2019 Electronics Sales Data - Analysis Process & Findings

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Date: December 13, 2025
Dataset: 2019 Electronics Sales Data - Source
Tools Used: Python(Pandas, Numpy, Matplotlib), Power BI

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1. Project Overview

1.1 Objective

Analyse 2019 electronics sales data to identify revenue patterns, product performance and profit trends. Provide actionable insights for business decision-making in inventory management, marketing strategy and product portfolio optimization.

1.2 Business Questions

1. What are the revenue and profit trends across monthly, weekly and hourly timeframes?
2. Which products drive the most revenue and profit?
3. Which products are underperforming?
4. What are the peak sales periods for resource allocation?
5. How do different product categories contribute to overall business performance?

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2. Data Understanding

Data Pipeline

Kaggle (Data Source) -> Python (ETL & EDA) -> Local Folder(CSVs) -> Power BI (Dashboards) -> Power BI Service(Publishing & Sharing)

2.1 Data Source

Data Source: Kaggle (Public Dataset)
File Format: CSV
Records: 185,950 transaction-level records

Time Period: Jan 1, 2019 to Dec 1, 2019
Geographic Coverage :

2.2 Initial Data Structure

Columns available:

1. ‘Unnamed: 0' - Sample index
2. 'Order ID' - Unique identifier for each transaction (multiple orders have same order ids)
3. 'Product' - Name of the Product
4. 'Quantity Ordered' - Number of units purchased per order
5. 'Price Each' - Selling price of each product in USD
6. 'Order Date' - Date and Time of order placed
7. 'Purchase Address' - Customer delivery address
8. 'Month' - Month of order places
9. 'Sales' - Amount paid by customer (‘price’ * ‘quantity’)
10. 'City' - Customer’s city
11. 'Hour' - Hour time of order placed

2.3 Data Quality Assessment

1. Total Duplicate Transactions : 0
2. Total Duplicate Transactions with same (order id, product, quantity, order date) : 264

```
#Checking Total Duplicates in two dimensions 1. Complete Transaction level, 2. Transactions with same order id, product, quantity with same timestamp

print(f'Total duplicate transactions : {df.duplicated().sum()}')

level2_dups = df[df[['Order ID', 'Product', 'Quantity Ordered', 'Order Date']].duplicated()]
true_dups = df.groupby(['Order ID', 'Product', 'Quantity Ordered', 'Order Date']).size().reset_index(name='count')
dups = len(true_dups[true_dups['count'] > 1])

print(f'\nTotal Duplicate Transactions with \nsame (order id, product, quantity, order date) = {dups}')
```

3. Verifying Datatypes

    a. Order Date -> obj : to be transformed to datetime
4. Checking price consistency
    a. All products are priced consistently throughout the year

```
price_consistent_checker = df.groupby('Product')['Price
Each'].agg(['max','min','nunique','mean'])
price_consistent_checker[price_consistent_checker['nunique'] > 1]
```

Key findings:

1. No missing values detected
2. No duplicate transactions available at transactions level
3. Price consistency verified
4. 264 data level transaction duplicates are identified
5. Cost Price of the products data is not available (to be simulated with 10-40% profit est.)
6. Column names to be renamed accurately and un-used columns must be dropped (Eg: ‘Unnamed 0’)

3.ETL : Data Preparation and Cleaning

3.1 Renaming Columns : converted all names to lowercase and replaced spaces with ‘_’

3.2 Dropping Duplicates and not required columns:

- Dropped ‘unnamed:_0’ column
- Dropped 264 data level duplicate transactions
- Renamed columns for clear ///

3.3 Assigning Correct Data Types

- Converted order_date dtype to datetime

3.4 Creating Required columns for Time Analysis

- Creating day, day_num, month, quarter columns
- Sorted dataframe in ascending order of date and time

3.5 Categorizing data as per product category (Assuming)

3.6 Since the cost price and profit data is not available, generated profit margins using randomized industry-standard ranges

Saved the data as ‘clean_sales_data.csv’ in CSV format for further processings

4. Exploratory Data Analysis

4.1 Revenue Analysis

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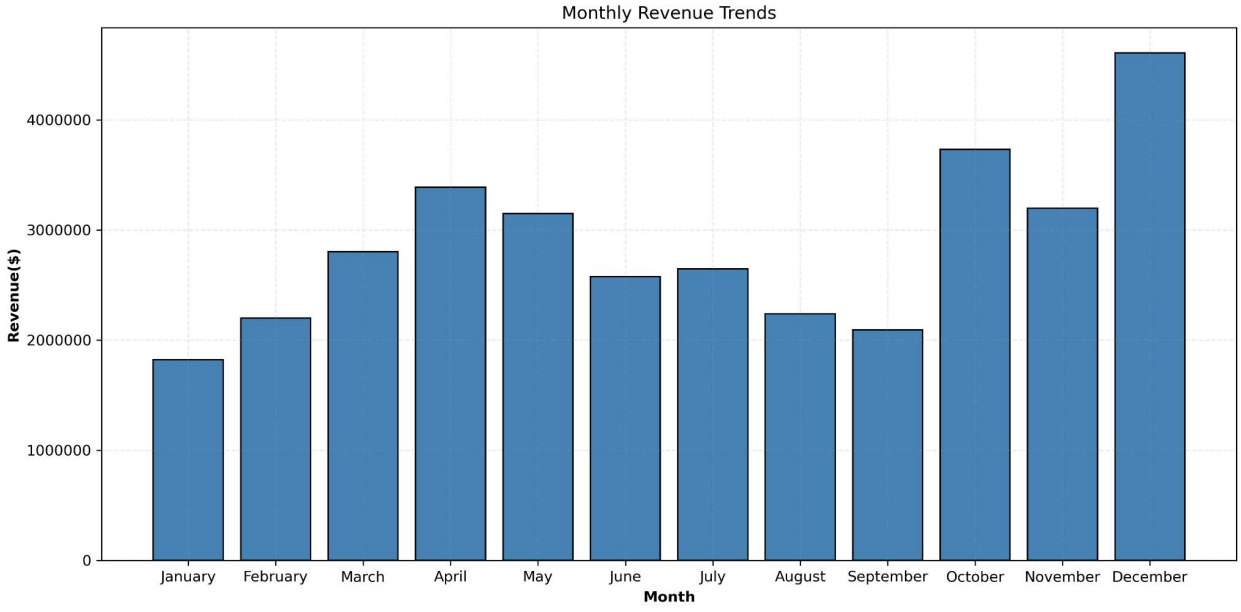
Total Business Revenue in 2019: $34,465,537.94
Total Orders Placed in 2019: 178,437 Orders
Total Quantity or Units sold in 2019: 208,812 Units
Average Order Value in 2019: $193.15
```

4.2 Monthly Revenue Trend Analysis

	month_num	month_name	m_revenue	m_orders	m_quantity	m_pct	m_revenue_rank
11	12	December	4608295.70	24004	28074	13.37	1
9	10	October	3734777.86	19436	22669	10.84	2
3	4	April	3389217.98	17528	20536	9.83	3
10	11	November	3197875.05	16859	19769	9.28	4
4	5	May	3150616.23	15836	18653	9.14	5

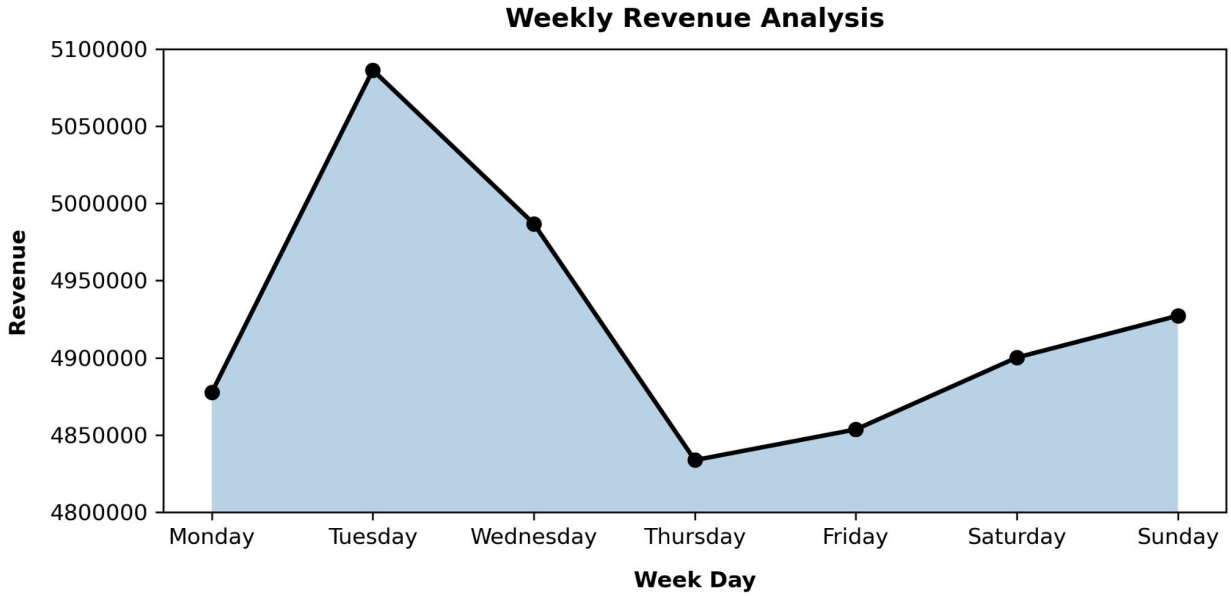
Top 5 Moths ['December', 'October', 'April', 'November', 'May'] had generated 52.46% of Total Revenue



4.3 Weekly Sales Pattern Analysis

	weekday_num	day_name	w_revenue	w_orders	w_quantity	w_pct	w_revenue_rank
0	0	Monday	4877588.21	25494	29860	14.15	5
1	1	Tuesday	5086275.40	26063	30686	14.76	1
2	2	Wednesday	4986823.36	25394	29759	14.47	2
3	3	Thursday	4833763.73	25368	29618	14.02	7
4	4	Friday	4853642.26	25216	29415	14.08	6
5	5	Saturday	4900195.58	25420	29729	14.22	4
6	6	Sunday	4927249.40	25482	29745	14.30	3

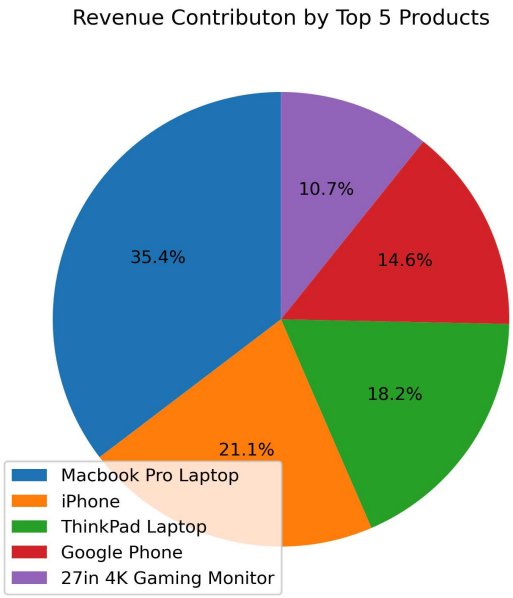
Top 2 days ['Tuesday', 'Wednesday'] had generated 29.23% of Total Revenue



4.4 Product Performance Analysis

Top 5 Products ['Macbook Pro Laptop', 'iPhone', 'ThinkPad Laptop', 'Google Phone', '27in 4K Gaming Monitor'] contributes 65.89% of Total Revenue

	index	category	product	p_revenue	p_avg_revenue	p_quantity	p_orders	p_cost_price	p_sell_price	P_profit_margin_pct	revenue_pct	p_rank
0	11	Laptop	Macbook Pro Laptop	8032500.00	1701.44	4725	4721	1278.95	1700.00	24.77	23.31	1.0
1	18	Phone	iPhone	4792900.00	700.72	6847	6840	525.52	700.00	24.93	13.91	2.0
2	12	Laptop	ThinkPad Laptop	4127958.72	1000.47	4128	4126	748.26	999.99	25.17	11.98	3.0
3	15	Phone	Google Phone	3317400.00	600.76	5529	5522	450.04	600.00	24.99	9.63	4.0
4	8	Computers	27in 4K Gaming Monitor	2433147.61	390.87	6239	6225	292.18	389.99	25.08	7.06	5.0



4.5 Profit Analysis

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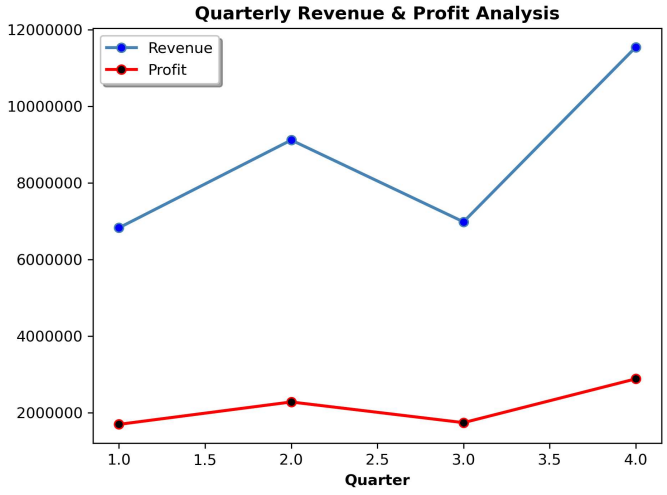
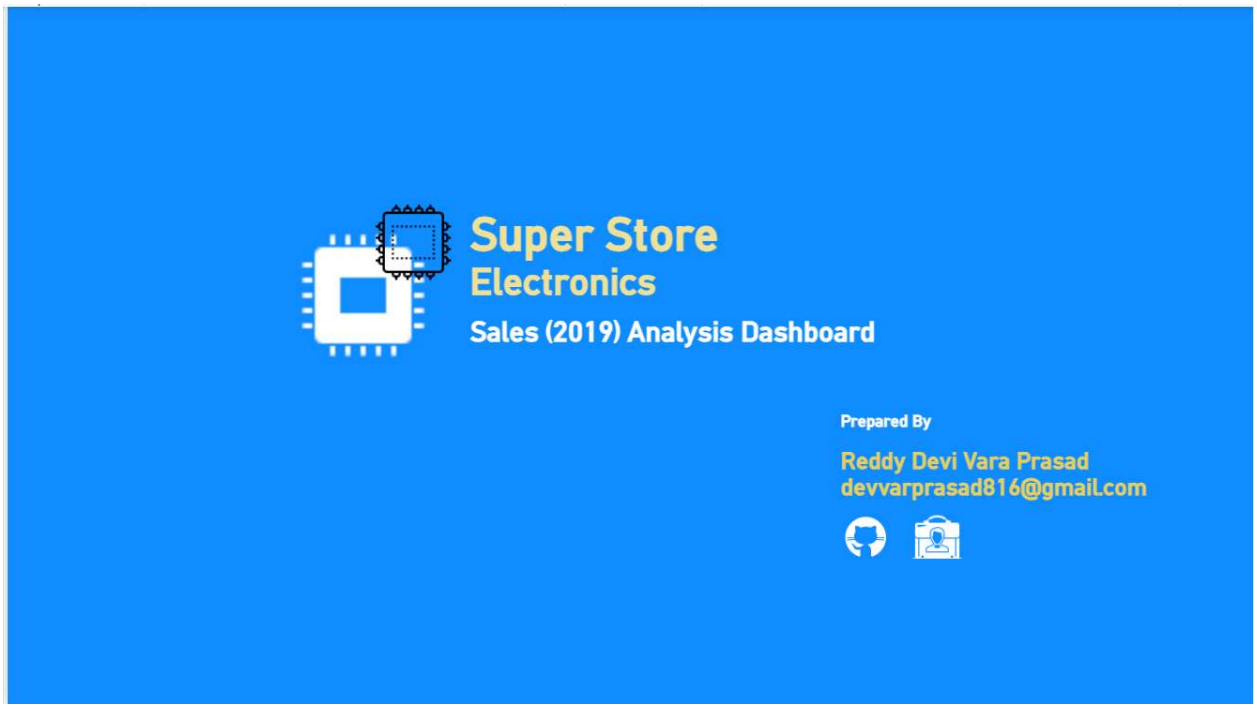
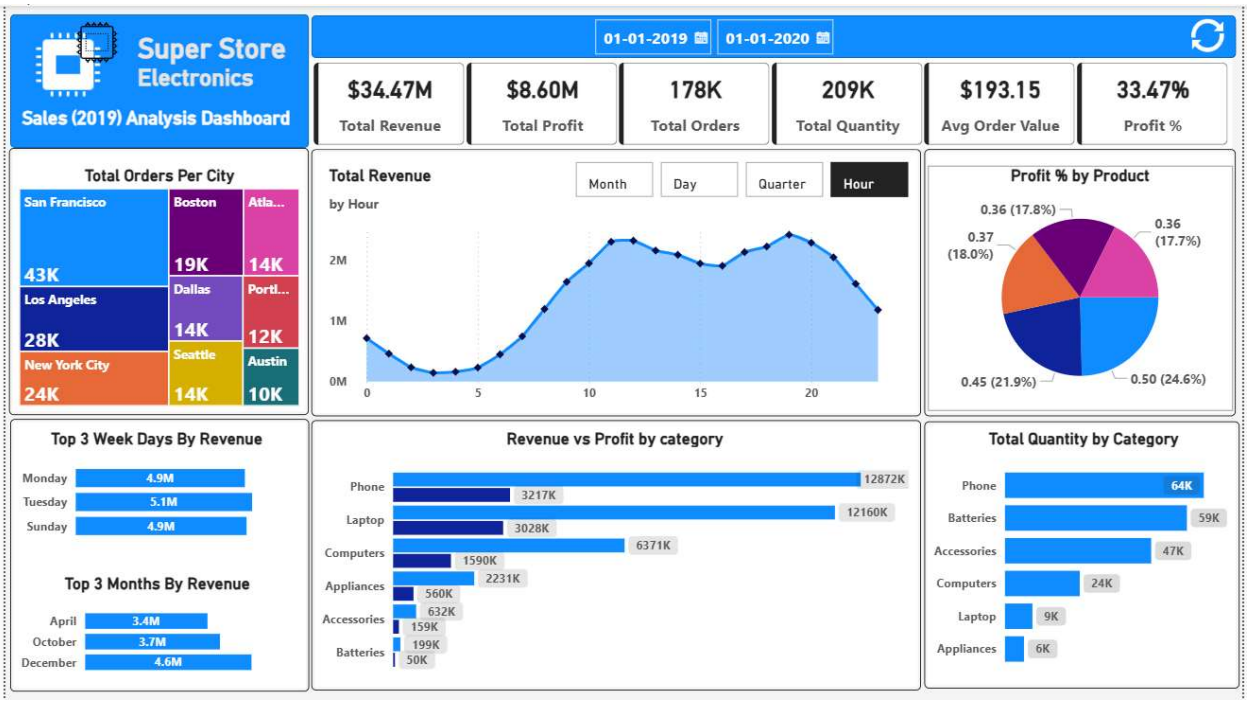
	quarter	q_revenue	q_avg_revenue	q_quantity	q_orders	q_profits	q_pct	q_pct_change
0	1	6826464.59	185.58	41303	35338	1696930.36	19.72	0.00
1	2	9116114.36	188.57	54423	46353	2281335.80	26.51	34.44
2	3	6982010.38	184.61	42574	36447	1741486.41	20.24	-23.66
3	4	11540948.61	183.96	70512	60299	2884637.92	33.53	65.64



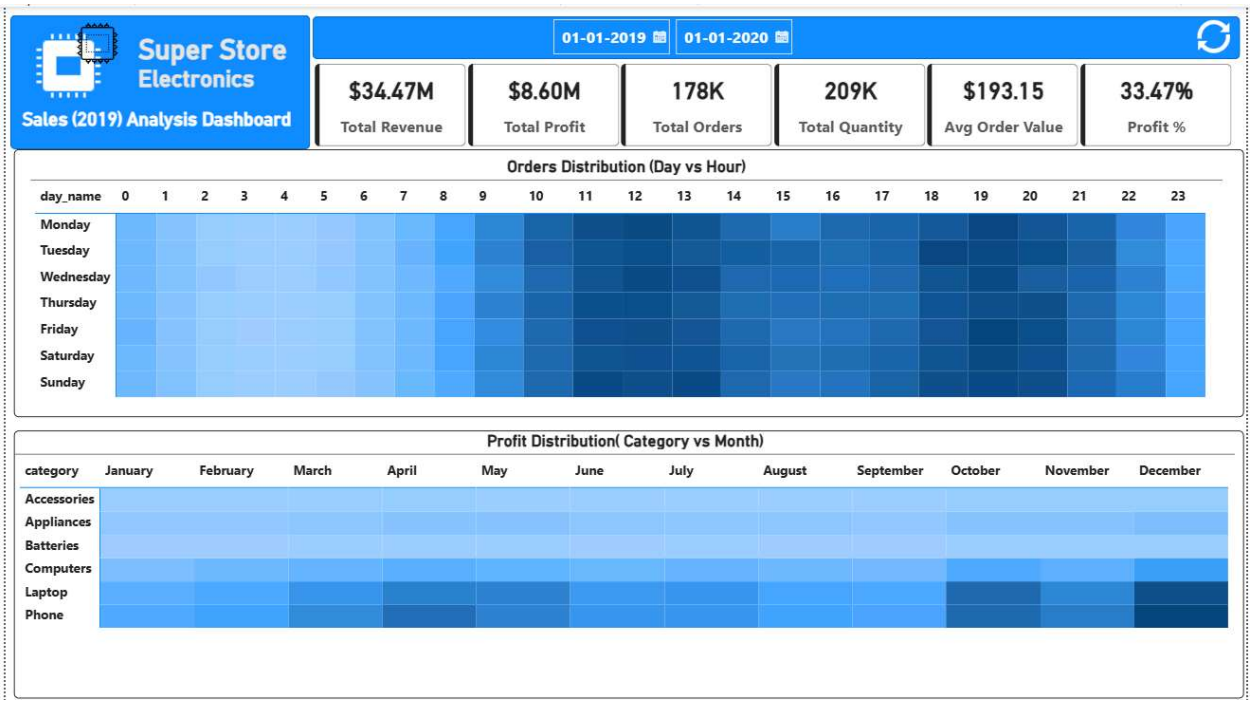
5. Data Visualisation in Power BI



5.1 Executive Sales Overview - Dashboard



5.2 Time Based Performance Analysis - Time vs Business



Analytics & Insights

- **Exploratory Data Analysis:** Uncovered revenue patterns across temporal, geographic, and product dimensions
- **Statistical Analysis:** Calculated KPIs including 33.47% profit margin and $193.15 average order value
- **Trend Analysis:** Identified weekly patterns showing Tuesday-Wednesday generate 29.23% of revenue
- **Category Performance:** Segmented products into 6 categories revealing Phones and Laptops drive 72.6% of sales

This project showcases my ability to transform raw data into strategic business intelligence, demonstrating skills essential for data analyst and business intelligence roles.