

Data Visualization

Lecture 1
Mark Hamazaspyan





Why do we need to visualize data?



Why do we need to visualize data?

1. Understanding Complex Data
 - a. Data visualization helps in making complex data more understandable and accessible. It allows individuals to grasp large datasets, patterns, and trends that might be challenging to comprehend in raw numerical or textual form.



Why do we need to visualize data?

1. Understanding Complex Data
2. Communication
 - a. Visualizations are powerful tools for communication. They make it easier to convey information to a diverse audience, including those who may not have a deep understanding of the underlying data. Visuals can tell a story, making it more engaging and memorable.



Why do we need to visualize data?

1. Understanding Complex Data
2. Communication
3. Identification of Patterns and Trends
 - a. Visualization enables the identification of patterns, trends, and correlations in data that might not be apparent through raw data analysis. This can lead to more informed decision-making and strategic planning.



Why do we need to visualize data?

1. Understanding Complex Data
2. Communication
3. Identification of Patterns and Trends
4. Decision-Making
 - a. Visualizations facilitate decision-making by providing a clear and concise representation of data. Decision-makers can quickly understand the implications of certain trends and make informed choices based on the insights gained from visualized data.



Why do we need to visualize data?

1. Understanding Complex Data
2. Communication
3. Identification of Patterns and Trends
4. Decision-Making
5. Spotting Anomalies and Outliers
 - a. Visualizations make it easier to identify outliers, anomalies, or unexpected patterns in data. This is crucial for quality control, fraud detection, and anomaly detection in various industries.



Why do we need to visualize data?

1. Understanding Complex Data
2. Communication
3. Identification of Patterns and Trends
4. Decision-Making
5. Spotting Anomalies and Outliers
6. Exploration and Discovery
 - a. Data visualization allows for interactive exploration of data. Users can manipulate visual representations, zoom in on specific details, and explore the data from different perspectives, promoting a deeper understanding of the information.



Why do we need to visualize data?

1. Understanding Complex Data
2. Communication
3. Identification of Patterns and Trends
4. Decision-Making
5. Spotting Anomalies and Outliers
6. Exploration and Discovery
7. Enhancing Presentations and Reports
 - a. Including visualizations in presentations and reports makes the content more engaging and easier to comprehend. Visuals capture attention and can convey complex information in a more digestible format.



Sales of Company ABC

	Month	Prodcut 1 sales \$
0	Jan	1000
1	Feb	500
2	Mar	2000
3	Apr	5000



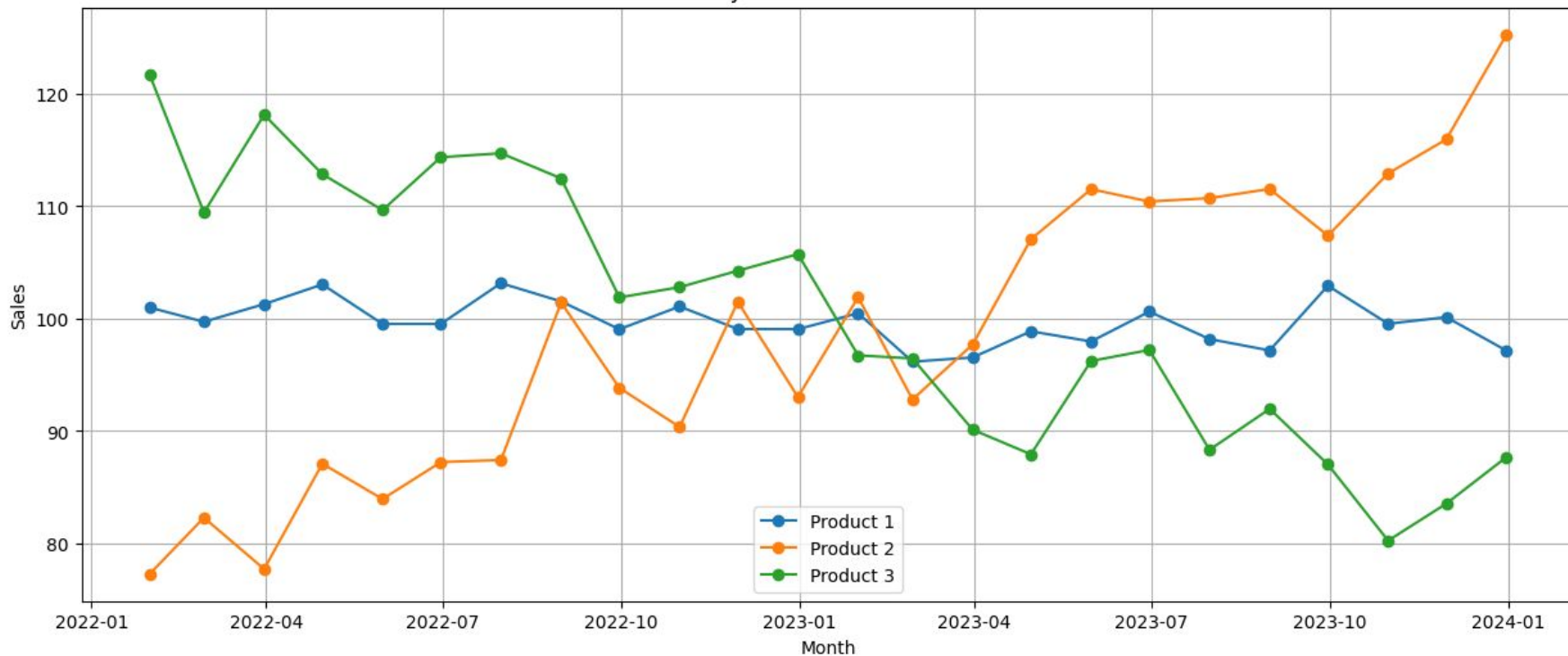
Sales of Company ABC

	Month	Product_1_Sales	Product_2_Sales	Product_3_Sales
0	2022-01-31	100.993428	77.278086	121.718091
1	2022-02-28	99.723471	82.293743	109.445669
2	2022-03-31	101.295377	77.723293	118.142159
3	2022-04-30	103.046060	87.095881	112.857197
4	2022-05-31	99.531693	83.953328	109.658868
5	2022-06-30	99.531726	87.237183	114.362729
6	2022-07-31	103.158426	87.426250	114.720215
7	2022-08-31	101.534869	101.435304	112.482488
8	2022-09-30	99.061051	93.845557	101.890869
9	2022-10-31	101.085120	90.363619	102.801764
10	2022-11-30	99.073165	101.504029	104.265013
11	2022-12-31	99.068540	93.026217	105.747291
12	2023-01-31	100.483925	101.913883	96.734564
13	2023-02-28	96.173440	92.810345	96.463009
14	2023-03-31	96.550164	97.706896	90.120499
15	2023-04-30	98.875425	107.071263	87.932010
16	2023-05-31	97.974338	111.518420	96.236542
17	2023-06-30	100.628495	110.422059	97.215983
18	2023-07-31	98.183952	110.726106	88.335602
19	2023-08-31	97.175393	111.537960	91.974186
20	2023-09-30	102.931298	107.389999	87.025571
21	2023-10-31	99.548447	112.922518	80.252662
22	2023-11-30	100.135056	115.957676	83.546108
23	2023-12-31	97.150504	125.285611	87.690183

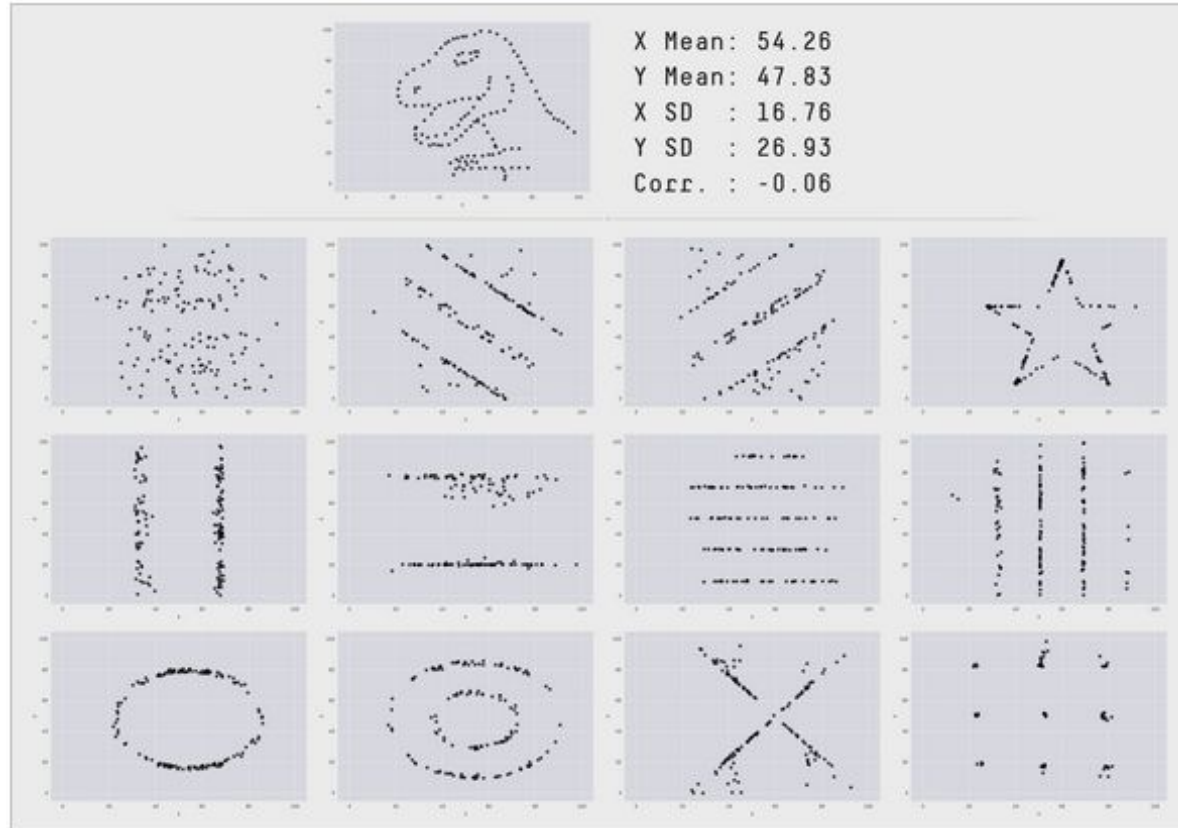


Sales of Company ABC

Monthly Sales Data for Products

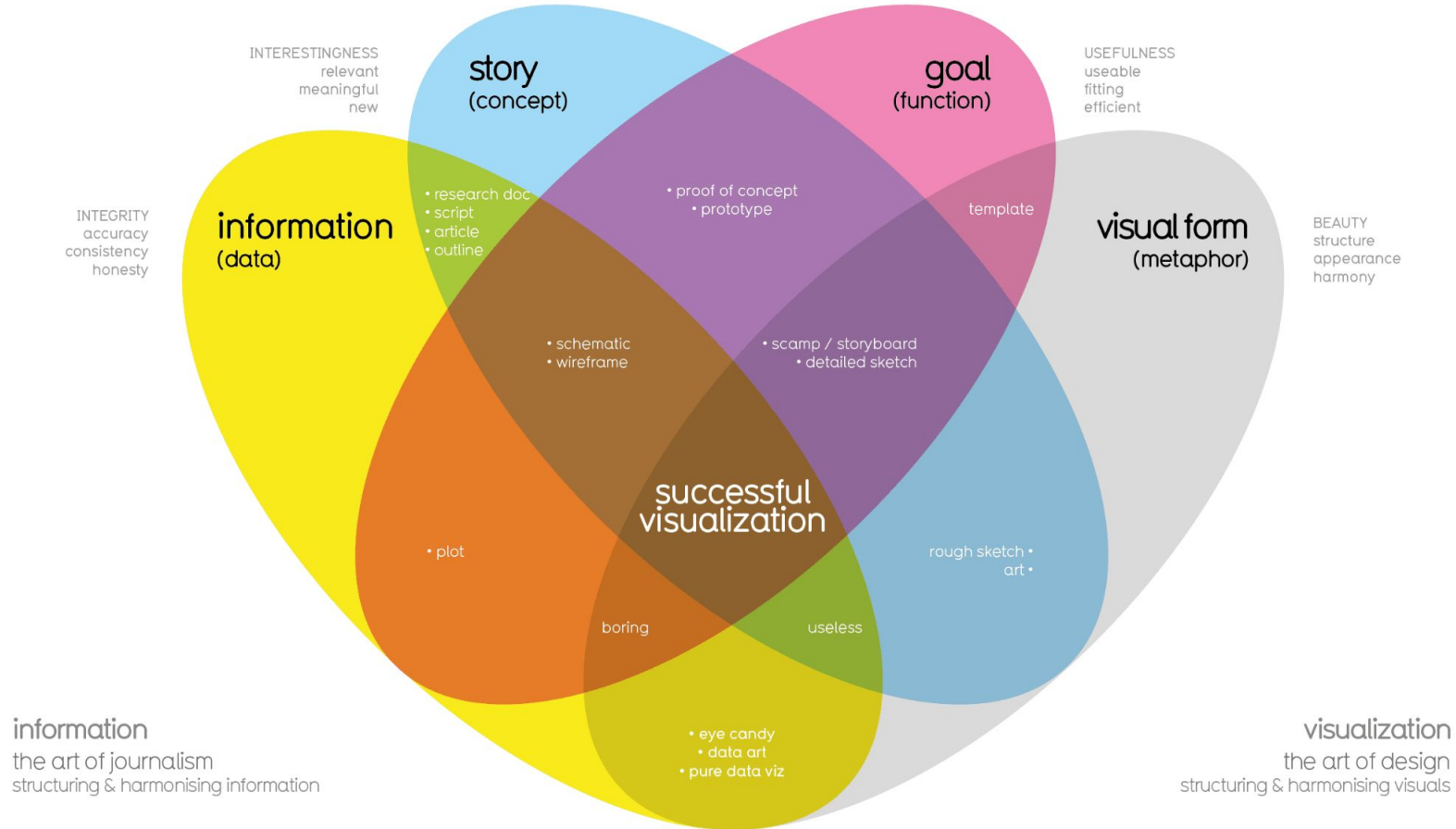


Importance of data visualization



What Makes a Good Visualization?

explicit (implicit)





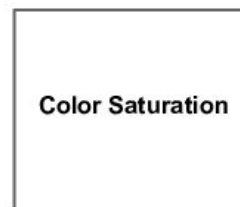
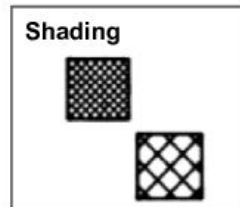
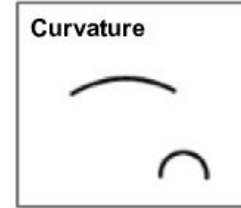
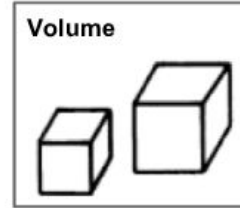
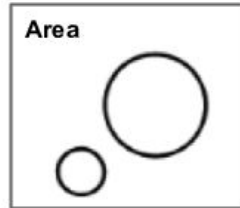
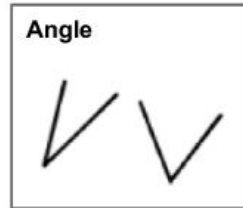
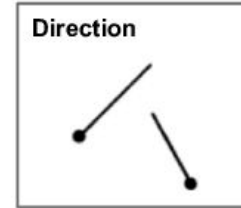
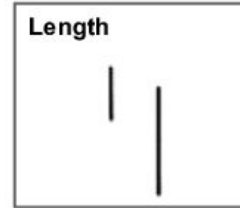
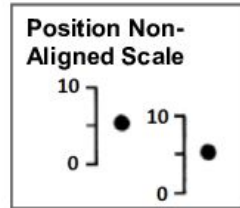
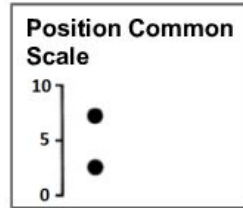
Data visualization catalogue

Explore here: <https://datavizcatalogue.com/>



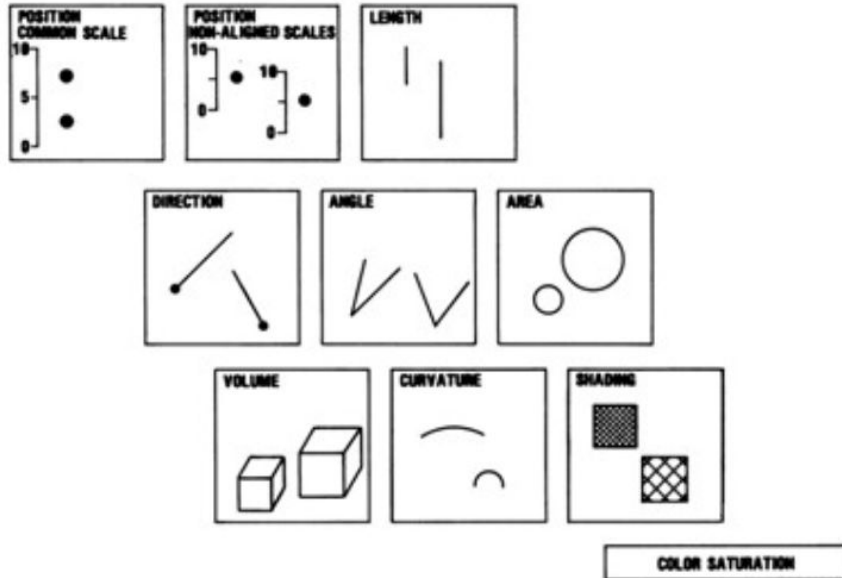
Cleveland and McGill on perception and accuracy

<https://sci-hub.se/10.2307/2288400>



Cleveland and McGill on perception and accuracy

More accurate

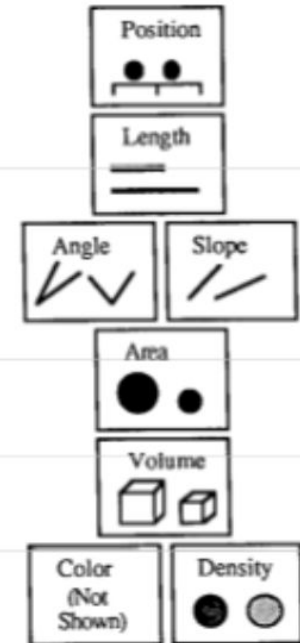


Less accurate

More accurate

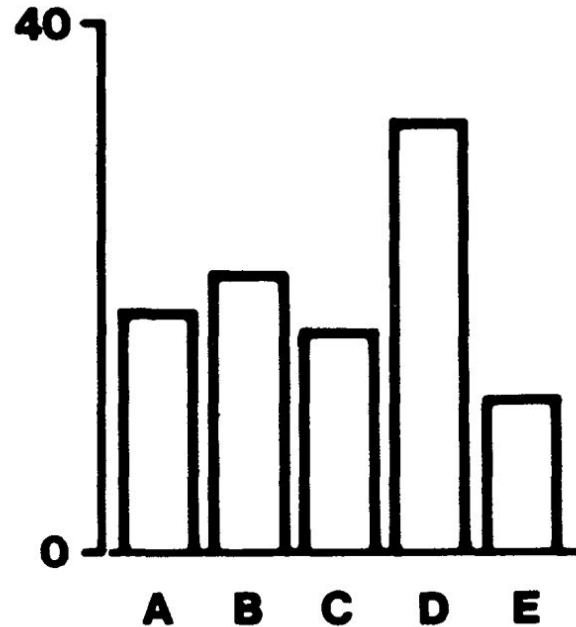
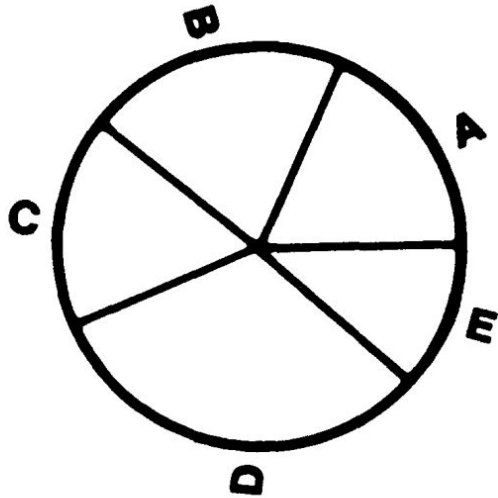


Less accurate

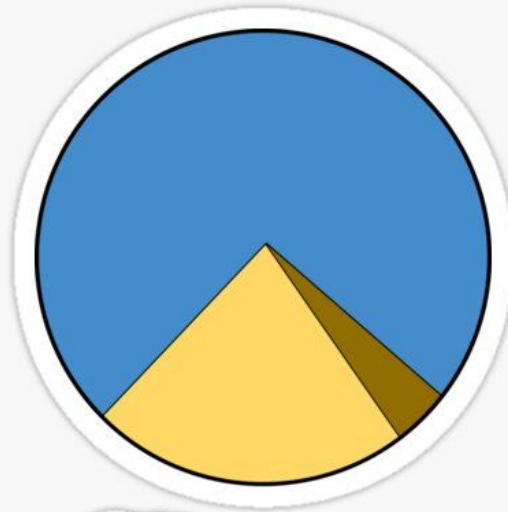




Cleveland and McGill on perception and accuracy



The only good applications of pie charts



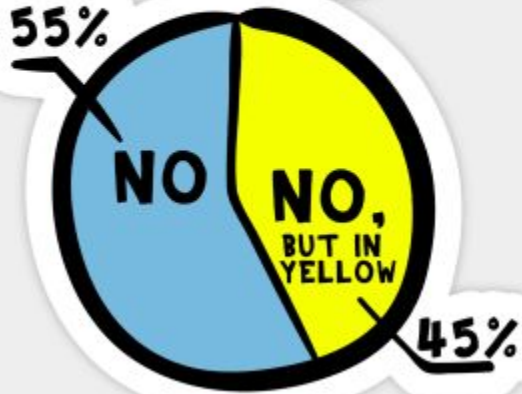
● SKY

● SUNNY SIDE OF PYRAMID

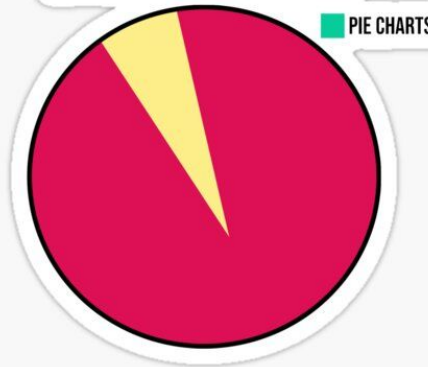
● SHADED SIDE OF PYRAMID

The only good applications of pie charts

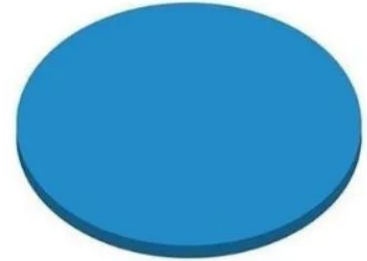
SHOULD YOU TALK
TO ME?



THINGS I DON'T
UNDERSTAND



People who read the
Terms and Conditions before
clicking "Agree"



- Have read
- Have not read

Dashboards

Sales KPI Dashboard

▼ Last Month

NUMBER OF SALES

115

▼ 4% ▲ 5%

REVENUE

\$150,009

▼ 9% ▼ 4%

PROFIT

\$39,709

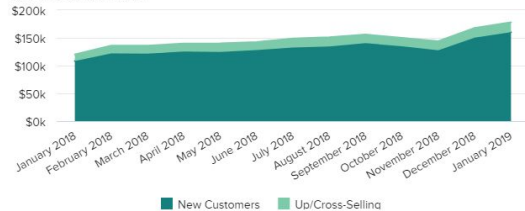
▼ 1% ▼ 11%

COST

\$110,300

▼ 12% ▼ 1%

SALES REVENUE



COST BREAKDOWN

Marketing

\$73,450

Sales

\$36,850



UP/CROSS SELL

Revenue \$16,501

% of Revenue 11%

CHURN

Total 26

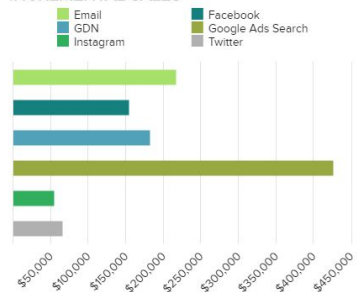
Rate 2%

Revenue \$43,812

ACCUMULATED REVENUE



INCREMENTAL SALES



Percentage above or below target



Comparison to previous time period

LinkedIn Company Page

Last 90 Days ▼

Followers Gained

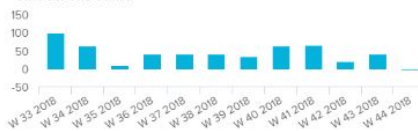


4,789
Total Followers



+3.9%
Followers gained

Total Followers Gained



Engagement Rate

3.25%



1,529
Total Engagement



1,223
Likes



211
Comments



95
Shares

Engagement Rate



Impressions vs. Unique Impressions



Click Through Rate

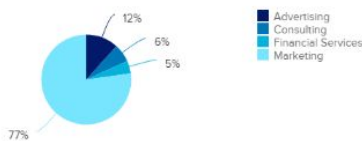
3.71%
Click Through Rate



1,746
Link Clicks



Followers by Company Industry



Last 5 company updates

Update	Publication Date	CTR
How to track your finances in real time	2018-10-25	2.53%
The biggest benefits of business intelligence	2018-10-22	1.76%
10 Inspirational Dashboard Designs	2018-10-19	1.76%
How to Create Dashboards	2018-10-17	0.66%
Your Ultimate Guide To Modern KPI Reports	2018-10-12	1.81%



Dashboards

- Analytical Dashboard:
 - Provides in-depth insights and data analysis.
 - Focuses on detailed exploration and examination of data trends.
 - Helps users make informed decisions based on thorough data examination.
- Operational Dashboard:
 - Offers real-time data on day-to-day activities and processes.
 - Aids in monitoring and managing ongoing operations efficiently.
 - Key metrics and KPIs are prominently displayed for quick decision-making.
- Strategic Dashboard:
 - Focuses on high-level strategic goals and objectives.
 - Presents a consolidated view of organizational performance.
 - Designed to assist executives in making long-term strategic decisions.

Dashboards (strategic)

Sales KPI Dashboard

▼ Last Month

NUMBER OF SALES

115



▼ 4%



▲ 5%

REVENUE

\$150,009



▼ 9%



▼ 4%

PROFIT

\$39,709



▼ 1%



▼ 11%

COST

\$110,300

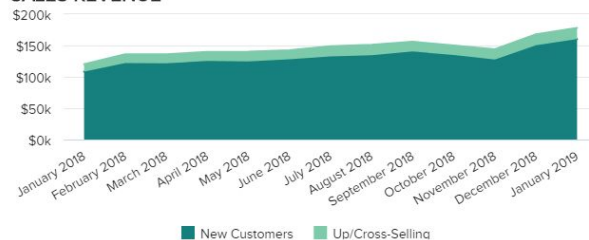


▼ 12%



▼ 1%

SALES REVENUE



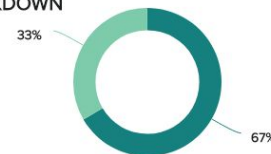
COST BREAKDOWN

Marketing

\$73,450

Sales

\$36,850



UP/CROSS SELL

Revenue \$16,501

% of Revenue 11%

CHURN

Total 26

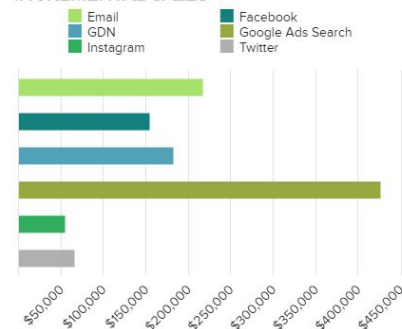
Rate 2%

Revenue \$43,812

ACCUMULATED REVENUE



INCREMENTAL SALES



Percentage above or below target



Comparison to previous time period

Dashboards (operational)

LinkedIn Company Page

Last 90 Days ▼

Followers Gained



4,789

Total Followers



+3.9%

Followers gained

Total Followers Gained



Engagement Rate



3.25%



1,529

Total Engagement



1,223

Likes



211

Comments



95

Shares

Engagement Rate



Impressions vs. Unique Impressions



Click Through Rate



3.71%

Click Through Rate

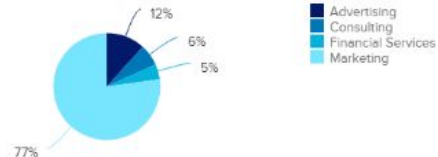


1,746

Link Clicks



Followers by Company Industry



Last 5 company updates

Update	Publication Date	CTR
How to track your finances in real time	2018-10-25	2.53%
The biggest benefits of business intelligence	2018-10-22	1.76%
10 Inspirational Dashboard Designs	2018-10-19	1.76%
How to Create Dashboards	2018-10-17	0.66%
Your Ultimate Guide To Modern KPI Reports	2018-10-12	1.81%

Dashboards (analytical)

FINANCIAL PERFORMANCE DASHBOARD



BALANCE SHEET

TOTAL ASSETS	€ 1,342,091	
Current Assets	€ 942,091	
Cash	€ 238,126	
Accounts Receivable	€ 458,863	
Inventory	€ 245,102	
Long-Term Assets	€ 400,000	
TOTAL LIABILITIES	€ 1,342,091	
Current Liabilities	€ 306,654	
Accounts Payable	€ 200,558	
Other Liabilities	€ 106,096	
Shareholder Equity	€ 693,115	
Common Stock	€ 470,000	
Current Earnings	€ 223,115	



Prerequisites

- Google colab/ VSCode/ Jupyter notebook
- Python ≥ 3.10
- Github repo

**Any
questions?**