Electronic Sales Analysis in Amazon

Python Project | Muhammad Iqbal

Problem Statement

- The source code for this project is available on my GitHub **(Here)**

- The dataset utilized originates from Kaggle **(Here)** with 1.292.954 rows and 10 columns.

- The dataset in question is sourced from Amazon and pertains to electronic sales, encompassing various aspects such as user information, item details, ratings, timestamps, and additional attributes.

- The primary objective of this project is to conduct a thorough analysis of the electronic sales data on Amazon and extract valuable insights to guide strategic decision-making and specific focus is on addressing key questions and exploring pertinent factors related to sales performance, customer behavior, and product attributes.

- The analysis aims to provide actionable recommendations for optimizing sales, improving customer satisfaction, and enhancing overall business performance.

Research Questions

1. **Time Series Analysis**

   - How is the annual trend in the sales of electronic products? Is there any specific increase or decrease?

   - Are there seasonal patterns in sales, such as during specific years and months?

   - What is the distribution of product ratings across the dataset over the years and months?

2. **Category and Brand Performances**

   - Which category of electronic products is the most popular on Amazon based on sales or average ratings?

   - Are there specific trends in the categories of products sold in different years?

   - Which electronic product brand is the most popular on Amazon based on sales or average ratings?

   - Are there specific trends in the brands of products sold in different years?

3. **User Segmentation**

   - What is the distribution of consumer gender across the entire dataset?

   - Can you identify and segment users based on model or category preferences?

How is the annual trend in the sales of electronic products? Is there any specific increase or decrease?

Number of Electronics Sales on Amazon Over the Years
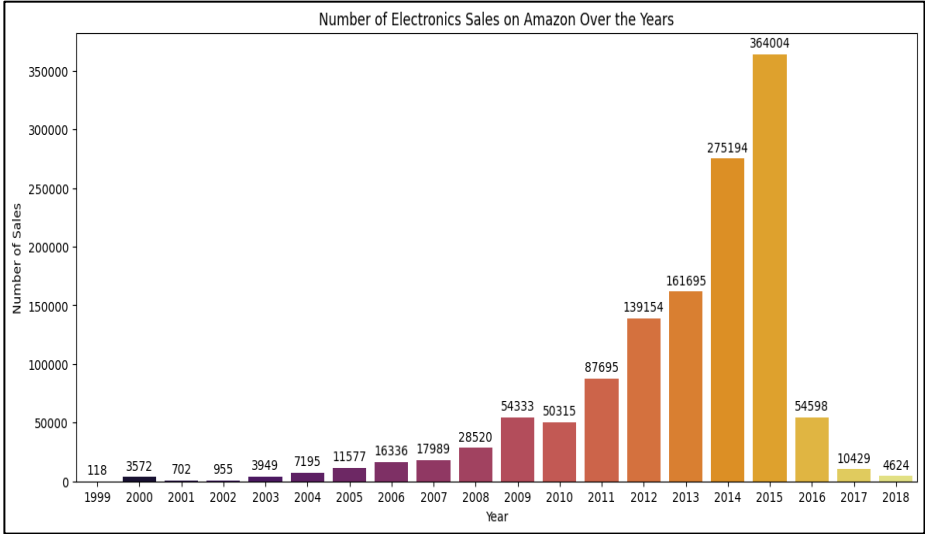
Electronics sales on Amazon have experienced **significant growth** in recent years. In 1999, the number of electronics sales on Amazon was only 118 units. However, in **2015**, the number of electronic sales on Amazon reached 364,004 units. Unfortunately, there was a **drastic decline** the following year.

Are there seasonal patterns in sales, such as during specific years and months?

Distribution of Sales (Year wise and Month wise)

Number of Electronics Sales on Amazon (Monthly)
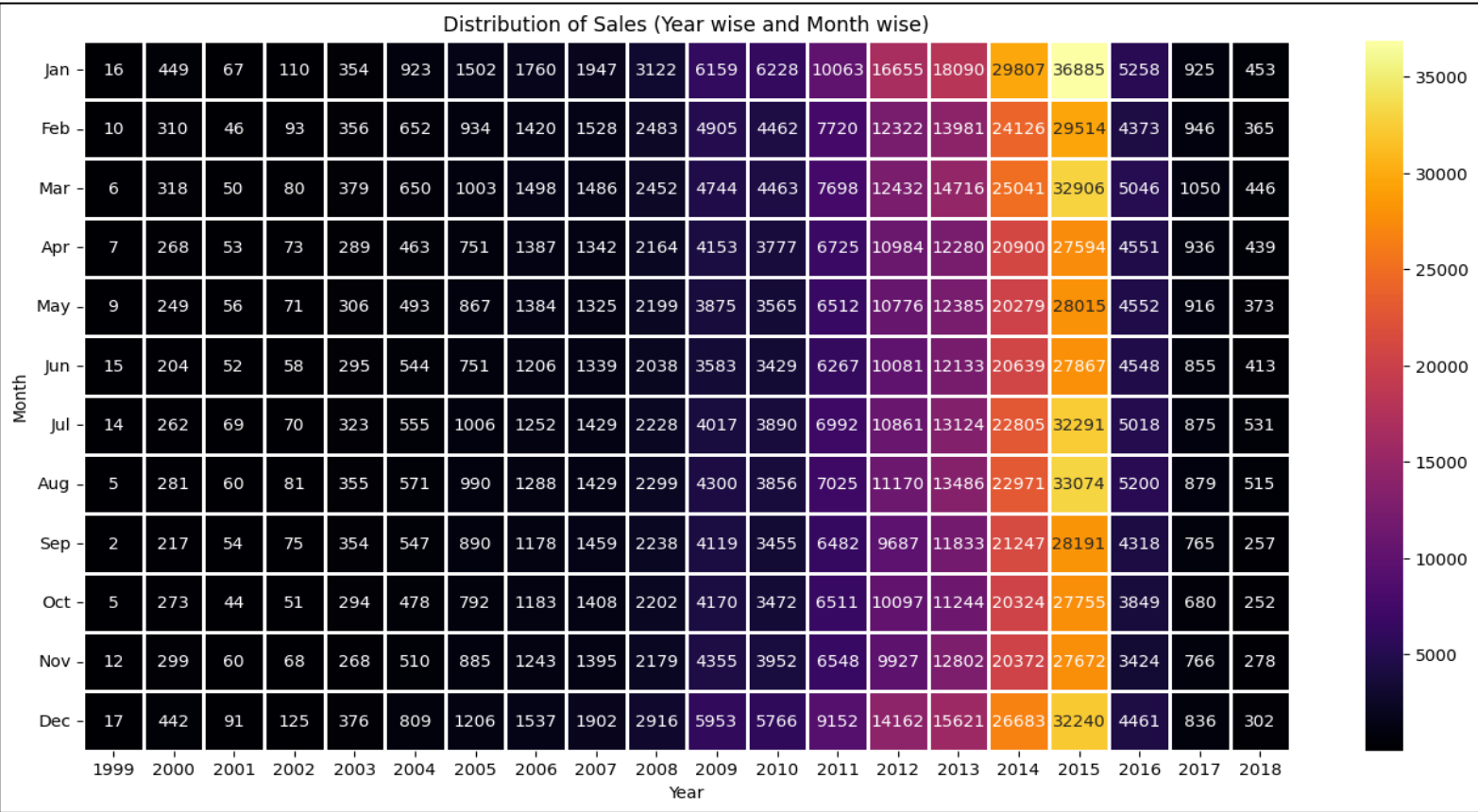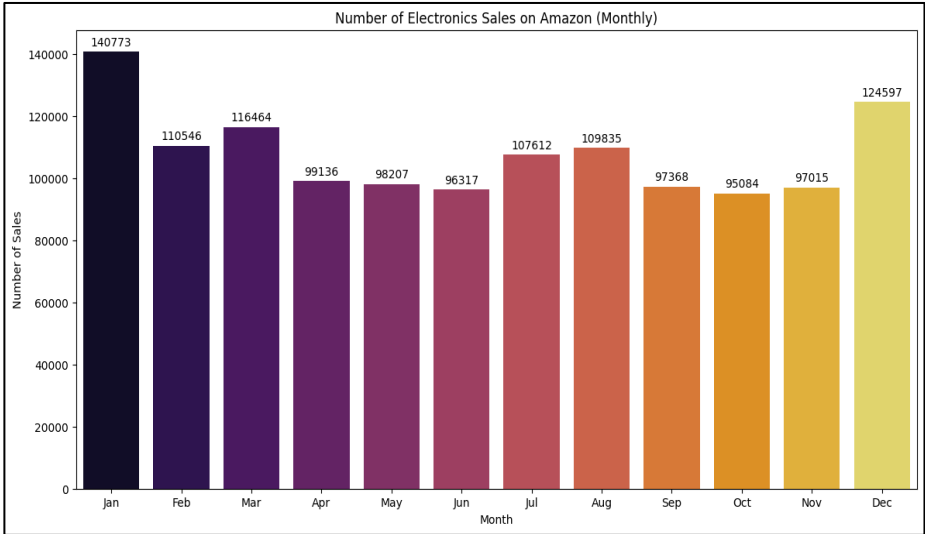
The busiest month all the time (1999-2018) for electronics sales was **January**, with **140.773** items sold. And the slowest month for electronics sales was **October**, with **95.084** items sold.

There seems to be a general upward trend in sales year-over-year, with each year surpassing the previous year's total sales. The analysis reveals that the period between **2009 and 2015 marked the busiest years**, with sales evenly distributed across each month. The pinnacle of sales occurred in **January 2015**.

What is the distribution of product ratings across the dataset over the years and months?

Number of Rating

Distribution of Rating

Number of Sales (Monthly)

Number of Rating (Monthly)
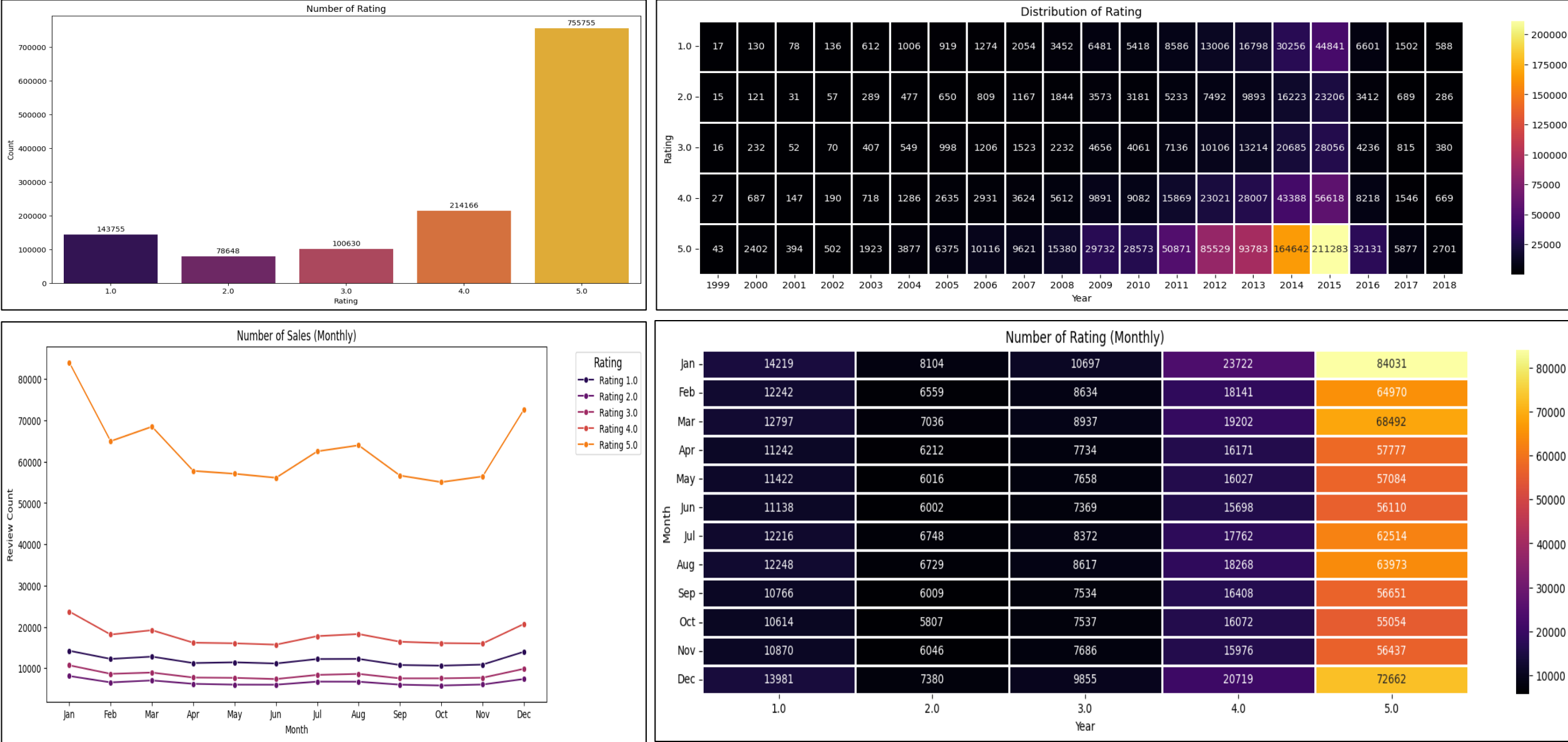
The distribution of ratings reveals that consumers predominantly assigned a **rating of 5**, totaling **755.755**, surpassing other ratings. Notably, across the annual spectrum, all ratings peaked in **2015**. Similarly, on a monthly basis, **January** witnessed the highest frequency of ratings.

Category and Brand Performance

Which category of electronic products is the most popular on Amazon based on sales or average ratings?

Number of Products in Each Category

Category	Number of Products
Headphones	359334
Computers & Accessories	322938
Camera & Photo	192573
Accessories & Supplies	158598
Portable Audio & Video	143370
Car Electronics & GPS	33070
Television & Video	32057
Home Audio	24193
Wearable Technology	16015
Security & Surveillance	10806

Distribution of Average Ratings by Product Category
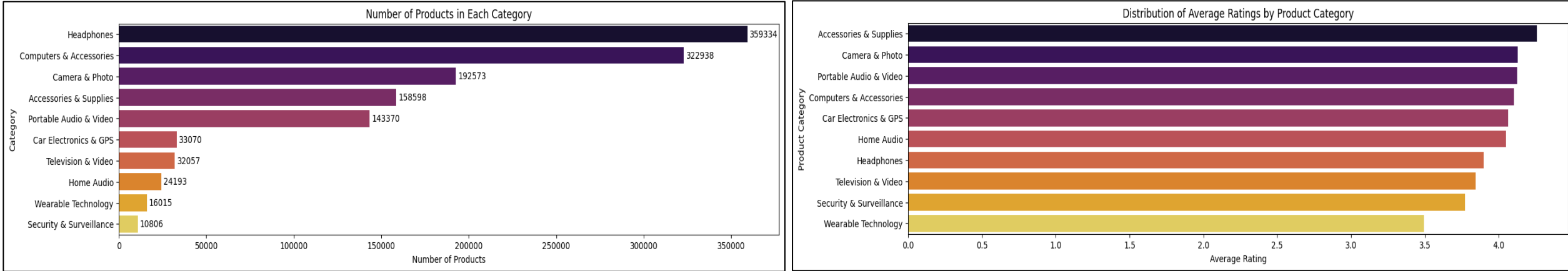
In terms of **sales**, the **headphones** category emerges as the **most popular**, boasting a total of **359,334** units sold. Conversely, the **security & surveillance** category lags behind as the **least popular**, with a total of **10,806** units sold. Shifting focus to average ratings, **accessories & supplies** claim the **top** spot, while **wearable technology** takes the **bottom** position in terms of consumer satisfaction.

Are there specific trends in the categories of products sold in different years?

Number of Sales by Category Products

Month	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Accessories & Supplies	0	12	18	0	661	40	54	1495	2205	1459	12075	6409	16794	17683	24770	32823	33534	6328	1647	591
Camera & Photo	0	65	596	341	1864	1770	3525	3312	6819	5707	7570	15220	12688	28515	18816	30803	42403	8850	2446	1263
Car Electronics & GPS	0	0	0	0	0	272	2863	190	159	937	2542	625	1341	1410	1327	10709	7574	1150	1143	828
Computers & Accessories	0	58	48	47	1413	793	88	5836	5455	14982	17270	8465	19650	45275	51484	69395	65243	14115	2306	1015
Headphones	0	3404	0	0	0	4276	4400	5067	896	2564	7325	16192	25343	29990	32846	78617	131097	15023	1766	528
Home Audio	0	0	40	0	0	0	239	0	838	23	2444	323	766	2464	2892	7271	5451	1390	37	15
Portable Audio & Video	118	22	0	567	0	15	187	247	1221	2642	4282	2103	8474	7196	18731	30935	62695	3305	416	214
Security & Surveillance	0	0	0	0	0	0	0	47	0	22	71	276	254	432	1155	4075	2759	1568	89	58
Television & Video	0	11	0	0	11	29	221	142	396	184	754	702	2385	6139	5033	5935	8114	1512	417	72
Wearable Technology	0	0	0	0	0	0	0	0	0	0	0	0	0	50	4641	4631	5134	1357	162	40

Products in the **headphones** category were the **most** sold, especially in **2014** and **2015**. Products in the **computers & accessories** category also saw an increase in sales from **2012** to **2015**.

Which electronic product brand is the most popular on Amazon based on sales or average ratings?

Number of Products in Each brand

Brand	Number of Products
Bose	29222
Logitech	29203
Sony	20360
Mpow	17477
EldHus	16530
Sennheiser	13322
Fujifilm	12245
TaoTronics	12125
Etre Jeune	11753
Pyle	11606
JLAB	10079
Skullcandy	10014
Kodak	8701
Linksys	8288
Jabra	7417
Panasonic	7349
Fintie	7212
Garmin	7212
Samsung	7051
Canon	6959
Neewer	6697
Philips	6658
Nikon	6539
Apple	6027
Polaroid	5926
DBPOWER	4818
Uniden	4701
Olympus	3709
ViewSonic	3426
ebasy	2771
Plemo	2385
HP	2140
LSS	2040
Toshiba	2008
Savage	1749
Tiamat	1738
XShields	1709
JVC	1702
Generic	1606
Gary Fong	1203
iRULU	991
Archos	961
Funlux	939
IRULU	933
Vivitar	774
Cooper Cases	745
Kensington	721
EINCAR	616
DURAGADGET	419
Koolertron	344

Distribution of Average Ratings by Product Brand

(Product brands ordered top to bottom: Plemo, Savage, Fintie, Tiamat, Cooper Cases, ebasy, Apple, Fujifilm, Neewer, Bose, Canon, Etre Jeune, EldHus, TaoTronics, Sony, Panasonic, Garmin, Gary Fong, Olympus, Logitech, Sennheiser, Koolertron, DBPOWER, Nikon, Samsung, Mpow, Toshiba, Kensington, JVC, HP, Philips, LSS, Uniden, Polaroid, Skullcandy, Kodak, ViewSonic, DURAGADGET, Pyle, Jabra, Linksys, Vivitar, JLAB, iRULU, Generic, Funlux, IRULU, Archos, EINCAR)

In terms of sales, **bose** and **logitech** emerges as the most popular, boasting a total of 29.2k units sold. Conversely, **koolertron** lags behind as the least popular, with a total of 344 units sold. Shifting focus to average ratings, **plemo** claim the top spot, while **EINCAR** takes the bottom position in terms of consumer satisfaction.

Are there specific trends in the brands of products sold in different years?

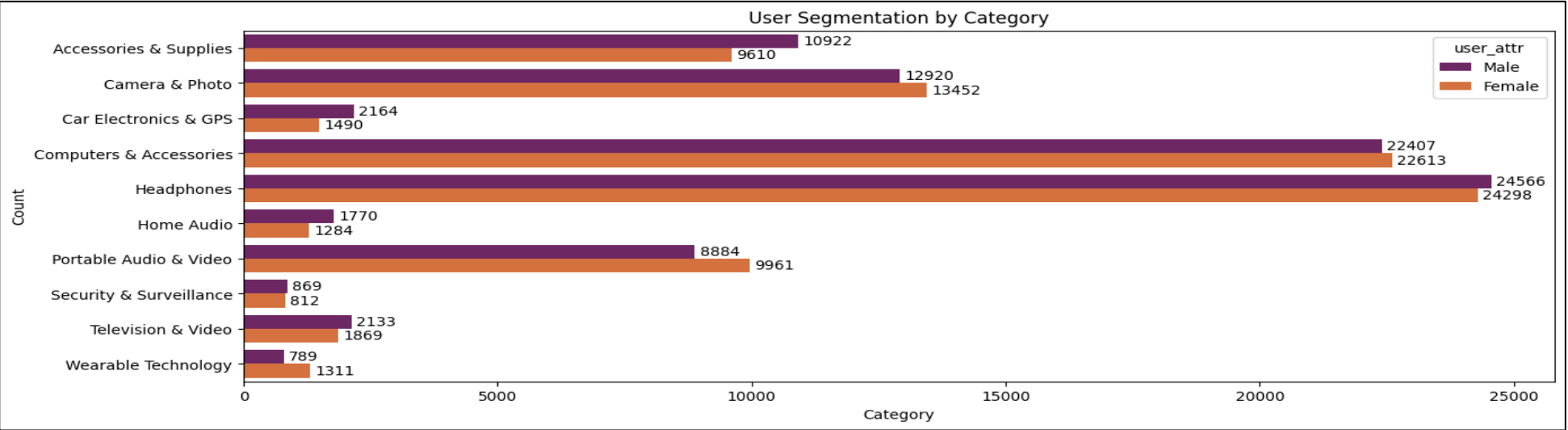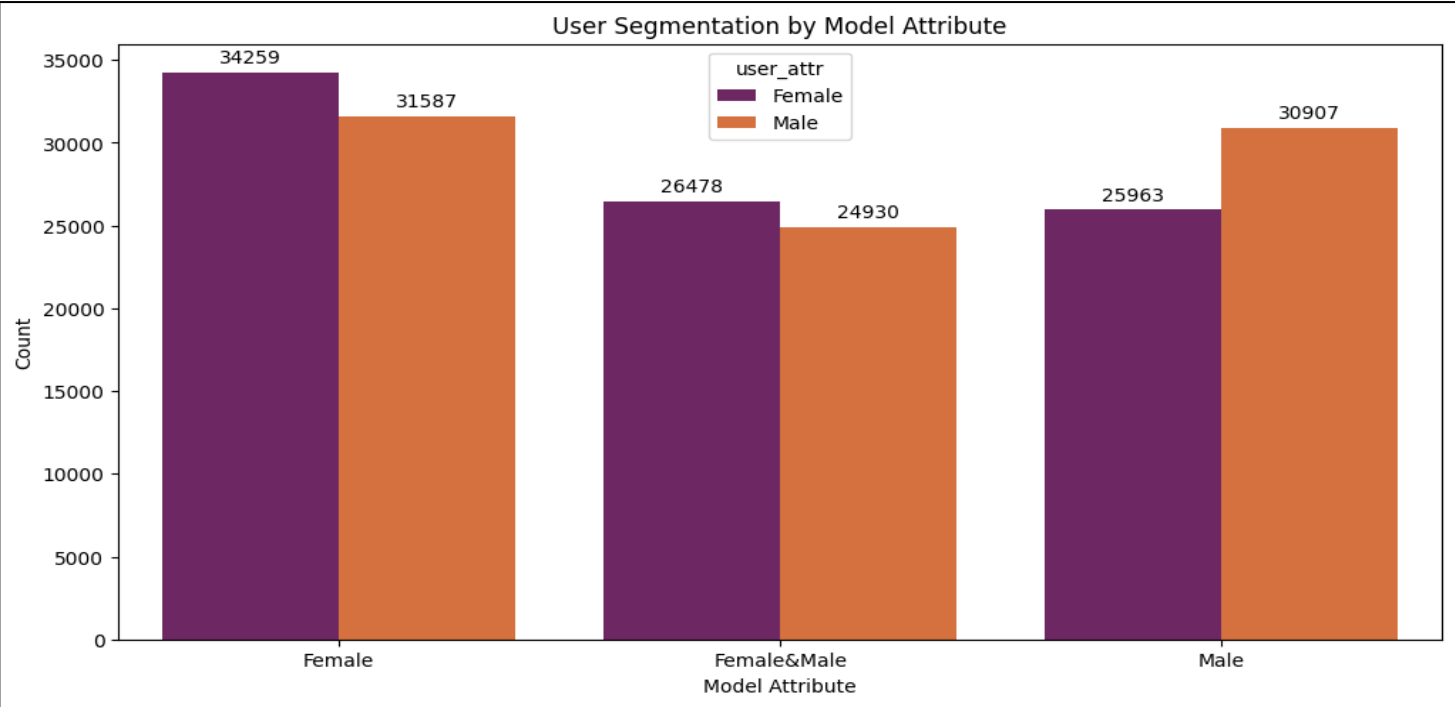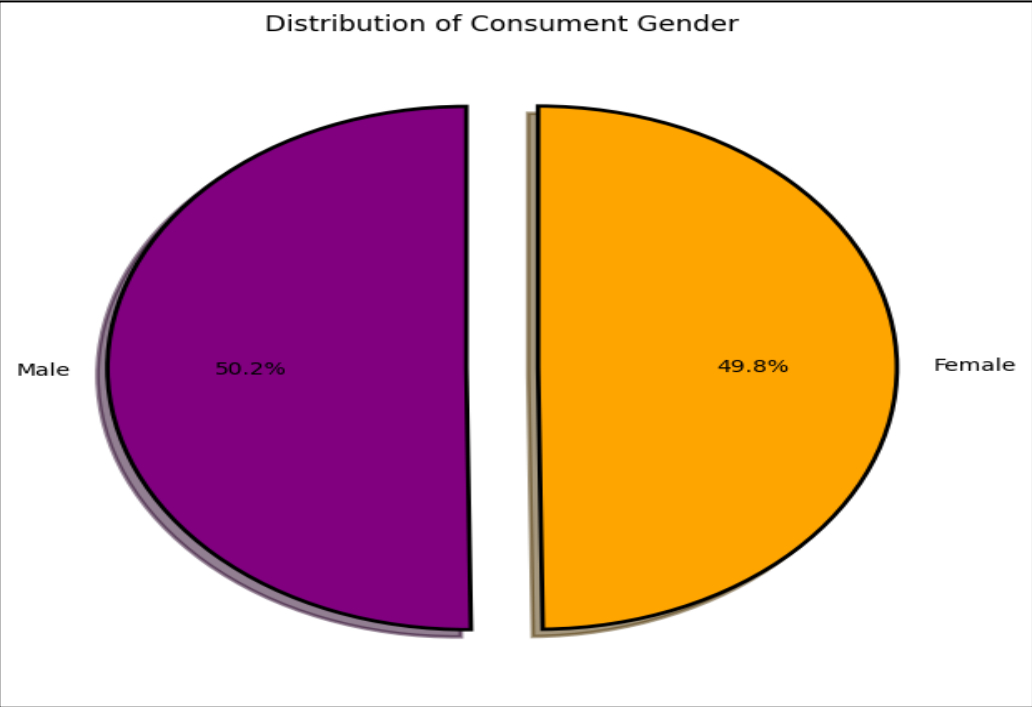### Number of Sales by Category Products

Month / Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Apple	0	0	0	37	0	0	200	116	16	1514	0	52	330	0	3096	627	34	5	0
Archos	0	0	0	0	0	0	31	518	120	6	0	77	152	57	0	0	0	0	0
Bose	0	0	0	0	0	239	293	0	0	0	981	3498	610	4936	9516	9143	6	0	0
Canon	10	0	152	134	586	937	261	83	356	190	119	1077	541	1541	50	410	420	92	0
Cooper Cases	0	0	0	0	0	0	0	0	0	0	0	0	51	32	468	165	29	0	0
DBPOWER	0	0	0	0	0	0	0	0	0	0	0	338	4102	350	20	8	0	0	0
DURAGADGET	0	0	0	0	0	0	0	0	0	0	0	247	0	90	25	34	23	0	0
EINCAR	0	0	0	0	0	0	0	0	0	0	0	60	16	338	140	52	10	0	0
EldHus	0	0	0	0	0	611	252	0	0	1185	723	1448	1094	5343	2264	1983	1627	0	0
Etre Jeune	0	0	0	661	0	0	0	0	0	1150	0	4057	486	4006	999	394	0	0	0
Fintie	0	0	0	0	0	0	0	0	0	0	0	0	1272	2344	3037	430	110	19	0
Fujifilm	0	17	0	1073	11	195	0	0	0	749	3162	20	13	572	3221	2895	182	76	59
Funlux	0	0	0	0	0	0	0	0	0	0	0	228	0	623	88	0	0	0	0
Garmin	0	0	0	0	2863	0	158	75	0	1457	421	286	0	231	949	725	21	8	18
Gary Fong	0	0	0	0	0	295	198	66	48	46	29	411	97	0	0	0	6	7	0
Generic	0	0	0	0	0	0	0	0	23	0	544	47	62	782	127	6	15	0	0
HP	58	0	0	0	66	39	0	5	15	46	0	16	5	14	1448	339	84	5	0
IRULU	0	0	0	0	0	0	0	0	0	0	0	0	0	638	290	5	0	0	0
JLAB	0	0	0	0	0	0	0	0	0	0	2088	1693	2640	1619	633	1362	37	0	7
JVC	0	0	13	22	0	7	36	132	199	534	112	5	248	57	19	253	26	19	20
Jabra	0	0	0	0	0	0	84	0	0	0	16	1515	826	2100	2577	262	21	16	0
Kensington	0	0	0	0	13	27	0	5	77	0	5	176	0	178	127	78	18	10	7
Kodak	0	175	10	88	515	886	238	508	644	1484	2316	998	586	5	95	124	29	0	0
Koolertron	0	0	0	0	0	0	0	0	0	0	0	13	13	23	65	180	34	16	0
LSS	0	0	0	0	0	0	0	0	0	0	0	0	0	1598	128	59	111	144	0
Linksys	0	0	0	993	731	0	208	422	3013	1670	441	0	0	810	0	0	0	0	0
Logitech	0	0	24	0	0	0	133	4520	5990	913	5548	9649	1270	429	581	82	33	31	0
Mpow	0	0	0	0	0	0	0	0	0	0	0	0	0	2868	14525	32	33	0	52
Neewer	0	0	0	0	0	0	0	0	0	0	0	3677	12	0	275	2350	328	55	0
Nikon	32	0	0	56	0	351	452	0	325	491	1692	1089	98	411	219	1199	105	11	8
Olympus	0	0	72	184	138	194	334	124	564	201	0	194	559	0	831	235	15	8	0
Panasonic	0	19	0	0	18	190	4319	315	119	194	313	691	6	322	0	111	383	349	0
Philips	11	40	0	0	0	405	307	359	25	497	594	960	360	1444	242	1283	80	21	30
Plemo	0	0	0	0	0	0	0	0	0	0	496	821	1061	0	0	0	7	0	0
Polaroid	23	0	0	22	0	0	0	0	0	274	264	21	2702	57	121	2366	49	17	10
Pyle	0	0	567	0	0	0	0	587	1807	161	737	1424	1787	3079	1085	320	25	27	0
Samsung	0	0	0	0	5	0	21	7	243	59	61	227	4035	1286	727	326	48	6	0
Savage	0	0	0	0	0	0	0	0	236	0	11	0	632	350	212	97	39	100	72
Sennheiser	0	0	0	266	4002	3353	42	0	921	55	1116	46	1694	1417	211	103	66	5	25
Skullcandy	0	0	0	0	0	0	0	0	0	0	0	3440	348	3335	2580	301	0	10	0
Sony	0	360	70	170	185	69	28	629	397	1074	593	9419	1705	1956	2370	971	223	56	85
TaoTronics	0	0	0	0	0	0	0	0	0	0	0	463	298	5897	5163	304	0	0	0
Tiamat	0	0	0	0	0	0	0	0	0	0	0	35	306	198	870	329	0	0	0
Toshiba	0	29	0	26	37	16	26	64	134	726	0	6	243	80	502	119	0	0	0
Uniden	0	0	0	0	0	0	0	0	0	188	0	384	567	1834	559	795	216	152	6
ViewSonic	0	0	0	0	0	0	0	0	11	34	62	194	1345	1572	37	0	6	0	7
Vivitar	0	0	0	32	0	19	0	0	0	13	53	34	0	50	307	195	49	15	7
XShields	0	0	0	0	0	0	0	0	0	0	0	0	0	514	913	205	63	14	0
ebasy	0	0	0	0	0	0	0	0	0	0	0	217	164	365	684	473	353	9	9
iRULU	0	0	0	0	0	0	0	0	0	0	0	34	0	151	582	83	0	0	0

In **2014** and **2015**, the sales trend for the **Mpow** and **Bose** brands increased drastically from previous years. In 2011, **Sony** became the best-selling brand and in 2012 it was taken over by **Logitech**.

User Segmentation

What is the distribution of consumer gender across the entire dataset? Can you identify and segment users based on model or category preferences?

Distribution of Consument Gender

Male — 50.2%
Female — 49.8%

User Segmentation by Model Attribute

Model Attribute	Female (user_attr)	Male (user_attr)
Female	34259	31587
Female&Male	26478	24930
Male	25963	30907

User Segmentation by Category

Category	Male	Female
Accessories & Supplies	10922	9610
Camera & Photo	12920	13452
Car Electronics & GPS	2164	1490
Computers & Accessories	22407	22613
Headphones	24566	24298
Home Audio	1770	1284
Portable Audio & Video	8884	9961
Security & Surveillance	869	812
Television & Video	2133	1869
Wearable Technology	789	1311

The consumer gender distribution is nearly equal, with males accounting for **50.2%** and females for **49.8%**. Based on the model, the highest sales are attributed to the **female** model. Meanwhile, in terms of categories, **headphones** have the highest sales.
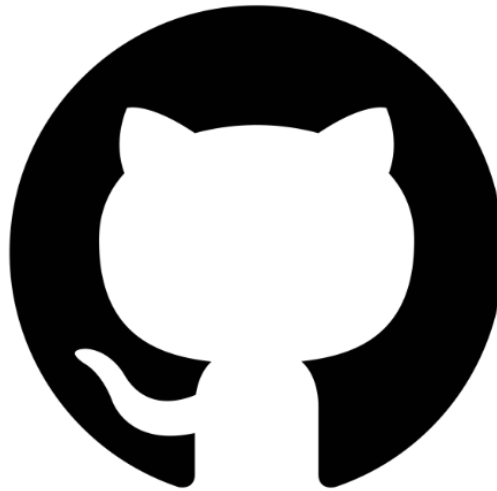
THANK YOU!!!

REACH ME OUT ON:

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