

Data Cleaning and Analysis of Retail Sales Dataset for Insight Generation

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OUTLINE

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1. Introduction

As part of my Data Analysis Course at Axia Africa, I carried out a project to clean, standardize, and analyze a structured retail sales dataset containing 31 transaction records. The primary objective was to improve its accuracy, completeness, and consistency, making it a reliable foundation for analysis.

The raw dataset exhibited common data quality challenges such as inconsistent name formatting, spelling errors in categorical fields, missing or invalid values, and irregular numeric entries. By applying systematic data cleaning techniques, I transformed the dataset into a high-integrity resource suitable for deeper analysis, trend identification, and actionable recommendations.

1.2 Purpose and Scope

This project was completed as part of the requirements for the 4-month Data Analysis training with Axia Africa. It provided a hands-on opportunity to apply critical data preparation skills, from detecting and resolving inconsistencies to structuring the data for meaningful insights. The ultimate goal was to demonstrate my ability to work with real-world dirty data and prepare it for business decision-making.

1.3 Dataset Description

The dataset contains entries of shopping records, consisting of the Date of Sale, the ID and Name of the Customer, the Product bought, the quantity bought and the price per unit of the Product bought. The dataset has 31 rows and 8 columns:

- **Date:** This Contains information for the date of the purchase.
- **ID:** This Contains unique Identifier for each customer.
- **Name:** This Contains information on the Name of the customer.
- **Region:** This Contains the location for the sale.
- **Rating:** This Contains the information on the customer experience.
- **Product:** This Contains the Product information.
- **Quantity:** This Contains the Information in the Quantity of the Product Bought.
- **Price Per Unit:** This Contains the information on the unit price of the product.

1	Date	ID	Name	Region	Rating	Product	Quantity	Price Per Unit
2	#####	1	John Smith	North	Good	Magic Wand	10	\$20.00
3	#####	2	Jane Doe	East	Excelent	Unicorn Horn	15	\$10.00
4	#####	3	Mike Iyson	West	Poor	Boxing Gloves	0 inf	
5	#####	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00
6	#####	5	Chris P. Bacon	East	Good	Bacon Scented Candle	30	\$16.67
7	#####	6	Peter Parker		Excelent	Web Shooter	0 inf	
8	#####	7	Mary Jane	West	Poor	Potent Potion	35	\$10.00
9	#####	8	Bruce Wayne	South	Average	Bat Signal	40	\$15.00
10	#####	9	Clark Kent	East	Good	Glasses with X-ray Vision	45	\$12.22
11	#####	10	Diana Prince	North	Excelent	Lasso of Truth	50	\$14.00
12	#####	11	Tony Stark	West	Poor	Iron Man Suit	5	\$160.00
13	#####	12	Steve Rogers	South	Average	Captain America Shield	20	\$45.00
14	#####	13	Natasha Romanoff	East	Good	Black Widow's Bite	0 inf	
15	#####	14	Bruce Banner		Excelent	Gamma Radiation Serum	30	\$36.67
16	#####	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00
17	#####	5	Chris P. Bacon	East	Good	Bacon Scented Candle	30	\$16.67
18	#####	6	Peter Parker		Excelent	Web Shooter	0 inf	
19	#####	15	Nick Fury	West	Poor	Eye Patch	35	\$34.29
20	#####	16	Phil Coulson		Average	Agent ID Card	0 inf	
21	#####	17	Peggy Carter	East	Good	Vintage Pistol	40	\$35.00

A Brief Overview of the 'Dirty' Dataset

2. Data Cleaning Process

Microsoft Excel was used for the data cleaning and initial exploration stages. Several issues within the dataset were identified and rectified, as summarized below:

2.1 Auto Fit Columns and Rows:

Due to the disparities in the data, and some Columns not showing properly due to the column length, I ensured all columns and rows were resized to fit their contents for better readability.

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	ID	Name	Region	Rating	Product	Quantity	Price Per Unit	
1/31/2021 0:00	1	John Smith	North	Good	Magic Wand	10	\$20.00	
2/28/2021 0:00	2	Jane Doe	East	Excellent	Unicorn Horn	15	\$10.00	
3/31/2021 0:00	3	Mike Tyson	West	Poor	Boxing Gloves	0	inf	
4/30/2021 0:00	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00	
5/31/2021 0:00	5	Chris P. Bacon	East	Good	Bacon Scented Candle	30	\$16.67	
6/30/2021 0:00	6	Peter Parker	East	Excellent	Web Shooter	0	inf	
7/31/2021 0:00	7	Mary Jane	West	Poor	Potent Potion	35	\$10.00	
8/31/2021 0:00	8	Bruce Wayne	South	Average	Bat Signal	40	\$15.00	
9/30/2021 0:00	9	Clark Kent	East	Good	Glasses with X-ray Vision	45	\$12.22	
10/31/2021 0:00	10	Diana Prince	North	Excellent	Lasso of Truth	50	\$14.00	
11/30/2021 0:00	11	Tony Stark	West	Poor	Iron Man Suit	5	\$160.00	
12/31/2021 0:00	12	Steve Rogers	South	Average	Captain America Shield	20	\$45.00	
1/31/2022 0:00	13	Natasha Romanoff	East	Good	Black Widow's Bite	0	inf	
2/28/2022 0:00	14	Bruce Banner	East	Excellent	Gamma Radiation Serum	30	\$36.67	
4/30/2021 0:00	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00	
5/31/2021 0:00	5	Chris P. Bacon	East	Good	Bacon Scented Candle	30	\$16.67	
6/30/2021 0:00	6	Peter Parker	East	Excellent	Web Shooter	0	inf	
3/31/2022 0:00	15	Nick Fury	West	Poor	Eye Patch	35	\$34.29	
4/30/2022 0:00	16	Phil Coulson	Average	Agent ID Card	0	inf		
5/31/2022 0:00	17	Peggy Carter	East	Good	Vintage Pistol	40	\$35.00	

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Date	ID	Name	Region	Rating	Product	Quantity	Price Per Unit
1/31/2021 0:00	1	John Smith	North	Good	Magic Wand	10	\$20.00
2/28/2021 0:00	2	Jane Doe	East	Excellent	Unicorn Horn	15	\$10.00
3/31/2021 0:00	3	Mike Tyson	West	Poor	Boxing Gloves	0 inf	\$10.00
4/30/2021 0:00	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00
5/31/2021 0:00	5	Chris P. Bacon	East	Good	Bacon Scented Candle	30	\$16.67
6/30/2021 0:00	6	Peter Parker	East	Excellent	Web Shooter	0 inf	\$10.00
7/31/2021 0:00	7	Mary Jane	West	Poor	Potent Potion	35	\$10.00
8/31/2021 0:00	8	Bruce Wayne	South	Average	Bat Signal	40	\$15.00
9/30/2021 0:00	9	Clark Kent	East	Good	Glasses with X-ray Vision	45	\$12.22
10/31/2021 0:00	10	Diana Prince	North	Excellent	Lasso of Truth	50	\$14.00
11/30/2021 0:00	11	Tony Stark	West	Poor	Iron Man Suit	5	\$160.00
12/31/2021 0:00	12	Steve Rogers	South	Average	Captain America Shield	20	\$45.00
1/31/2022 0:00	13	Natasha Romanoff	East	Good	Black Widow's Bite	0 inf	\$10.00
2/28/2022 0:00	14	Bruce Banner	East	Excellent	Gamma Radiation Serum	30	\$36.67
4/30/2021 0:00	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00

After Autofit Rows

2.2 Removing Duplicates

With further steps to improving data quality, duplicate values were removed, 3 duplicates were removed in total and 28 unique values were remaining

Date

ID

Name

Region

Rating

Product

1/31/2021 0:00

1

John Smith

North

Good

Magic Wand

2/28/2021 0:00

2

Jane Doe

East

Excellent

Unicorn Horn

3/31/2021 0:00

3

Mike Tyson

West

Poor

Boxing Gloves

4/30/2021 0:00

4

Anna Belle

South

Average

Fairy Dust

5/31/2021 0:00

5

Chris P. Bacon

East

Good

Bacon Scented Candle

6/30/2021 0:00

6

Peter Parker

East

Excellent

Web Shooter

7/31/2021 0:00

7

Mary Jane

West

Poor

Potent Potion

8/31/2021 0:00

8

Bruce Wayne

South

Average

Bat Signal

9/30/2021 0:00

9

Clark Kent

East

Good

Glasses with X-ray Vision

10/31/2021 0:00

10

Diana Prince

North

Excellent

Lasso of Truth

11/30/2021 0:00

11

Tony Stark

West

Poor

Iron Man Suit

12/31/2021 0:00

12

Steve Rogers

South

Average

Captain America Shield

1/31/2022 0:00

13

Natasha Romanoff

East

Good

Black Widow's Bite

2/28/2022 0:00

14

Bruce Banner

East

Excellent

Gamma Radiation Serum

4/30/2021 0:00

4

Anna Belle

South

Average

Fairy Dust

5/31/2021 0:00

5

Chris P. Bacon

East

Good

Bacon Scented Candle

6/30/2021 0:00

6

Peter Parker

East

Excellent

Web Shooter

3/31/2022 0:00

15

Nick Fury

West

Poor

Eye Patch

4/30/2022 0:00

16

Phil Coulson

Average

Agent ID Card

5/31/2022 0:00

17

Peggy Carter

East

Good

Vintage Pistol

6/30/2022 0:00

18

Howard Stark

North

Excellent

Arc Reactor

Remove Duplicates

To delete duplicate values, select one or more columns that contain duplicates.

Selected all

Unselected All

My data has headers

Columns

☒ Date

☒ ID

☒ Name

☒ Region

☒ Rating

☒ Product

OK

Cancel

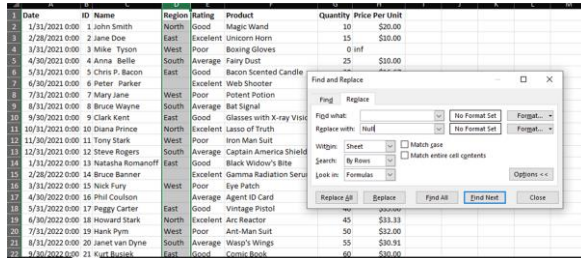
Before Removing Duplicates

Date	ID	Name	Region	Rating	Product	Quantity	Price Per Unit
1/31/2021 0:00	1	John Smith	North	Good	Magic Wand	10	\$20.00
2/28/2021 0:00	2	Jane Doe	East	Excellent	Unicorn Horn	15	\$10.00
3/31/2021 0:00	3	Mike Tyson	West	Poor	Boxing Gloves	0 inf	\$10.00
4/30/2021 0:00	4	Anna Belle	South	Average	Fairy Dust	25	\$10.00
5/31/2021 0:00	5	Chris P. Bacon	East	Good	Bacon Scented Candle	30	\$16.67
6/30/2021 0:00	6	Peter Parker	East	Excellent	Web Shooter	0 inf	\$10.00
7/31/2021 0:00	7	Mary Jane	West	Poor	Potent Potion	35	\$10.00
8/31/2021 0:00	8	Bruce Wayne	South	Average	Bat Signal	40	\$15.00
9/30/2021 0:00	9	Clark Kent	East	Good	Glasses with X-ray Vision	45	\$12.22
3 duplicate values found and removed. 28 unique values remain. Note that counts may include empty cells, spaces, etc.							
OK							
10/31/2021 0:00	10	Diana Prince	North	Excellent	Lasso of Truth	50	\$14.00
11/30/2021 0:00	11	Tony Stark	West	Poor	Iron Man Suit	5	\$160.00
12/31/2021 0:00	12	Steve Rogers	South	Average	Captain America Shield	20	\$45.00
1/31/2022 0:00	13	Natasha Romanoff	East	Good	Black Widow's Bite	0 inf	\$10.00
2/28/2022 0:00	14	Bruce Banner	East	Excellent	Gamma Radiation Serum	30	\$36.67
3/31/2022 0:00	15	Nick Fury	West	Poor	Eye Patch	35	\$34.29
4/30/2022 0:00	16	Phil Coulson	Average	Agent ID Card	0 inf	\$10.00	
5/31/2022 0:00	17	Peggy Carter	East	Good	Vintage Pistol	40	\$15.00
6/30/2022 0:00	18	Howard Stark	North	Excellent	Arc Reactor	45	\$33.33
7/31/2022 0:00	19	Hank Pym	West	Poor	Ant-Man Suit	50	\$12.00
8/31/2022 0:00	20	Janet van Dyne	South	Average	Wasp's Wings	55	\$80.91

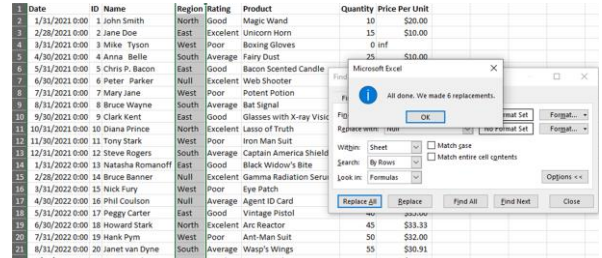
After Removing Duplicates

2.3 Eliminate Blank Cells

To continue with the data cleaning, blank cells needed to be fixed. A total of 6 blank cells were found at the Region Column, and after checking for the trend in the data and its consistencies, Null values were better replaced in the empty spaces than guessing or removing the entire row.



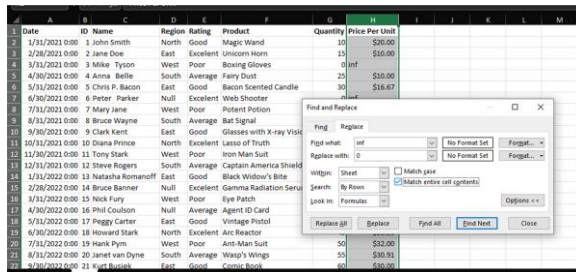
Before Eliminating Blank Cells



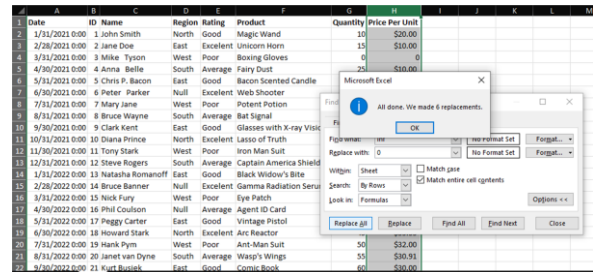
After Eliminating Blank Cells

2.4 Use find and replace to correct Errors

In the data, at the price per unit column, the column contained values like 'inf' which doesn't actually depict what should be in the column. The column is better represented with zero as its consistent with the zero on the quality column. After changing the 'inf' to 0, a total of 6 replacements were made and the data looks better for analysis and insights.



Before using find and replace



After using find and replace

2.5 Using the Appropriate Data Types

The Data types of the columns were incorrect, so there was a need to put the individual columns in their correct data types, which proved to be good, as the data became perfect for analysis and insights.



Before changing data types



After changing data types

2.6 Convert Data To Table:

For the closing steps of the data cleaning, the data is converted to Table, so it can be further used to generate insights for perform further calculative or visualization tasks.

Date	ID	Name	Region	Rating	Product	Quantity	Price Per Unit
1/31/2021	1.00	John Smith	North	Good	Magic Wand	10.00	\$ 20.00
2/28/2021	2.00	Jane Doe	East	Excellent	Unicorn Horn	15.00	\$ 10.00
3/31/2021	3.00	Mike Tyson	West	Poor	Boxing Gloves	0.00	\$ -
4/30/2021	4.00	Anna Belle	South	Average	Fairy Dust	25.00	\$ 10.00
5/31/2021	5.00	Chris P. Bacon	East	Good	Bacon Scented Candle	30.00	\$ 16.67
6/30/2021	6.00	Peter Parker	Null	Excellent	Web Shooter	0.00	\$ -
7/31/2021	7.00	Mary Jane	West	Poor	Potent Potion	35.00	\$ 10.00
8/31/2021	8.00	Bruce Wayne	South	Average	Bat Signal	40.00	\$ 15.00
9/30/2021	9.00	Clark Kent	East	Good	Glasses with X-ray Vision	45.00	\$ 12.22
10/31/2021	10.00	Diana Prince	North	Excellent	Lasso of Truth	50.00	\$ 14.00
11/30/2021	11.00	Tony Stark	West	Poor	Iron Man Suit	5.00	\$ 160.00
12/31/2021	12.00	Steve Rogers	South	Average	Captain America Shield	20.00	\$ 45.00
1/31/2022	13.00	Natasha Romanoff	East	Good	Black Widow's Bite	0.00	\$ -
2/28/2022	14.00	Bruce Banner	Null	Excellent	Gamma Radiation Serum	30.00	\$ 36.67
3/31/2022	15.00	Nick Fury	West	Poor	Eye Patch	35.00	\$ 34.29
4/30/2022	16.00	Phil Coulson	Null	Average	Agent ID Card	0.00	\$ -
5/31/2022	17.00	Peggy Carter	East	Good	Vintage Pistol	40.00	\$ 35.00
6/30/2022	18.00	Howard Stark	North	Excellent	Arc Reactor	45.00	\$ 33.33
7/31/2022	19.00	Hank Pym	West	Poor	Ant-Man Suit	50.00	\$ 32.00
8/31/2022	20.00	Janet van Dyne	South	Average	Wasp's Wings	55.00	\$ 30.91
9/30/2022	21.00	Kurt Busiek	East	Good	Comic Book	60.00	\$ 30.00
10/31/2022	22.00	George Perez	North	Excellent	Drawing Pad	0.00	\$ -

Before converting data to table

Date	ID	Name	Region	Rating	Product	Quantity	Price Per Unit
1/31/2021	1.00	John Smith	North	Good	Magic Wand	10.00	\$ 20.00
2/28/2021	2.00	Jane Doe	East	Excellent	Unicorn Horn	15.00	\$ 10.00
3/31/2021	3.00	Mike Tyson	West	Poor	Boxing Gloves	0.00	\$ -
4/30/2021	4.00	Anna Belle	South	Average	Fairy Dust	25.00	\$ 10.00
5/31/2021	5.00	Chris P. Bacon	East	Good	Bacon Scented Candle	30.00	\$ 16.67
6/30/2021	6.00	Peter Parker	Null	Excellent	Web Shooter	0.00	\$ -
7/31/2021	7.00	Mary Jane	West	Poor	Potent Potion	35.00	\$ 10.00
8/31/2021	8.00	Bruce Wayne	South	Average	Bat Signal	40.00	\$ 15.00
9/30/2021	9.00	Clark Kent	East	Good	Glasses with X-ray Vision	45.00	\$ 12.22
10/31/2021	10.00	Diana Prince	North	Excellent	Lasso of Truth	50.00	\$ 14.00
11/30/2021	11.00	Tony Stark	West	Poor	Iron Man Suit	5.00	\$ 160.00
12/31/2021	12.00	Steve Rogers	South	Average	Captain America Shield	20.00	\$ 45.00
1/31/2022	13.00	Natasha Romanoff	East	Good	Black Widow's Bite	0.00	\$ -
2/28/2022	14.00	Bruce Banner	Null	Excellent	Gamma Radiation Serum	30.00	\$ 36.67
3/31/2022	15.00	Nick Fury	West	Poor	Eye Patch	35.00	\$ 34.29
4/30/2022	16.00	Phil Coulson	Null	Average	Agent ID Card	0.00	\$ -
5/31/2022	17.00	Peggy Carter	East	Good	Vintage Pistol	40.00	\$ 35.00
6/30/2022	18.00	Howard Stark	North	Excellent	Arc Reactor	45.00	\$ 33.33
7/31/2022	19.00	Hank Pym	West	Poor	Ant-Man Suit	50.00	\$ 32.00
8/31/2022	20.00	Janet van Dyne	South	Average	Wasp's Wings	55.00	\$ 30.91
9/30/2022	21.00	Kurt Busiek	East	Good	Comic Book	60.00	\$ 30.00
10/31/2022	22.00	George Perez	North	Excellent	Drawing Pad	0.00	\$ -

After converting data to table

2.7 Validate data to be sure it is thoroughly clean.

For the last steps, the Data quantity was validated and was put to effect for other columns.

Validating data

3.0 Conclusion

This project demonstrated the importance of thorough data cleaning in ensuring the accuracy and reliability of datasets used for analysis. By systematically applying Excel cleaning techniques, the dataset was transformed into a well-structured and reliable resource for generating actionable insights.

	A	B	C	D	E	F	G	H
1	Date	ID	Name	Region	Rating	Product	Quantity	Price Per Unit
2	1/31/2021	1.00	John Smith	North	Good	Magic Wand	10.00	\$ 20.00
3	2/28/2021	2.00	Jane Doe	East	Excellent	Unicorn Horn	15.00	\$ 10.00
4	3/31/2021	3.00	Mike Tyson	West	Poor	Boxing Gloves	0.00	\$ -
5	4/30/2021	4.00	Anna Belle	South	Average	Fairy Dust	25.00	\$ 10.00
6	5/31/2021	5.00	Chris P. Bacon	East	Good	Bacon Scented Candle	30.00	\$ 16.67
7	6/30/2021	6.00	Peter Parker	Null	Excellent	Web Shooter	0.00	\$ -
8	7/31/2021	7.00	Mary Jane	West	Poor	Potent Potion	35.00	\$ 10.00
9	8/31/2021	8.00	Bruce Wayne	South	Average	Bat Signal	40.00	\$ 15.00
10	9/30/2021	9.00	Clark Kent	East	Good	Glasses with X-ray Vision	45.00	\$ 12.22
11	10/31/2021	10.00	Diana Prince	North	Excellent	Lasso of Truth	50.00	\$ 14.00
12	11/30/2021	11.00	Tony Stark	West	Poor	Iron Man Suit	5.00	\$ 160.00
13	12/31/2021	12.00	Steve Rogers	South	Average	Captain America Shield	20.00	\$ 45.00
14	1/31/2022	13.00	Natasha Romanoff	East	Good	Black Widow's Bite	0.00	\$ -
15	2/28/2022	14.00	Bruce Banner	Null	Excellent	Gamma Radiation Serum	30.00	\$ 36.67
16	3/31/2022	15.00	Nick Fury	West	Poor	Eye Patch	35.00	\$ 34.29
17	4/30/2022	16.00	Phil Coulson	Null	Average	Agent ID Card	0.00	\$ -
18	5/31/2022	17.00	Peggy Carter	East	Good	Vintage Pistol	40.00	\$ 35.00
19	6/30/2022	18.00	Howard Stark	North	Excellent	Arc Reactor	45.00	\$ 33.33
20	7/31/2022	19.00	Hank Pym	West	Poor	Ant-Man Suit	50.00	\$ 32.00
21	8/31/2022	20.00	Janet van Dyne	South	Average	Wasp's Wings	55.00	\$ 30.91
22	9/30/2022	21.00	Kurt Busiek	East	Good	Comic Book	60.00	\$ 30.00
23	10/31/2022	22.00	George Perez	North	Excellent	Drawing Pad	0.00	\$ -

AN OVERVIEW OF THE FINAL DATASET