

Prepared by Dr. Wesam Ahmed

IT393  
Business Intelligence

## Lecture 4



# Practical guide to using spreadsheets for Data Analytics

## Lecture 4

IT393

Business Intelligence

Prepared by  
**Dr. Wesam Ahmed**



01

## Learning Objectives:

- 1.1 The data analytics lifecycle
- 1.2 Using spreadsheets for data analytics
- 1.3 Solving problems with data
- 1.4 Large language models (LLMs)

# 02

## The data analytics lifecycle:

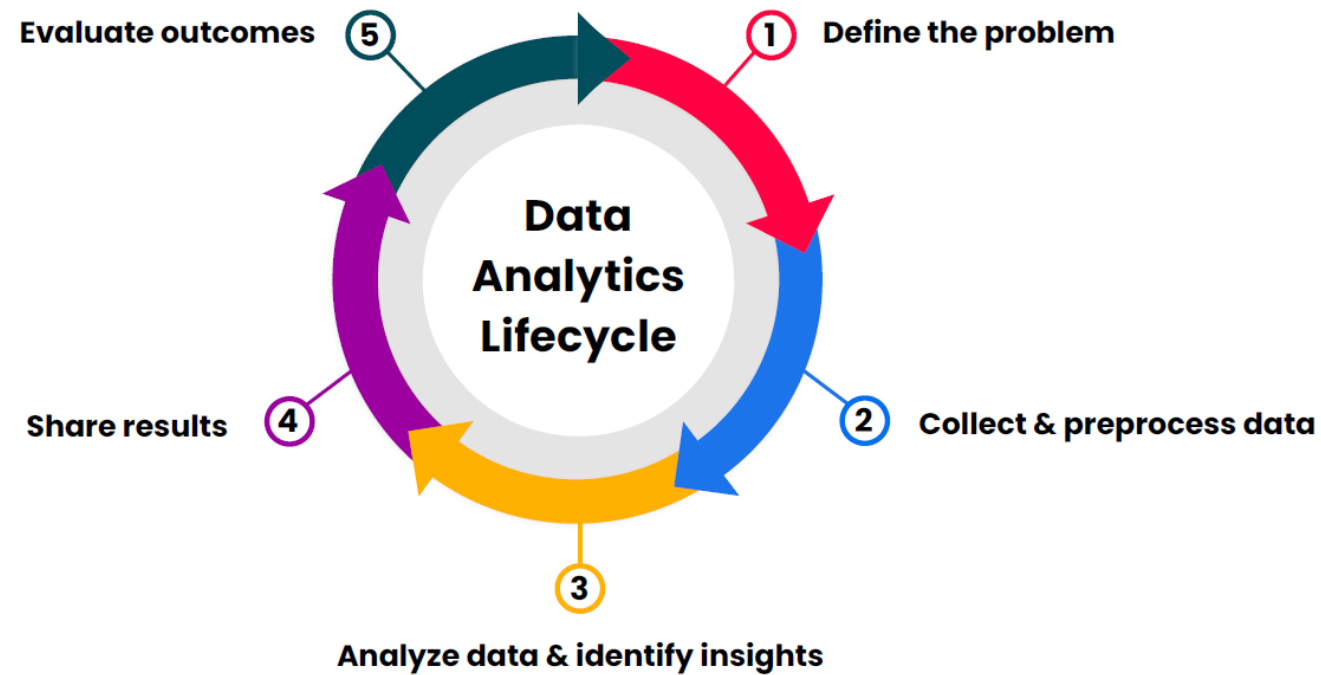
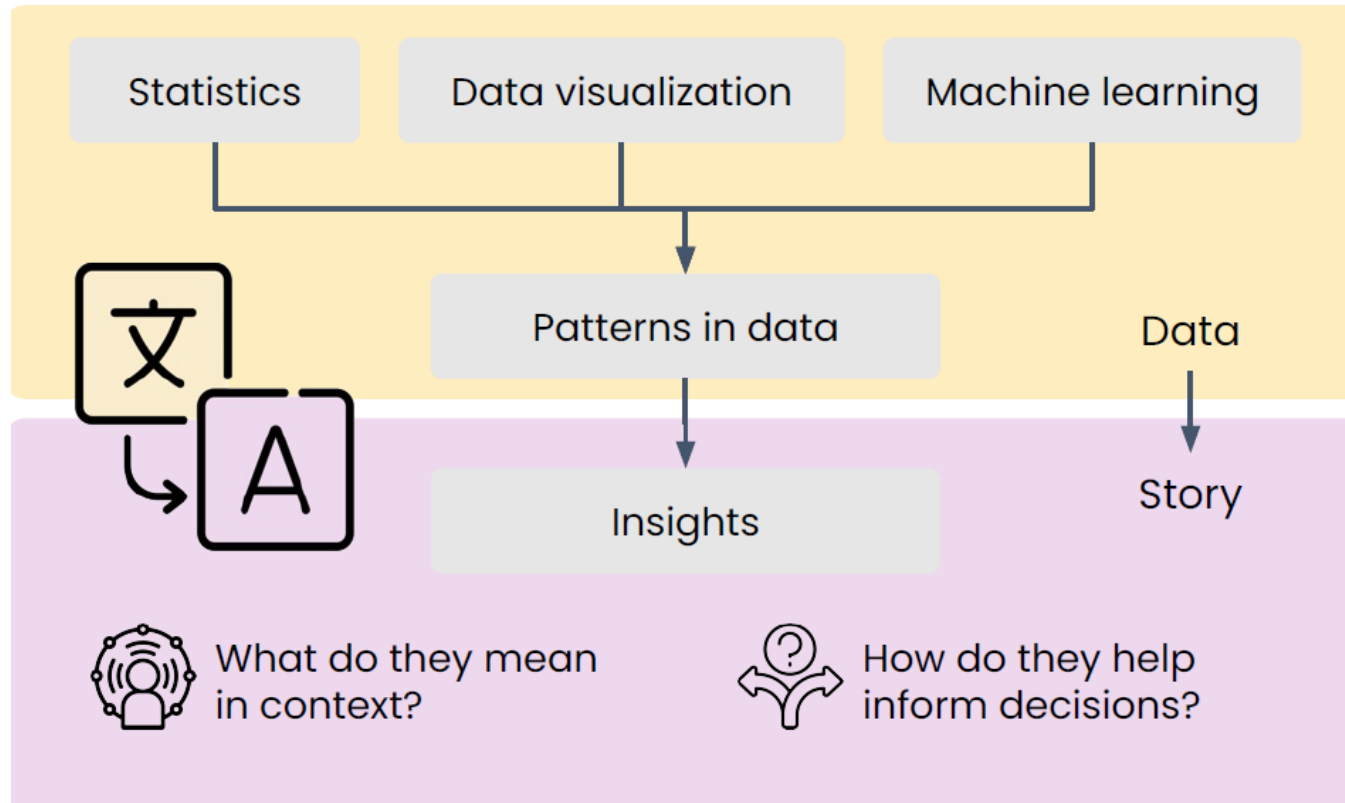


Figure 4.1 Data analytics cycle

# 03

## The data analytics lifecycle:



## Common techniques for data analysis:

Summarize different features in data

- Identify trends not apparent from descriptive statistics

Evaluate hypotheses about data

Understand relationships between features

Sophisticated algorithms learn from data & make predictions

A horizontal number line with arrows at both ends, divided into four equal segments by three vertical tick marks. The left end is labeled "Less complex" and the right end is labeled "More complex".

## 05

## The data analytics lifecycle:

**Case Study: Analyzing Customer Churn in a Telecom Company:****Descriptive statistics:**

**Goal:** Summarize customer data to understand the overall picture.

**Techniques Used:** Frequency, Mean, Median, Correlation.

**Example:**

- Count how many customers churned (left) vs. stayed (Frequency).
- Compute the **average tenure** of customers (Mean).
- Find the **median monthly charges**.
- Calculate the **correlation** between tenure and churn ?

## 06

## The data analytics lifecycle:

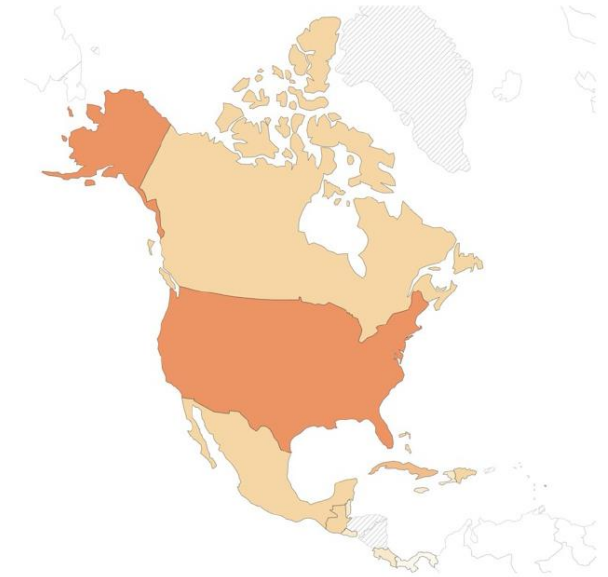
**Data Visualization: really shine for:** Complex or large data sets

**Goal:** Show patterns and trends visually that aren't obvious from numbers and summarize the descriptive statistics you calculated.

**Techniques Used:** Histograms ,Box plots ,Scatter plots,Bar charts

**Example:**

- Create a **histogram** of tenure to see its distribution.
- Use a **box plot** to compare monthly charges of churned vs. retained customers.
- **Scatter plot** to view relationship between tenure and monthly charges.



## 07

## The data analytics lifecycle:

**Statistical analysis & modeling:**

Allows you to be more confident that results are:

- True effects
- Not Random chance

**Goal:** Formulate and **test hypotheses, understand relationships.**

**Techniques Used:**

Hypothesis testing (t-tests, chi-square)

Regression model

**Example:**

Use a **chi-square test** to see if contract type (monthly, yearly) significantly affects churn.

Apply **logistic regression** to model the probability of churn based on age, tenure, charges, etc.

## 08

## The data analytics lifecycle:

## Machine learning:

A class of techniques that:

- Learn patterns from data
- Predict specific outcomes of interest

**Goal:** Build a predictive model to classify future churn.

**Techniques Used:** Decision Trees, Random Forest

**Example:**

Train a **random forest model** using labeled data (churned vs. not) with features like age, tenure, charges, support calls. Evaluate the model's accuracy, precision, and recall.

## 09

## The data analytics lifecycle:

## Framework for insight finding:



## 1. Identify key results

Here, we summarize the **main findings** from our analysis (descriptive stats, visualizations, models).

- ✓ Key Results:
- 27% of customers churned.
  - Most churned customers had **month-to-month contracts** and **short tenures**.
  - Logistic regression and machine learning models confirmed that **contract type**, **tenure**, and **monthly charges** were the top predictors of churn.
  - The Random Forest model achieved **85% prediction accuracy**.

## 10

## The data analytics lifecycle:

## Framework for insight finding:

2. Business goal:

This step ties results back to the **business goal** – in this case, **reducing churn**.

 Business Goal: **Decrease customer churn rate.**

3. Explanation for results:

 Explanation:

- Customers on **monthly contracts may feel less committed** and can easily switch to competitors.
- High monthly charges **may lead to dissatisfaction or perceived poor value.**

4. Recommend decisions:

 Recommendations:

- Offer **discounted annual plans** to encourage long-term commitment.
- Design onboarding programs to **increase engagement in the first 3–6 months.**
- **Target at-risk customers** (identified by the model) with retention offers or better support.

## 11

## The data analytics lifecycle:

Communicating findings effectively empowers stakeholders to:

- Make informed decisions
- Achieve the project goals
- What is the best approach for the insights you need to summarize?
- What are your stakeholder needs?



## 12

## The data analytics lifecycle:

## Reports:

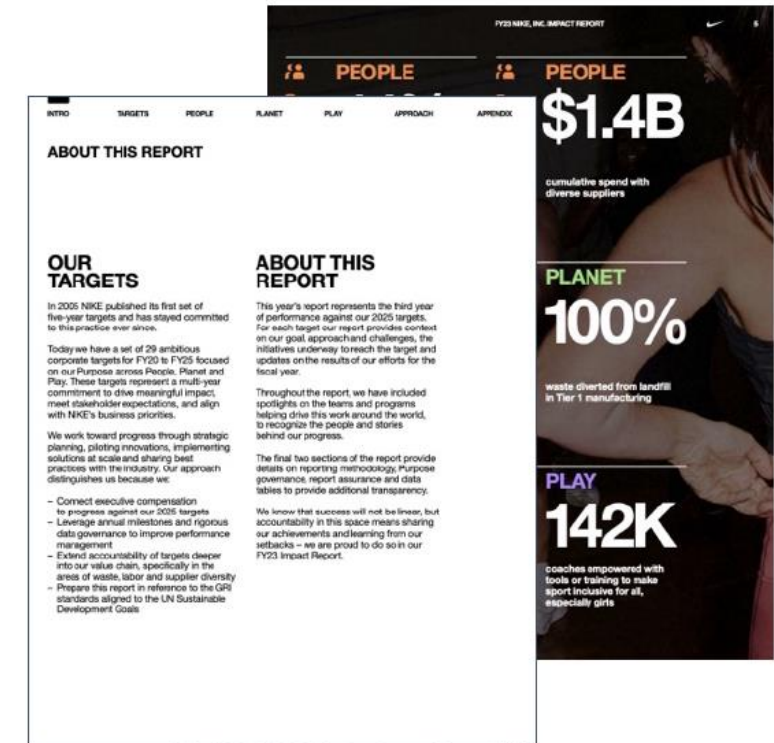
- Written summaries of findings
- Often include visualizations

## Useful when you need to...

- ✓ Provide a thorough explanation
- ✓ Document methodology
- ✓ Present complex findings to a technical audience

## Not as useful when you need to...

- ✗ Communicate quickly
- ✗ Communicate with a non-technical audience



[Nike. (2023). 2023 Nike, Inc. Impact Report. Nike]

## 13

## The data analytics lifecycle:

**Dashboards**: Interactive visualizations that allow users to explore data on their own.

**Useful when you need to...**

- ✓ Empower stakeholders to uncover own insights
- ✓ Provide easy access to current information
- ✓ Track performance over time

**Not as useful when you need to...**

- ✗ Provide a detailed explanation
- ✗ Document methodology
- ✗ When interactivity isn't useful

## 14

## The data analytics lifecycle:

Presentations: Live share-outs of your findings, often accompanied by visuals.

## Useful when you need to...

- ✓ Persuade your audience
- ✓ Engage stakeholders in a discussion
- ✓ Present to a large audience

## Not as useful when...

- ✗ Audience needs to re-engage with information
- ✗ Audience needs different depths of explanation



[160over90. (2023). 2022-23 NFL Season Recap. 160over90]

15

## The data analytics lifecycle:

Analysis

Decision

Impact?

### Questions to ask:

- Did the decision lead to the desired outcome?
- Were the stakeholders satisfied with the results?
- What were the key learnings from the project?
- What could be improved in the future?



# 16

## The data analytics lifecycle:

### Assessing stakeholder satisfaction

Gather feedback through:

Surveys

Interviews

Focus groups

Ask:

What worked well?

What could be improved?



## 17

# The data analytics lifecycle:

## Business stakeholders



### Their role:

- Make decisions based on insights



### Your role:

- Understand their problems
- Provide them with insights to make informed decisions

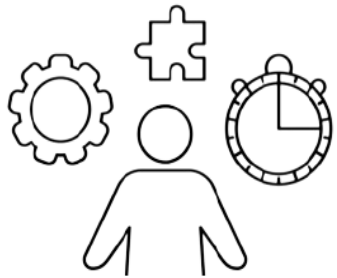
| Stakeholder      | Goal              |
|------------------|-------------------|
| Restaurant owner | Optimize menu     |
| Store manager    | Track inventory   |
| Policymaker      | Evaluate new bill |



## 18

## The data analytics lifecycle:

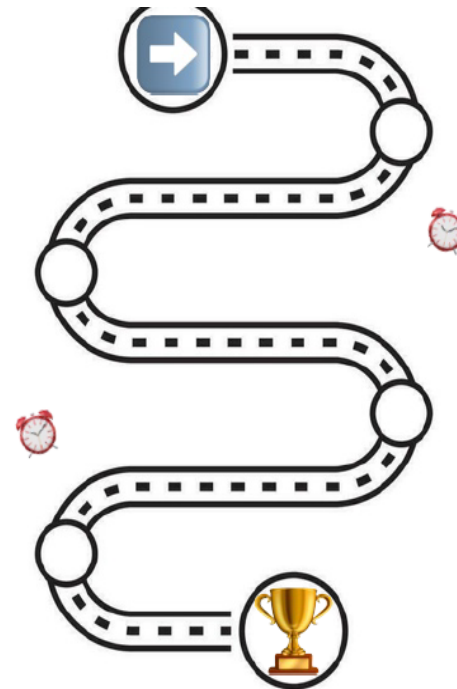
## Product managers


**Their role:**

- Develops roadmap for a product
- Implement planned features


**Your role:**

- Ensure your work aligns with their goals



## 19

## The data analytics lifecycle:

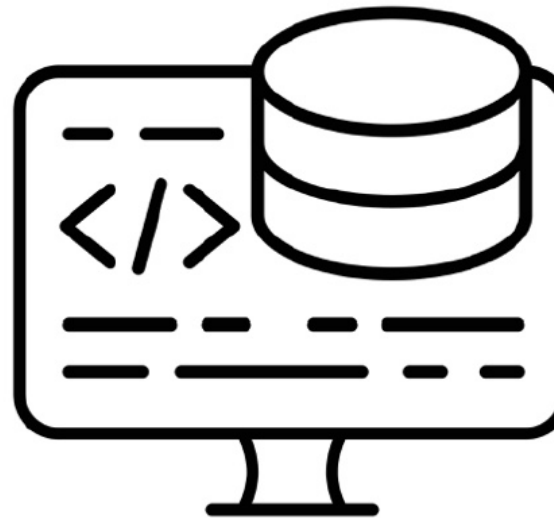
## Engineering teams

**Their role:**

- Build applications that serve your users
- Own the data collection systems
- Implement systems to gather data

**Your role:**

- Develop insights that can be integrated into the product



## 20

## Solving problems with data:

What outcomes am I interested in?

| Problem                                                                                                     | Outcome                    | Data                                                                                                                |
|-------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------|
|  Increase profit           | + Sales                    |  Sales reports                   |
|                                                                                                             | — Expenses                 |  Expense reports                 |
|  Improve patient outcomes | + Patient satisfaction     |  Patient surveys                 |
|                                                                                                             | — Length of hospital stays |  Admission and discharge dates |

21

## Solving problems with data:

**What data provides context?**

Who

What

When

Where

Outcome

**Customer ID****Product****Purchase Date****Region****Sale**

# 22

## Solving problems with data:

### Increasing revenue for a solar panel company

| Who                       | What                          | When                               | Where                          | Outcome                |
|---------------------------|-------------------------------|------------------------------------|--------------------------------|------------------------|
| <b>Customer ID</b><br>973 | <b>Product</b><br>Cable set   | <b>Purchase Date</b><br>06/15/2024 | <b>Region</b><br>North America | <b>Sale</b><br>\$1,600 |
| <b>Customer ID</b><br>111 | <b>Product</b><br>Solar panel | <b>Purchase Date</b><br>09/10/2024 | <b>Region</b><br>Asia          | <b>Sale</b><br>\$3,200 |

- High paying customers?

# 23

## Solving problems with data:

### Increasing revenue for a solar panel company

| Who                       | What                          | When                               | Where                          | Outcome                |
|---------------------------|-------------------------------|------------------------------------|--------------------------------|------------------------|
| <b>Customer ID</b><br>973 | <b>Product</b><br>Cable set   | <b>Purchase Date</b><br>06/15/2024 | <b>Region</b><br>North America | <b>Sale</b><br>\$1,600 |
| <b>Customer ID</b><br>111 | <b>Product</b><br>Solar panel | <b>Purchase Date</b><br>09/10/2024 | <b>Region</b><br>Asia          | <b>Sale</b><br>\$3,200 |

Specific products driving sales?

24

## Solving problems with data:

### Increasing revenue for a solar panel company

| Who                       | What                          | When                               | Where                          | Outcome                |
|---------------------------|-------------------------------|------------------------------------|--------------------------------|------------------------|
| <b>Customer ID</b><br>973 | <b>Product</b><br>Cable set   | <b>Purchase Date</b><br>06/15/2024 | <b>Region</b><br>North America | <b>Sale</b><br>\$1,600 |
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How are sales trending?

25

Solving problems with data:

**Increasing revenue for a solar panel company**

| Who                       | What                          | When                               | Where                          | Outcome                |
|---------------------------|-------------------------------|------------------------------------|--------------------------------|------------------------|
| <b>Customer ID</b><br>973 | <b>Product</b><br>Cable set   | <b>Purchase Date</b><br>06/15/2024 | <b>Region</b><br>North America | <b>Sale</b><br>\$1,600 |
| <b>Customer ID</b><br>111 | <b>Product</b><br>Solar panel | <b>Purchase Date</b><br>09/10/2024 | <b>Region</b><br>Asia          | <b>Sale</b><br>\$3,200 |

**Sales vary across regions?**

26

Solving problems with data:

**Increasing revenue for a solar panel company**

| Who                       | What                          | When                               | Where                          | Outcome                |
|---------------------------|-------------------------------|------------------------------------|--------------------------------|------------------------|
| <b>Customer ID</b><br>973 | <b>Product</b><br>Cable set   | <b>Purchase Date</b><br>06/15/2024 | <b>Region</b><br>North America | <b>Sale</b><br>\$1,600 |
| <b>Customer ID</b><br>111 | <b>Product</b><br>Solar panel | <b>Purchase Date</b><br>09/10/2024 | <b>Region</b><br>Asia          | <b>Sale</b><br>\$3,200 |

**Business or individual purchaser?**

○ **If business, how large?**

# 27

## Large language models (LLMs):

### How LLMs work

#### Prompt

Finish this sentence:  
I love learning

#### LLM Response

new skills.

about different dinosaurs.

for the sake of it.

#### Prompt

Help me create a  
presentation outline

#### LLM Response

Sure, I can help you  
with that! ...

#### Prompt

Help me steal a  
competitor's data

#### LLM Response

I can't assist with any  
illegal activities

# 28

## Large language models (LLMs):

### Available LLMs

#### Popular choices as of 2025:



**ChatGPT o3**  
from OpenAI



**ChatGPT 4o**  
from OpenAI



**Claude 3.5**  
from Anthropic



**Llama 3.2**  
from Meta



**Gemini Pro**  
from Google

### Closed vs. open LLMs

#### Closed LLMs

- ChatGPT, Claude, Gemini
- Model and training methods aren't publicly available



Cost money for the best tier



Outperform in response quality



Less provocative responses

#### Open LLMs

- Llama 3
- Code available for anyone to download and customize



Free to use with own computer or cloud service



Good but not state-of-the-art response quality



More unpredictable responses

## 29

## Large language models (LLMs):

## Prompting LLMs

Two key skills:

- 1 Writing good prompts
  - Be detailed and specific
  - Guide the model to think through its answer
  - Experiment and iterate
- 2 Recognizing the limits of the LLM

## LLM limitations

**Be mindful when working against the LLM's training**

- Double-check responses
- Choose a tool that is better suited to the task:



Search engine



Spreadsheet

## 30

## Large language models (LLMs):

### Demo: Interacting with LLMs

<https://www.kimi.com/>



I have uploaded hotel reservation data. I want to identify the most common five business questions.

#### Top 5 Business Questions from Hotel Reservation Data

1. What is the cancellation rate, and what factors influence it?
  - Understand what percentage of bookings are canceled.
  - Analyze how factors like lead time, meal plan, or market segment relate to cancellations.
2. Which room types are most frequently booked?
  - Helps optimize inventory and pricing for the most popular room types.
3. What is the average revenue per booking or per customer segment?
  - Based on `avg_price_per_room` and stay duration (`weekend + week_nights`), determine revenue patterns by customer type, market segment, or booking status.
4. When is peak demand? (seasonality analysis)
  - Use `arrival_year`, `arrival_month`, and `arrival_date` to identify high and low season months.
5. Which channels or market segments bring the most bookings?
  - Analyze `market_segment_type` to find the most effective sources of customers (e.g., Online, Offline, Corporate).

## 31

## Large language models (LLMs):

## Demo: Interacting with LLMs

<https://grok.com/>**Common Business Questions**

Based on the dataset's structure and industry-standard analyses, the following five business questions are commonly asked to derive actionable insights:

1. **What is the overall cancellation rate of hotel bookings, and does it differ by booking channel (e.g., online vs. offline)?**

This question helps quantify cancellations and identify whether specific channels, such as online platforms, contribute to higher cancellation rates, informing retention strategies.

2. **Which room types are most frequently booked, and what is their average price?**

Understanding room type popularity and pricing aids in inventory management and pricing strategy optimization to maximize revenue.

4. **How does the lead time affect the likelihood of a booking being canceled?**

Analyzing lead time's impact on cancellations can guide policies like deposit requirements to reduce revenue loss.

5. **Do bookings with special requests have a different cancellation rate compared to those without?**

Exploring the relationship between special requests and cancellations can inform customer service strategies to enhance guest commitment.

## 32

## Large language models (LLMs):

## Demo: Interacting with LLMs

Perform these steps using Excel:

1. Come up with five data cleaning techniques for data scraped from the web
2. Write a spreadsheet formula for each one

 1. Remove Extra Whitespace

**Problem:** Web data often includes irregular spacing.

**Formula:**

excel

 Copy  Edit

=TRIM(A2)

**Use:** Removes leading, trailing, and multiple spaces from the text in cell A2.

 2. Convert to Proper Case (Name Formatting)

**Problem:** Names or titles may be in all caps or lowercase.

**Formula:**

excel

 Copy  Edit

=PROPER(A2)

**Use:** Converts "john DOE" to "John Doe".

## 33

## Spreadsheets for business analytics:

Excel is a spreadsheet program from Microsoft and a component of its Office product group for business applications.

Microsoft Excel enables users to format, organize and calculate data in a spreadsheet.

By organizing data using software like Excel, data analysts and other users can make information easier to view as data is added or changed. Excel contains a large number of boxes called cells that are ordered in rows and columns. Data is placed in these cells.

# 33

## Spreadsheets for business analytics:

### Why start with spreadsheets?



Industry standard tool



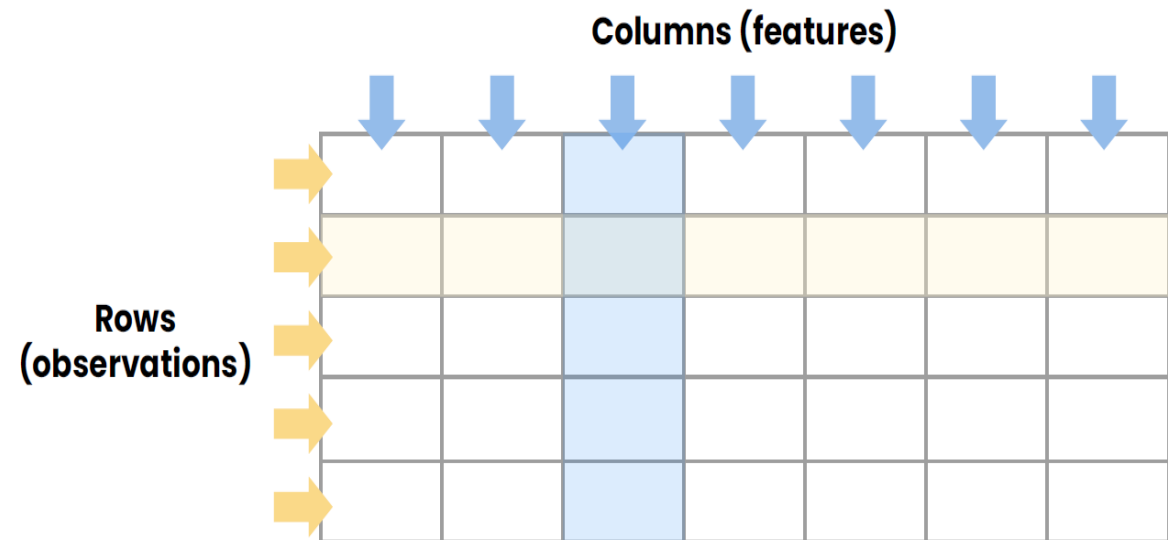
Opens in a few seconds



Free

### Spreadsheet applications

★ Designed for working with structured data



## 33

## Spreadsheets for business analytics:

### Excel terminology and components

**Cell:** A user enters data into a cell, which is the intersection of a column and row.

**Workbook:** This is an Excel file that contains one or more worksheets.

**Worksheet:** These are the different documents nested within a Workbook.

**Column and row headings:** These are the numbered and lettered cells located just outside of the columns and rows.

**Selecting a header** highlights the entire row or column.

**Formula:** Formulas are mathematical equations, cell references or functions that can be placed inside a cell to produce a value. Formulas must start with an equal "=" sign.

**Formula bar:** This is the long input bar that is used to enter values or formulas in cells. It is located at the top of the worksheet, next to the "fx" label.

34

## Spreadsheets for business analytics:

### Navigating Excel Sheets



**Sheets**



**Excel**

<https://workspace.google.com/products/sheets/>

# 35

## Spreadsheets for business analytics:

### Navigating Excel Sheets

Expense details: Paint for living room  
 Category: Materials  
 Budget: \$60.00  
 Cost: \$65.99  
 Transaction date: 5/12/2031  
 Paid by: Sean  
 Notes:

Expense details: Kitchen countertop polish  
 Category: Materials  
 Budget: \$25.00  
 Cost: \$34.25  
 Transaction date: 6/3/2031  
 Paid by: Isabel  
 Notes:

Expense details: Building permit  
 Category: Permits  
 Budget: \$150.00  
 Cost: \$150.00  
 Transaction date: 2/25/2031  
 Paid by: Jan  
 Notes:

Expense details: Consultation  
 Category: Design  
 Budget: \$300.00  
 Cost: \$319.00

| Expense details           | Category  | Budget            | Cost              | Difference       | Transaction date | Paid by | Notes                   |
|---------------------------|-----------|-------------------|-------------------|------------------|------------------|---------|-------------------------|
| Building permit           | Permits   | 150               | 150               | 0                | 2/25/2031        | Jan     |                         |
| Consultation              | Design    | 300               | 319               | 19               | 3/19/2031        | Magui   |                         |
| Paint for living room     | Materials | 60                | 65.99             | 5.99             | 5/12/2031        | Sean    |                         |
| Kitchen countertop polish | Materials | 25                | 34.25             | 9.25             | 6/3/2031         | Isabel  |                         |
| New hammer                | Materials | 20                | 21.25             | 1.25             | 7/2/2031         | Sean    | Good quality            |
| Electrical outlet covers  | Materials | 15                | 15.15             | 0.15             | 7/14/2031        | Joi     |                         |
| Plants                    | Materials | 25                | 45.03             | 20.03            | 7/14/2031        | Joi     |                         |
| Bathroom mirror           | Materials | 80                | 43.88             | -36.12           | 7/14/2031        | Joi     |                         |
| Plumbing repair           | Labor     | 650               | 439               | -211             | 8/5/2031         | Sean    | Asked our friend Vinny  |
| Whale-shaped soap holder  | Materials | 15                | 8                 | -7               | 8/5/2031         | Sean    | Cute!                   |
| Ceiling repair            | Labor     | 400               | 400               | 0                | 8/11/2031        | Jan     |                         |
| Door handles              | Materials | 55                | 58                | 3                | 9/15/2031        | Sean    |                         |
| Light fixture             | Materials | 80                | 71.89             | -8.11            | 10/20/2031       | Magui   | Replacing kitchen light |
| <b>Total</b>              |           | <b>\$1,875.00</b> | <b>\$1,671.44</b> | <b>-\$203.56</b> |                  |         |                         |

## 36

## Spreadsheets for business analytics:

## Loading data into Excel Sheets



**Generate** data directly in the spreadsheet



**Open** an existing file



**Import** a structured data set (.csv, .xlsx)

# 37

## Spreadsheets for business analytics:

### Loading data into Excel Sheets

| Booking_id | no_of_adults | no_of_children | no_of_weekend_nights | no_of_week_nights | type_of_meal_plan | required_car_parking_space | room_type_reserved | lead_time | arrival_year | arrival_month | arrival_date | market_segment_type | repea |
|------------|--------------|----------------|----------------------|-------------------|-------------------|----------------------------|--------------------|-----------|--------------|---------------|--------------|---------------------|-------|
| INN00001   | 2,0          | 1,2            | Meal Plan 1,0        | Room_Type 1,224   | 2017,10,2         | Offline,0,0,0,65,0         | Not_Canceled       |           |              |               |              |                     |       |
| INN00002   | 2,0          | 2,3            | Not Selected,0       | Room_Type 1,5     | 2018,11,6         | Online,0,0,0,106.68        | 1,Not_Canceled     |           |              |               |              |                     |       |
| INN00003   | 1,0          | 2,1            | Meal Plan 1,0        | Room_Type 1,1     | 2018,2,28         | Online,0,0,0,60,0          | Canceled           |           |              |               |              |                     |       |
| INN00004   | 2,0          | 0,2            | Meal Plan 1,0        | Room_Type 1,211   | 2018,5,20         | Online,0,0,0,100,0         | Canceled           |           |              |               |              |                     |       |
| INN00005   | 2,0          | 1,1            | Not Selected,0       | Room_Type 1,48    | 2018,4,11         | Online,0,0,0,94.5          | 0,Canceled         |           |              |               |              |                     |       |
| INN00006   | 2,0          | 0,2            | Meal Plan 2,0        | Room_Type 1,346   | 2018,9,13         | Online,0,0,0,115,1         | Canceled           |           |              |               |              |                     |       |
| INN00007   | 2,0          | 1,3            | Meal Plan 1,0        | Room_Type 1,34    | 2017,10,15        | Online,0,0,0,107.55        | 1,Not_Canceled     |           |              |               |              |                     |       |
| INN00008   | 2,0          | 1,3            | Meal Plan 1,0        | Room_Type 4,83    | 2018,12,26        | Online,0,0,0,105.61        | 1,Not_Canceled     |           |              |               |              |                     |       |
| INN00009   | 3,0          | 0,4            | Meal Plan 1,0        | Room_Type 1,121   | 2018,7,6          | Offline,0,0,0,96.9         | 1,Not_Canceled     |           |              |               |              |                     |       |
| INN00010   | 2,0          | 0,5            | Meal Plan 1,0        | Room_Type 4,44    | 2018,10,18        | Online,0,0,0,133.44        | 3,Not_Canceled     |           |              |               |              |                     |       |
| INN00011   | 1,0          | 1,0            | Not Selected,0       | Room_Type 1,0     | 2018,9,11         | Online,0,0,0,85.03         | 0,Not_Canceled     |           |              |               |              |                     |       |
| INN00012   | 1,0          | 2,1            | Meal Plan 1,0        | Room_Type 4,35    | 2018,4,30         | Online,0,0,0,140.4         | 1,Not_Canceled     |           |              |               |              |                     |       |
| INN00013   | 2,0          | 2,1            | Not Selected,0       | Room_Type 1,30    | 2018,11,26        | Online,0,0,0,88,0          | Canceled           |           |              |               |              |                     |       |
| INN00014   | 1,0          | 2,0            | Meal Plan 1,0        | Room_Type 1,95    | 2018,11,20        | Online,0,0,0,90,2          | Canceled           |           |              |               |              |                     |       |
| INN00015   | 2,0          | 0,2            | Meal Plan 1,0        | Room_Type 1,47    | 2017,10,20        | Online,0,0,0,94.5          | 2,Not_Canceled     |           |              |               |              |                     |       |
| INN00016   | 2,0          | 0,2            | Meal Plan 2,0        | Room_Type 1,256   | 2018,6,15         | Online,0,0,0,115,1         | Canceled           |           |              |               |              |                     |       |
| INN00017   | 1,0          | 1,0            | Meal Plan 1,0        | Room_Type 1,0     | 2017,10,5         | Offline,0,0,0,96,0         | Not_Canceled       |           |              |               |              |                     |       |
| INN00018   | 2,0          | 1,3            | Not Selected,0       | Room_Type 1,1     | 2017,8,10         | Online,0,0,0,96,1          | Not_Canceled       |           |              |               |              |                     |       |
| INN00019   | 2,0          | 2,2            | Meal Plan 1,0        | Room_Type 1,99    | 2017,10,30        | Online,0,0,0,65,0          | Canceled           |           |              |               |              |                     |       |
| INN00020   | 2,0          | 1,0            | Meal Plan 1,0        | Room_Type 1,12    | 2017,10,4         | Offline,0,0,0,72,0         | Not_Canceled       |           |              |               |              |                     |       |
| INN00021   | 2,0          | 2,2            | Meal Plan 1,0        | Room_Type 1,99    | 2017,10,30        | Online,0,0,0,65,0          | Canceled           |           |              |               |              |                     |       |
| INN00022   | 1,0          | 0,1            | Meal Plan 1,0        | Room_Type 1,122   | 2018,11,25        | Corporate,0,0,0,67,0       | Not_Canceled       |           |              |               |              |                     |       |
| INN00023   | 2,0          | 2,4            | Meal Plan 1,0        | Room_Type 1,2     | 2018,3,20         | Offline,0,0,0,85,0         | Not_Canceled       |           |              |               |              |                     |       |
| INN00024   | 2,0          | 0,3            | Meal Plan 1,0        | Room_Type 1,37    | 2018,10,13        | Offline,0,0,0,105,0        | Not_Canceled       |           |              |               |              |                     |       |
| INN00025   | 2,0          | 2,1            | Not Selected,0       | Room_Type 1,130   | 2018,5,22         | Online,0,0,0,94.5          | 1,Not_Canceled     |           |              |               |              |                     |       |

## 38

## Spreadsheets for business analytics:

### Loading data into Excel Sheets

| Booking_ID | no_of_adults | no_of_children | no_of_weekend_nights | no_of_week_nights | type_of_meal_plan | required_car_parking_space | room_type_reserved | lead_time | arri |
|------------|--------------|----------------|----------------------|-------------------|-------------------|----------------------------|--------------------|-----------|------|
| INN00001   | 2            | 0              | 1                    | 2                 | Meal Plan 1       |                            | Room_Type 1        | 224       |      |
| INN00002   | 2            | 0              | 2                    | 3                 | Not Selected      |                            | Room_Type 1        | 5         |      |
| INN00003   | 1            | 0              | 2                    | 1                 | Meal Plan 1       |                            | Room_Type 1        | 1         |      |
| INN00004   | 2            | 0              | 0                    | 2                 | Meal Plan 1       |                            | Room_Type 1        | 211       |      |
| INN00005   | 2            | 0              | 1                    | 1                 | Not Selected      |                            | Room_Type 1        | 48        |      |
| INN00006   | 2            | 0              | 0                    | 2                 | Meal Plan 2       |                            | Room_Type 1        | 346       |      |
| INN00007   | 2            | 0              | 1                    | 3                 | Meal Plan 1       |                            | Room_Type 1        | 34        |      |
| INN00008   | 2            | 0              | 1                    | 3                 | Meal Plan 1       |                            | Room_Type 4        | 83        |      |
| INN00009   | 3            | 0              | 0                    | 4                 | Meal Plan 1       |                            | Room_Type 1        | 121       |      |
| INN00010   | 2            | 0              | 0                    | 5                 | Meal Plan 1       |                            | Room_Type 4        | 44        |      |
| INN00011   | 1            | 0              | 1                    | 0                 | Not Selected      |                            | Room_Type 1        | 0         |      |
| INN00012   | 1            | 0              | 2                    | 1                 | Meal Plan 1       |                            | Room_Type 4        | 35        |      |
| INN00013   | 2            | 0              | 2                    | 1                 | Not Selected      |                            | Room_Type 1        | 30        |      |
| INN00014   | 1            | 0              | 2                    | 0                 | Meal Plan 1       |                            | Room_Type 1        | 95        |      |
| INN00015   | 2            | 0              | 0                    | 2                 | Meal Plan 1       |                            | Room_Type 1        | 47        |      |
| INN00016   | 2            | 0              | 0                    | 2                 | Meal Plan 2       |                            | Room_Type 1        | 256       |      |
| INN00017   | 1            | 0              | 1                    | 0                 | Meal Plan 1       |                            | Room_Type 1        | 0         |      |
| INN00018   | 2            | 0              | 1                    | 3                 | Not Selected      |                            | Room_Type 1        | 1         |      |
| INN00019   | 2            | 0              | 2                    | 2                 | Meal Plan 1       |                            | Room_Type 1        | 99        |      |
| INN00020   | 2            | 0              | 1                    | 0                 | Meal Plan 1       |                            | Room_Type 1        | 12        |      |
| INN00021   | 2            | 0              | 2                    | 2                 | Meal Plan 1       |                            | Room_Type 1        | 99        |      |
| INN00022   | 1            | 0              | 0                    | 1                 | Meal Plan 1       |                            | Room_Type 1        | 122       |      |
| INN00023   | 2            | 0              | 2                    | 4                 | Meal Plan 1       |                            | Room_Type 1        | 2         |      |
| INN00024   | 2            | 0              | 0                    | 3                 | Meal Plan 1       |                            | Room_Type 1        | 37        |      |
| INN00025   | 2            | 0              | 2                    | 1                 | Not Selected      |                            | Room_Type 1        | 130       |      |
| INN00026   | 2            | 0              | 0                    | 2                 | Meal Plan 1       |                            | Room_Type 1        | 99        |      |
| INN00027   | 2            | 0              | 1                    | 1                 | Meal Plan 1       |                            | Room_Type 1        | 60        |      |
| INN00028   | 1            | 0              | 0                    | 2                 | Meal Plan 1       |                            | Room_Type 4        | 2         |      |

## Summary

1. The data analytics lifecycle.
2. How to use LLMS for data analysis.
3. Using spreadsheets for data analytics.



**Thank You**