | Lokomotiv Moscow       |
        1 | 2018-07-31   | Lokomotiv Moscow       |
        1 | 2018-07-05   | Sassuolo               |
        1 | 2018-07-10   | Valencia CF            |
        1 | 2018-01-01   | Los Angeles FC         |
        1 | 2018-06-20   | West Ham United        |
        1 | 2018-07-24   | Wolverhampton Wanderers |
        1 | 2018-08-23   | Al Hilal               |
        1 | 2018-07-11   | Sporting CP            |
        1 | 2018-07-01   | Olympique Lyonnais     |
----------+-------------+------------------------+
in set (0.00 sec)
```



	Name	About	price	lat	long	location	Opening hours	JPGs
0	Claro	Located in the Sarona Compound, Claro is a far...	3	32.071482	34.787672	30, Rav David Eleazar, Sarona, Tel Aviv-Jaffa	Sun-Thu 12:00-16:00, 18:30-Last customer; Fri-...	Claro1,Claro2 Claro3,Claro4
1	Mashya	Located in the Mendeli Street Hotel, this cont...	3	32.080027	34.768921	5 Mendeli St, Tel Aviv	Sun-Thu 07:00-11:00, 12:30-16:00, 18:30-00:00;...	Mashya1,Mashya2,Mashya3
2	Taizu	Taizu manages to pull off sophisticated Pan-As...	3	32.064200	34.779889	33 Derech Menachem Begin, Tel Aviv	Sun-Thu, Sat 12:30-15:30; Mon-Thu 18:30-00:00;...	Taizu1,Taizu2,Taizu3
3	Alena	The Norman Hotel has established itself as one...	2	32.066549	34.774821	Tel Aviv	Alena is open from 07:00-11:30, 12:30-15:00, 1...	Alena1,Alena2,Alena3,
4	Popina	Located in the romantic Neve Tzedek neighborho...	3	32.064248	34.768507	3 Ahad Ha'am St. Tel Aviv-Jaffa	Sun-Fri 18:00-01:00; Sat 12:00-15:00, 18:00-01:00	Popina1,Popina2,Popina3,Popina4

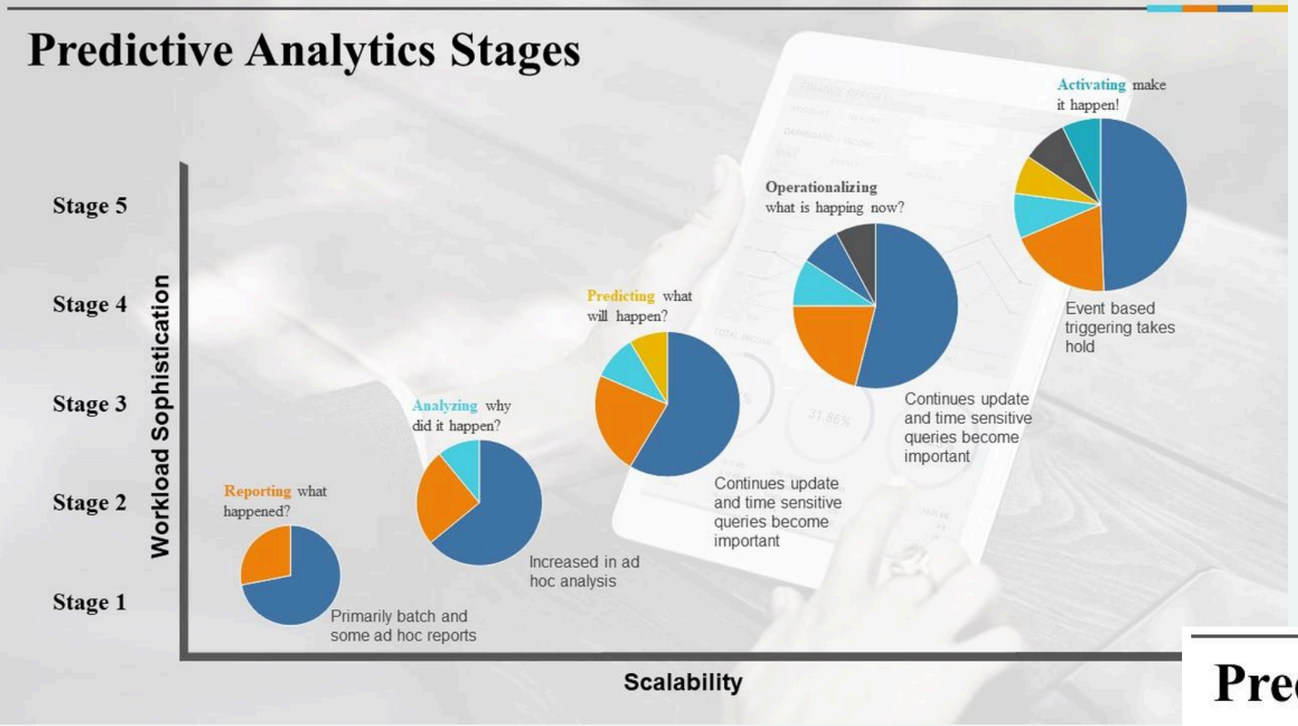
```
window.dccFunctions = window.dccFunctions || {};
window.dccFunctions.temperatureInCelsius = function(value) {
    return ((value - 32) * 5/9).toFixed(2);
}
```

We then pass this function name to the `tooltip.transform` parameter:

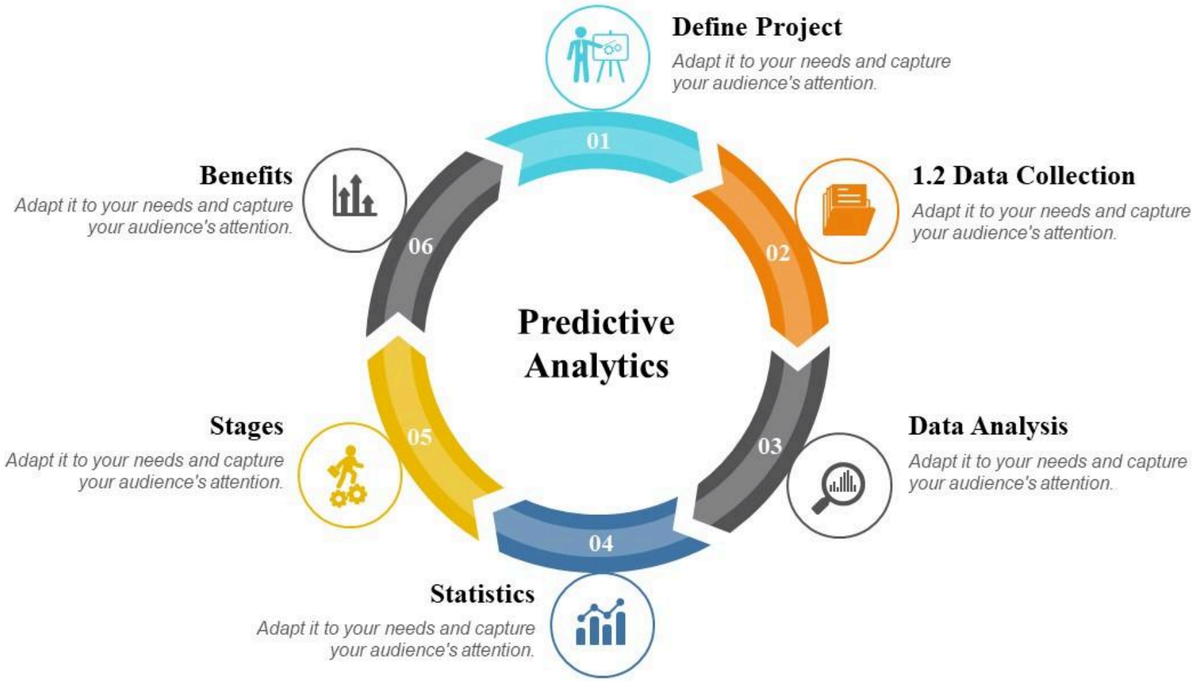
```
from dash import dcc

dcc.Slider(
    0,
    10,
    step=None,
    marks={0: "0°F", 3: "3°F", 5: "5°F", 7.65: "7.65°F", 10: "10°F"},
    value=5,
    tooltip={"always_visible": True, "transform": "temperatureInCelsius"},
)
```

Predictive Analytics Stages



Predictive Analytics Steps



Conclusion

In conclusion, the project revealed significant insights through comprehensive data exploration and predictive modeling. Key findings from exploratory data analysis highlighted patterns in launch outcomes correlated with factors like payload mass and launch site. Predictive analysis using machine learning models achieved high accuracy in predicting mission success based on historical data. The interactive visualizations and geospatial analysis provided deeper insights into launch distribution and performance metrics across different locations. Moving forward, leveraging these insights could optimize future mission planning and decision-making processes within the aerospace industry, emphasizing the value of data-driven approaches in enhancing operational efficiency and success rates in space missions.

Innovative Insights

Throughout the project, several innovative insights emerged from the data analysis. One notable finding was the discovery of a non-linear relationship between payload mass and mission success probability, challenging conventional assumptions. This insight suggests that optimizing payload configurations could potentially enhance mission outcomes more than previously thought. Additionally, geospatial analysis using interactive maps highlighted clustering of successful launches around specific geographic regions, pointing towards potential environmental or logistical factors influencing mission success. These insights underscore the importance of detailed data analysis in uncovering hidden patterns and optimizing decision-making processes in the aerospace industry, paving the way for more efficient and successful space missions in the future.