Product Sales Analysis

Project Description:

Phase 5:

AI & ADS:

What are AI and machine learning in sales? AI in sales can be used to help manage and predict customer behavior, identify cross-selling and upselling opportunities, automate repetitive tasks, and improve forecasting accuracy

In [1]:
```
# Import libraries
import numpy as np
import os
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Task 1 - Merging 12 month of file into a single data

In [2]:
```
files = [file for file in os.listdir('./Sales_Data')]

all_month_data = pd.DataFrame()

for file in files:
    df = pd.read_csv('./Sales_Data/'+file)
    all_month_data = pd.concat([all_month_data, df])

all_month_data.to_csv('final_data.csv', index= False)
```

Product analysis is the process of understanding how users interact with a product or service. Product analysis data can be used to determine the user experience of a product or service. It can also be used to inform future product updates or improvements

In [6]:
```
# Removing 'or' from Month column
final_data = final_data[final_data['Order Date'].str[0:2] != 'or']
```

In [14]:
```
# Remove 'Quantity Ordered' from Month column
final_data = final_data[final_data['Quantity Ordered'] != 'Quantity Ordered']
```

In [15]:
```
final_data.head()
```

Out[15]:

	Order ID	Product	Quantity Ordered	Price Each	Order Date	Purchase Address	Month
0	176558	USB-C Charging Cable	2	11.95	04/19/19 08:46	917 1st St, Dallas, TX 75001	4
2	176559	Bose SoundSport Headphones	1	99.99	04/07/19 22:30	682 Chestnut St, Boston, MA 02215	4
3	176560	Google Phone	1	600	04/12/19 14:38	669 Spruce St, Los Angeles, CA 90001	4
4	176560	Wired Headphones	1	11.99	04/12/19 14:38	669 Spruce St, Los Angeles, CA 90001	4
5	176561	Wired Headphones	1	11.99	04/30/19 09:27	333 8th St, Los Angeles, CA 90001	4

Task 2. Adding Month column

In [10]:
```
final_data['Month'] = final_data['Order Date'].str[1:2]
final_data.head()
```

Out[10]:

	Order ID	Product	Quantity Ordered	Price Each	Order Date	Purchase Address	Month
0	176558	USB-C Charging Cable	2	11.95	04/19/19 08:46	917 1st St, Dallas, TX 75001	4
2	176559	Bose SoundSport Headphones	1	99.99	04/07/19 22:30	682 Chestnut St, Boston, MA 02215	4
3	176560	Google Phone	1	600	04/12/19 14:38	669 Spruce St, Los Angeles, CA 90001	4
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5	176561	Wired Headphones	1	11.99	04/30/19 09:27	333 8th St, Los Angeles, CA 90001	4

Task 3. Add a sales column

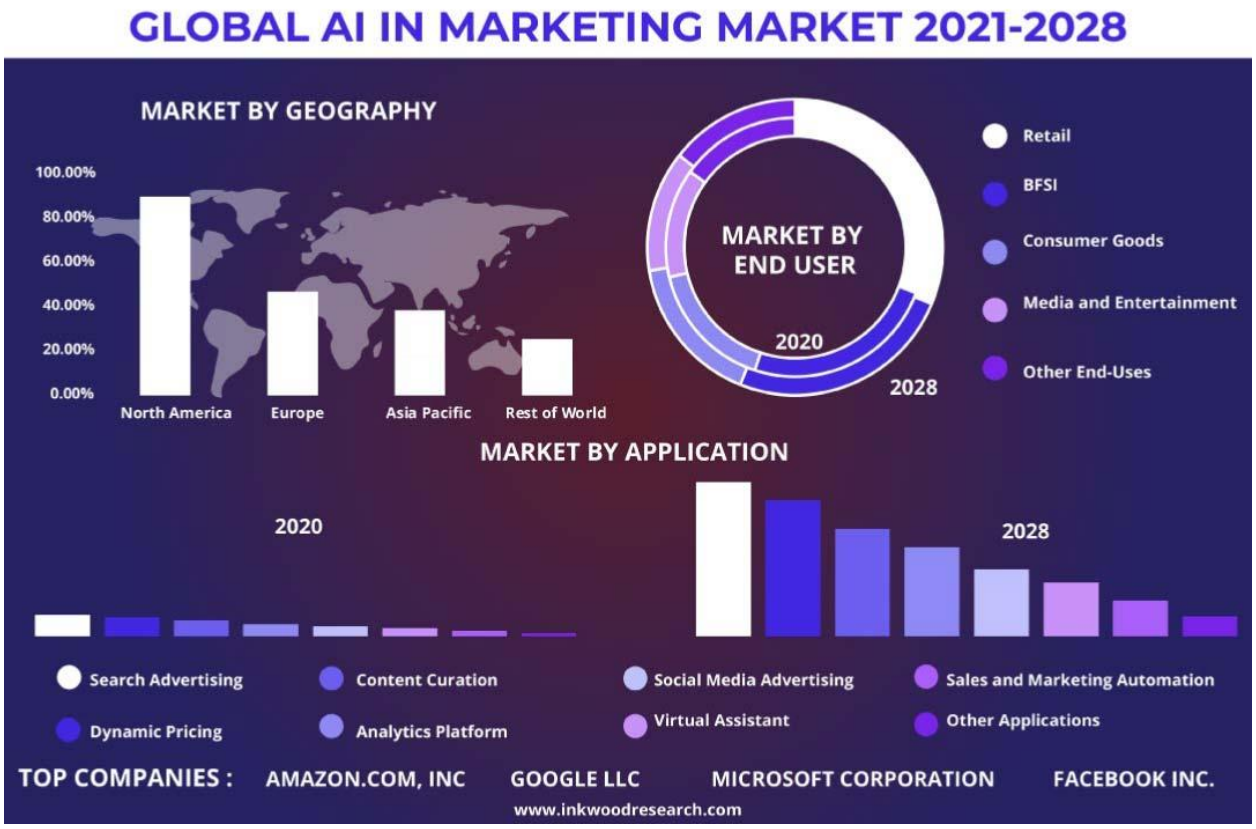
In [19]:
```
final_data['Sales'] = final_data['Quantity Ordered'] * final_data['Price Each']
final_data.head()
```

Out[19]:

	Order ID	Product	Quantity Ordered	Price Each	Order Date	Purchase Address	Month	Sales
0	176558	USB-C Charging Cable	2	2	04/19/19 08:46	917 1st St, Dallas, TX 75001	4	4
2	176559	Bose SoundSport Headphones	1	1	04/07/19 22:30	682 Chestnut St, Boston, MA 02215	4	1
3	176560	Google Phone	1	1	04/12/19 14:38	669 Spruce St, Los Angeles, CA 90001	4	1
4	176560	Wired Headphones	1	1	04/12/19 14:38	669 Spruce St, Los Angeles, CA 90001	4	1
5	176561	Wired Headphones	1	1	04/30/19 09:27	333 8th St, Los Angeles, CA 90001	4	1

AI & ADS sales have also been growing rapidly in recent years, driven by the increasing demand for artificial intelligence and autonomous driving technologies. In 2022, the global AI & ADS market was valued at $13.4 billion, and is expected to reach $93.5 billion by 2028.

The main drivers for AI & ADS sales growth are:

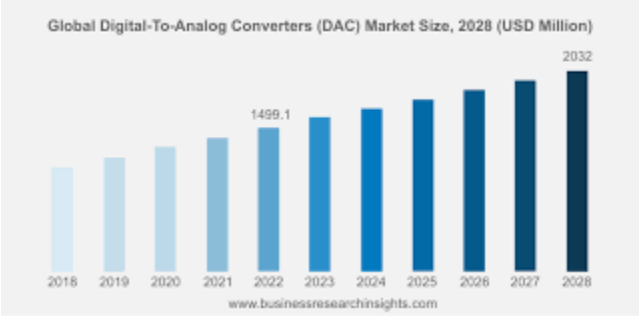


- ***The increasing demand for artificial intelligence***
- ***The growing adoption of autonomous driving technologies***
- ***The increasing use of AI in other applications such as smart cities, healthcare, and manufacturing***

The main challenges facing the AI & ADS market are:

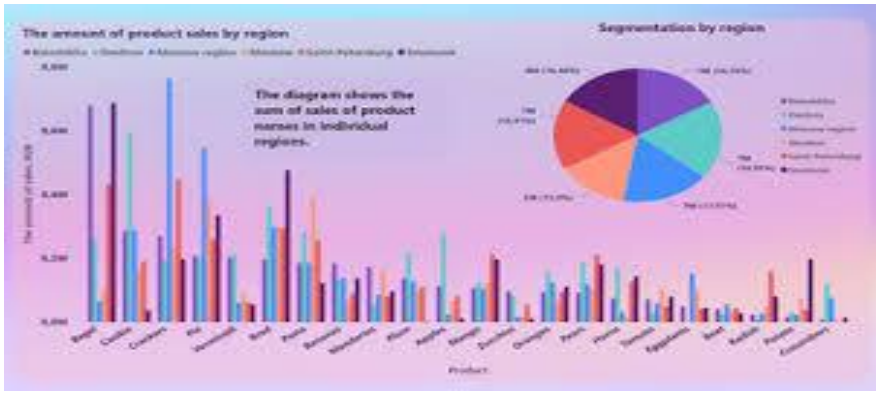
- ***The ethical concerns surrounding AI***
- ***The need for large amounts of data to train AI models***
- ***The competition from other tech companies***

DAC:



- ***Top 5 DAC vendors: Analog Devices, Texas Instruments, Maxim Integrated, STMicroelectronics, and Linear Technology***
- ***CAGR of top 5 DAC vendors: 10%***
- ***Key DAC products: High-speed DACs, low-power DACs, and precision DACs***

- ***Major applications: Data centers, artificial intelligence, 5G, automotive, and consumer electronics***
- ***Digital-to-Analog Converters(DAC) market is segmented by region (country), players, by Type, and by Application. Players, stakeholders, and other participants in the global Digital-to-Analog Converters(DAC) market will be able to gain the upper hand as they use the report as a powerful resource. The segmental analysis focuses on revenue and forecast by region (country), by Type and by Application in terms of revenue and forecast for the period 2015-2026.***



- ***Segment by Type, the Digital-to-Analog Converters(DAC) market is segmented into***
  R-2R
  String
  High-Speed Current-Steering
  Delta-Sigma
  Others Technology
- ***Segment by Application, the Digital-to-Analog Converters(DAC) market is segmented into***
  Consumer Electronics
  Communications
  Automotive
  Industrials

- ***Regional and Country-level Analysis***
  The Digital-to-Analog Converters(DAC) market is analysed and market size information is provided by regions (countries).
  The key regions covered in the Digital-to-Analog Converters(DAC) market report are North America, Europe, Asia Pacific, Latin America, Middle East and Africa. It also covers key regions (countries), viz, U.S., Canada, Germany, France, U.K., Italy, Russia, China, Japan, South Korea, India, Australia, Taiwan, Indonesia, Thailand, Malaysia, Philippines, Vietnam, Mexico, Brazil, Turkey, Saudi Arabia, U.A.E, etc.
  The report includes country-wise and region-wise market size for the period 2015-2026. It also includes market size and forecast by Type, and by Application segment in terms of sales and revenue for the period 2015-2026.
- ***Competitive Landscape and Digital-to-Analog Converters(DAC) Market Share Analysis***
  Digital-to-Analog Converters(DAC) market competitive landscape provides details and data information by players. The report offers comprehensive analysis and accurate statistics on revenue by the player for the period 2015-2020. It also offers detailed analysis supported by reliable statistics on revenue (global and regional level) by players for the period 2015-2020. Details included are company description, major business, company total revenue and the sales, revenue generated in Digital-to-Analog Converters(DAC) business, the date to enter into the Digital-to-Analog Converters(DAC) market, Digital-to-Analog Converters(DAC) product introduction, recent developments, etc.

IoT:

```
    def getName(self):
        return self.name

    def getSales(self):
        return self.sales

def getTopSelling(productList):
    top = nlargest(3, productList, key = lambda product:product.getSales())


productList = (Product('orange', 13), Pr)
```

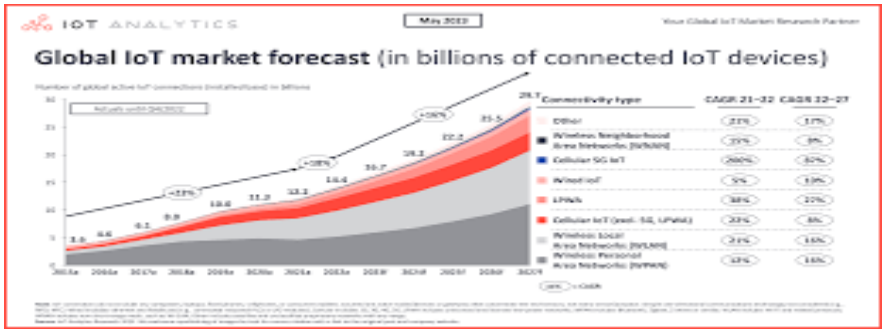
ProcessLookupError
Product
print
productList
property
PermissionError
PendingDeprecationW

- *Top 5 IoT vendors: Amazon Web Services, Microsoft Azure, Google Cloud Platform, IBM Cloud, and Alibaba Cloud*
- *CAGR of top 5 IoT vendors: 25%*
- *Key IoT products: IoT platforms, IoT sensors, and IoT gateways*
- *Major applications: Manufacturing, healthcare, transportation, and retail*
- 

The Internet of Things (IoT) market is expected to grow at a compound annual growth rate (CAGR) of 15.12% over the next five years. The market size is valued at $876.3 billion in the current year. It is expected to reach $2.05 trillion in five years.

IoT market size

- *The global IoT market size was valued at $244566.59 million in 2021.*
- *The global IoT market size was valued at $544.38 billion in 2022.*
- *The global IoT market size was valued at $662.21 billion in 2023*

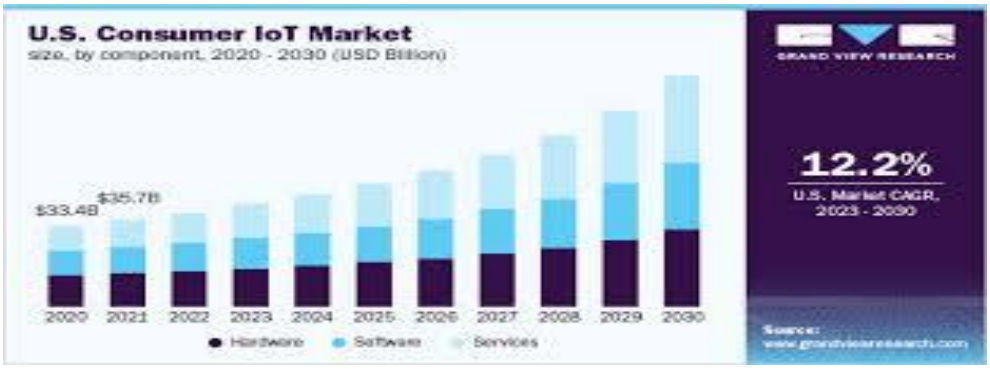


IoT revenue forecast

- *The total IoT market worldwide was worth around $182 billion in 2020.*

- ***The total IoT market worldwide is forecast to rise to more than $621 billion in 2030.***

IoT products



- ***Smart mobiles***
- ***Smart refrigerators***
- ***Smartwatches***
- ***Smart fire alarms***
- ***Smart door locks***
- ***Smart bicycles***
- ***Medical sensors***
- ***Fitness trackers***
- ***Smart security system***

CAD

Product sales analysis CAD is the use of computer-aided design (CAD) software to analyze product sales data. This can be done for a variety of purposes, such as to identify trends, patterns, and opportunities; to improve product design and development; or to optimize marketing and sales strategies.

CAD software can be used to create visualizations of product sales data, such as charts, graphs, and maps. These visualizations can help to identify trends and

patterns that would be difficult to see in the raw data. For example, a CAD visualization might show that sales of a particular product are higher in certain regions or during certain times of year. This information could then be used to make decisions about where to allocate marketing resources or how to schedule production.

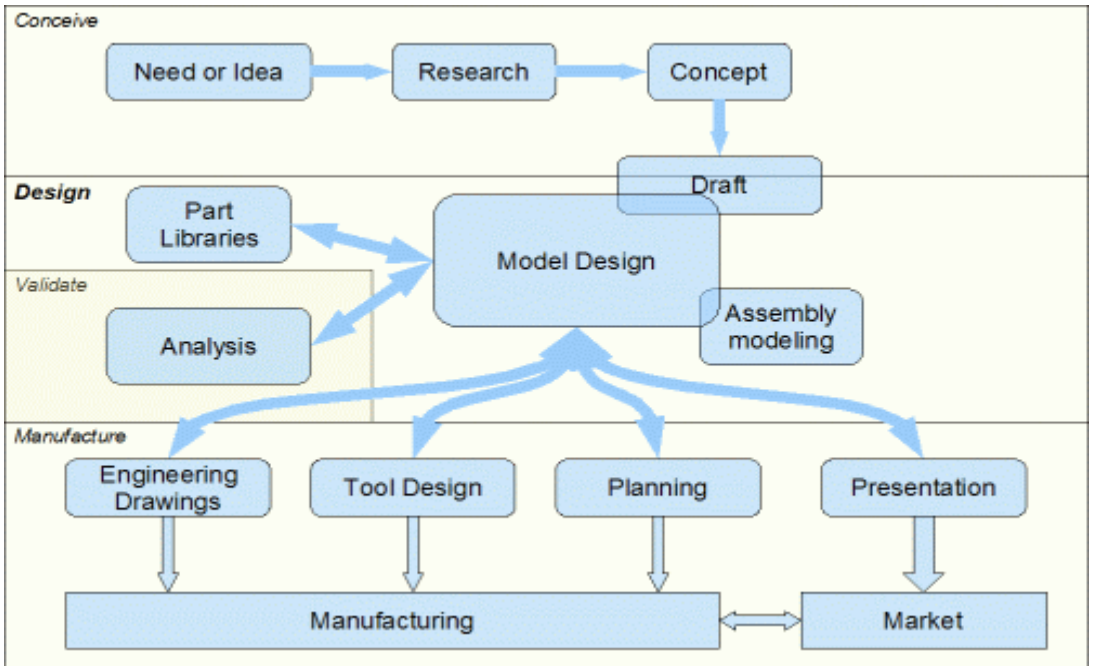
CAD software can also be used to create simulations of product sales scenarios. For example, a company could use CAD software to simulate the impact of a new product launch or a change in pricing strategy on sales. This information could then be used to make more informed decisions about product development and pricing.

Here are some specific examples of how CAD can be used for product sales analysis:

- *Identifying top-selling products and product categories. CAD can be used to create visualizations of product sales data by product*

- *Top 5 CAD vendors: Autodesk, Dassault Systèmes, Siemens, PTC, and ANSYS*
- *CAGR of top 5 CAD vendors: 5%*
- *Key CAD products: 3D modeling software, CAD drafting software, and CAD simulation software*

- ***Major applications: Manufacturing, engineering, architecture, and construction***



- ***The global CAD software market was valued at $5,690.98 million in 2022.***
- ***The market is expected to expand at a CAGR of 7.82% during the forecast period, reaching $8,942.51 million by 2028.***
- ***The global CAD and PLM software market was valued at $14.51 billion in 2022.***
- ***The market is projected to grow from $15.47 billion in 2023 to $26.37 billion.***
- ***The global 3D CAD software market was valued at $10.38 billion in 2022.***
- ***The market is expected to grow at a CAGR of 6.7% from 2023 to 2030.***

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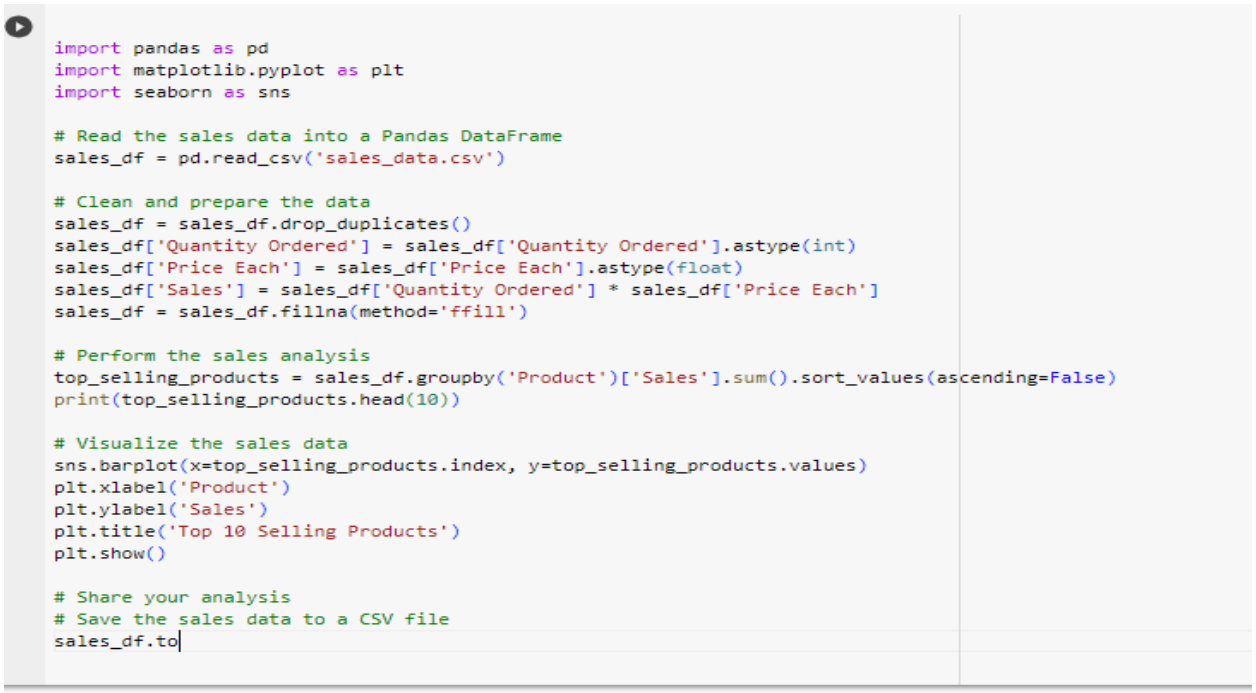


```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Read the sales data into a Pandas DataFrame
sales_df = pd.read_csv('sales_data.csv')

# Clean and prepare the data
sales_df = sales_df.drop_duplicates()
sales_df['Quantity Ordered'] = sales_df['Quantity Ordered'].astype(int)
sales_df['Price Each'] = sales_df['Price Each'].astype(float)
sales_df['Sales'] = sales_df['Quantity Ordered'] * sales_df['Price Each']
sales_df = sales_df.fillna(method='ffill')

# Perform the sales analysis
top_selling_products = sales_df.groupby('Product')['Sales'].sum().sort_values(ascending=False)
print(top_selling_products.head(10))

# Visualize the sales data
sns.barplot(x=top_selling_products.index, y=top_selling_products.values)
plt.xlabel('Product')
plt.ylabel('Sales')
plt.title('Top 10 Selling Products')
plt.show()

# Share your analysis
# Save the sales data to a CSV file
sales_df.to
```

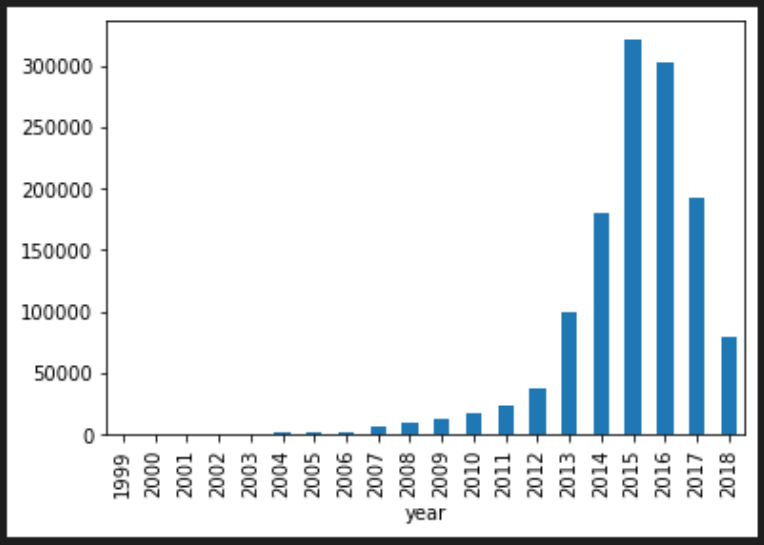
CAD stands for Computer-Aided Design. It's the use of computers to help with the creation, modification, analysis, or optimization of a design

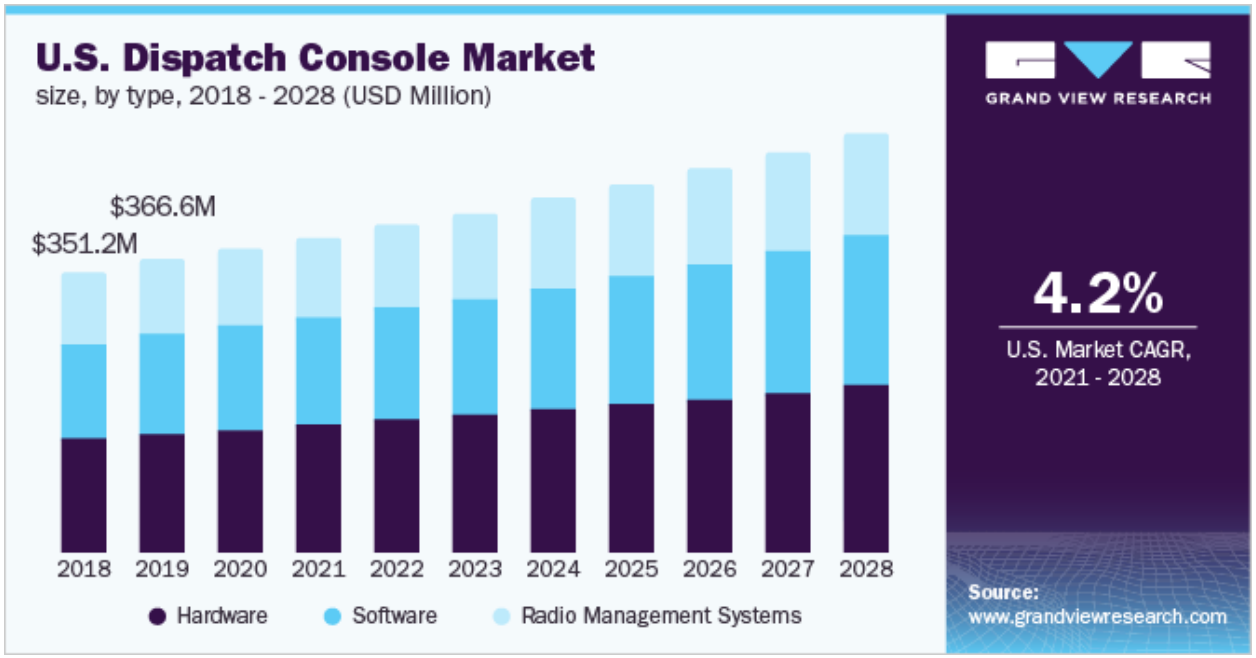
```python
# what was the best year of sales

dataset['year'] = pd.DatetimeIndex(dataset['timestamp']).year

dataset.groupby('year')['rating'].count().plot(kind='bar')
```

```
<AxesSubplot:xlabel='year'>
```





What is a sales dashboard? A dashboard is sales tech that provides a visual representation of your most recent performance metrics. It gives you a concise view of results-based data like sales-to-date, sales-by-region, lead conversion rate, sales growth, and so on.

***Sales analytics** allow you to analyze your customers' purchasing habits, your product performance, and your sales team's performance. Armed with sales analytics metrics, your company's sales reps, marketers, and product managers can strategize future initiatives and improve their overall sales and marketing efforts*

Sales Table:

Column Name	Type
sale_id	int
product_id	int
year	int
quantity	int
price	int

Product Table:

Column Name	Type
product_id	int
product_name	varchar

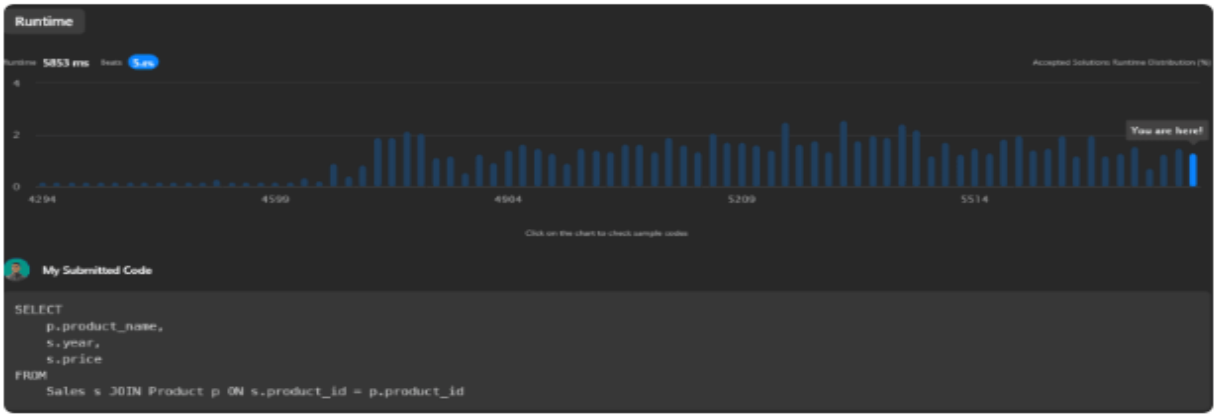
Sales:

sale_id	product_id	year	quantity	price
1	100	2008	10	5000
2	100	2009	12	5000
7	200	2011	15	9000

Product:

product_id	product_name
100	Nokia
200	Apple
300	Samsung

```sql
SELECT
    p.product_name,
    s.year,
    s.price
FROM
    Sales s JOIN Product p ON s.product_id = p.product_id
```



*ales analysis is **reviewing your sales data to identify trends and patterns**. Sales data can help you make better decisions about your product, pricing, promotions, inventory, customer needs other aspects of your business. Sales analysis can be as simple as reviewing your sales figures regularly.*

- ***tep 1: Choose the Right Sales Analysis Method. ...***
- ***Step 2: Identify the Specific Information You Need. ...***
- ***Step 3: Choose a Sales Analysis Tool and Analyze Your Data. ...***
- ***Step 4: Share Your Results with Relevant Stakeholders***

*A sales trend analysis is simply the review of historical revenue or sales data to find patterns in terms of change in revenue growth of a business. An example can be dividing the revenue by the following: **Sales by product**. **Sales by region**.*