

	Invoice	StockCode	Description	Quantity	InvoiceDate	Price	Customer ID	Country
0	489434	85048	15CM CHRISTMAS GLASS BALL 20 LIGHTS	12	2009-12-01 07:45:00	6.95	13085.0	United Kingdom
1	489434	79323P	PINK CHERRY LIGHTS	12	2009-12-01 07:45:00	6.75	13085.0	United Kingdom
2	489434	79323W	WHITE CHERRY LIGHTS	12	2009-12-01 07:45:00	6.75	13085.0	United Kingdom
3	489434	22041	RECORD FRAME 7" SINGLE SIZE	48	2009-12-01 07:45:00	2.10	13085.0	United Kingdom
4	489434	21232	STRAWBERRY CERAMIC TRINKET BOX	24	2009-12-01 07:45:00	1.25	13085.0	United Kingdom

### Displaying data head

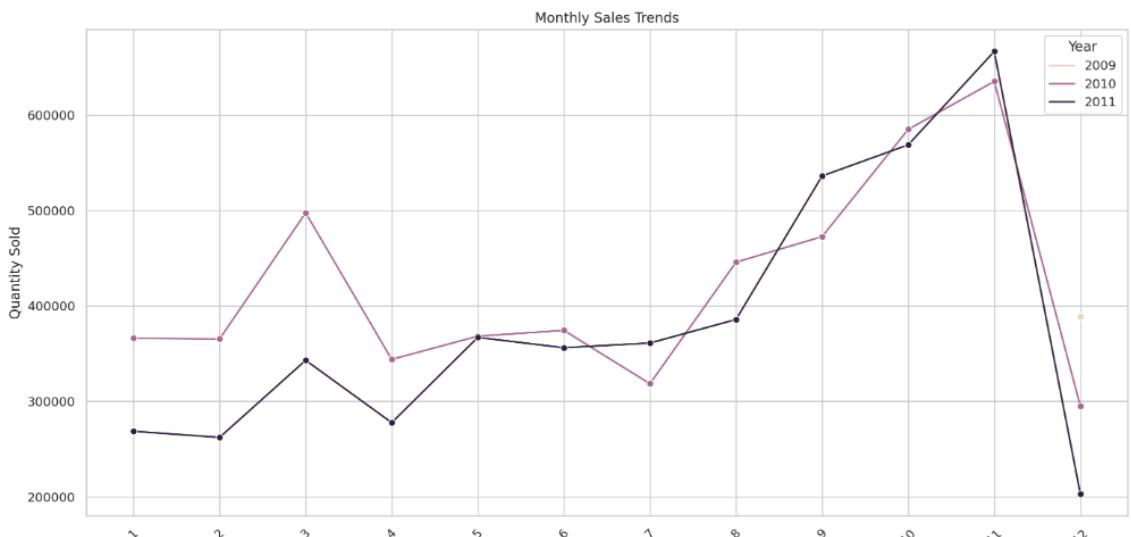
	Invoice	StockCode	Description	Quantity	InvoiceDate	Price	Customer ID	Country
count	525461.0	525461		522533	525461.000000		417534.000000	525461
unique	28816.0	4632		4681	NaN		NaN	40
top	537434.0	85123A	WHITE HANGING HEART T-LIGHT HOLDER	NaN			NaN	United Kingdom
freq	675.0	3516		3549	NaN		NaN	485852
mean	NaN	NaN		NaN	10.337667	2010-06-28 11:37:36.845017856	4.688834	15360.645478
min	NaN	NaN		NaN	-9600.000000	2009-12-01 07:45:00	-53594.360000	12346.000000
25%	NaN	NaN		NaN	1.000000	2010-03-21 12:20:00	1.250000	13983.000000
50%	NaN	NaN		NaN	3.000000	2010-07-06 09:51:00	2.100000	15311.000000
75%	NaN	NaN		NaN	10.000000	2010-10-15 12:45:00	4.210000	16799.000000
max	NaN	NaN		NaN	19152.000000	2010-12-09 20:01:00	25111.090000	18287.000000
std	NaN	NaN		NaN	107.424110		146.126914	1680.811316

### Data Description

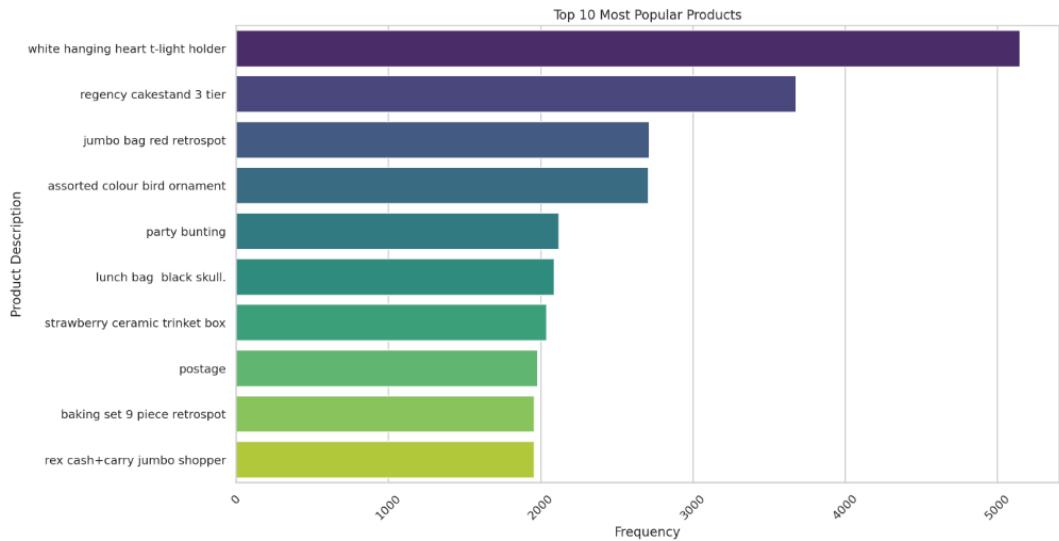
Head of the cleaned DataFrame:

	Invoice	StockCode	Description	Quantity	InvoiceDate	Price	Customer ID	Country
0	489434	85048	15CM CHRISTMAS GLASS BALL 20 LIGHTS	12	2009-12-01 07:45:00	6.95	13085.0	United Kingdom
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4	489434	21232	STRAWBERRY CERAMIC TRINKET BOX	24	2009-12-01 07:45:00	1.25	13085.0	United Kingdom

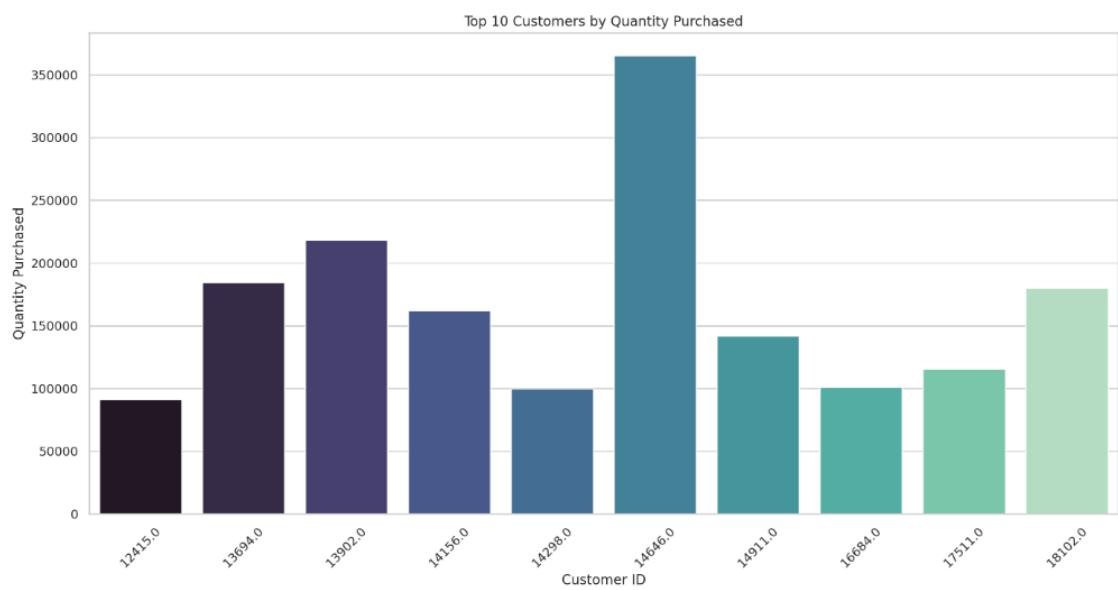
### Cleaned Data



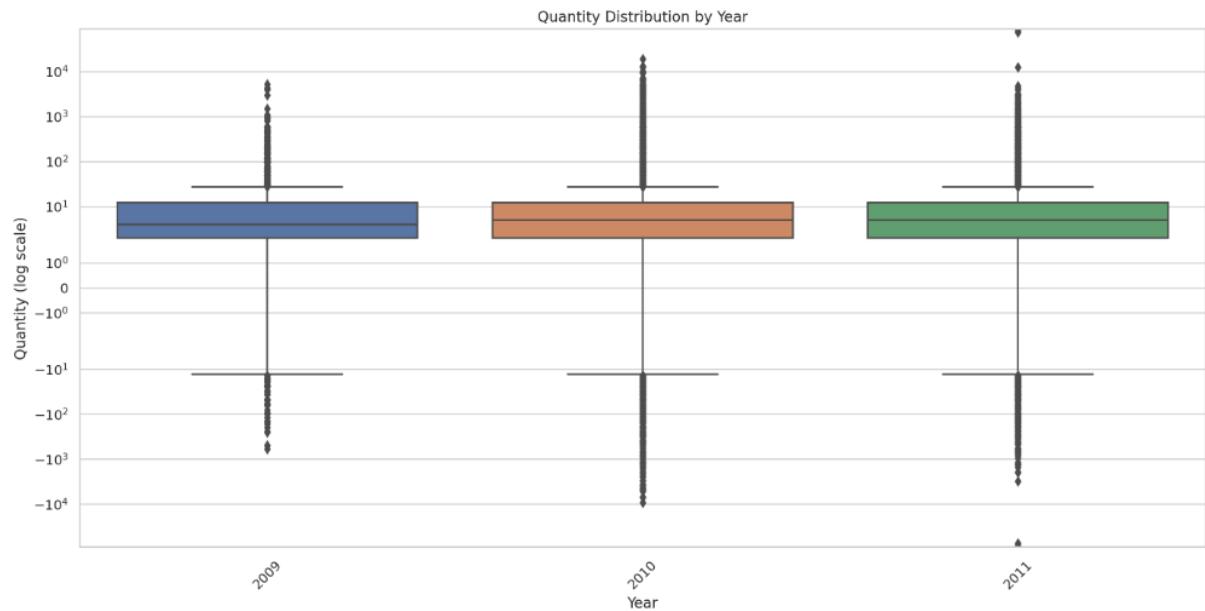
### Monthly Sales Trend



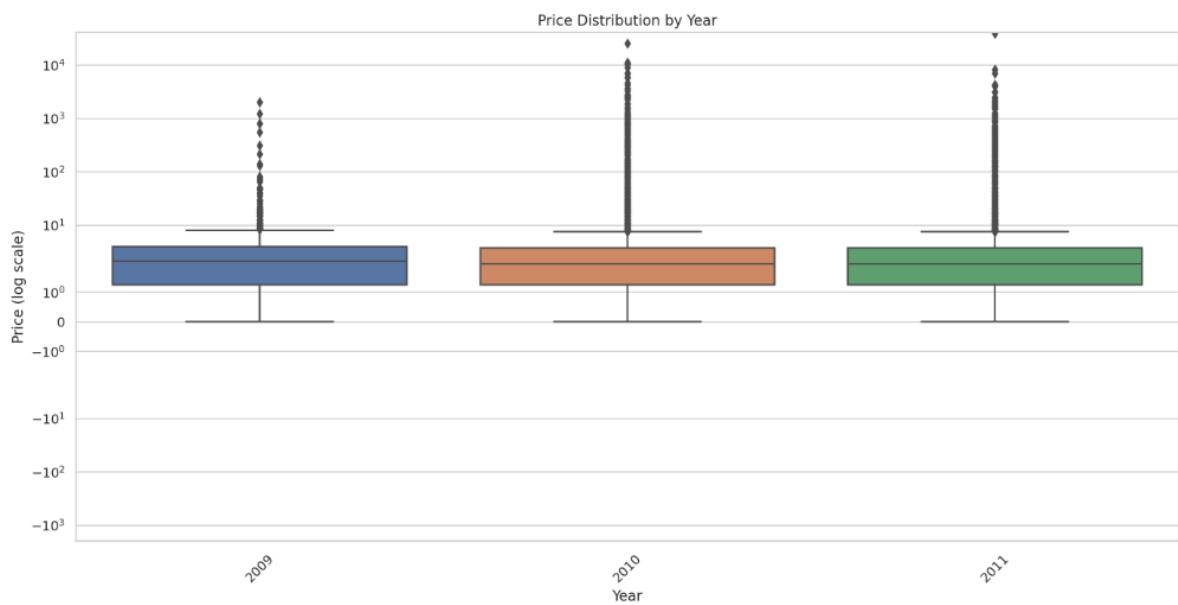
### Top 10 Popular Products



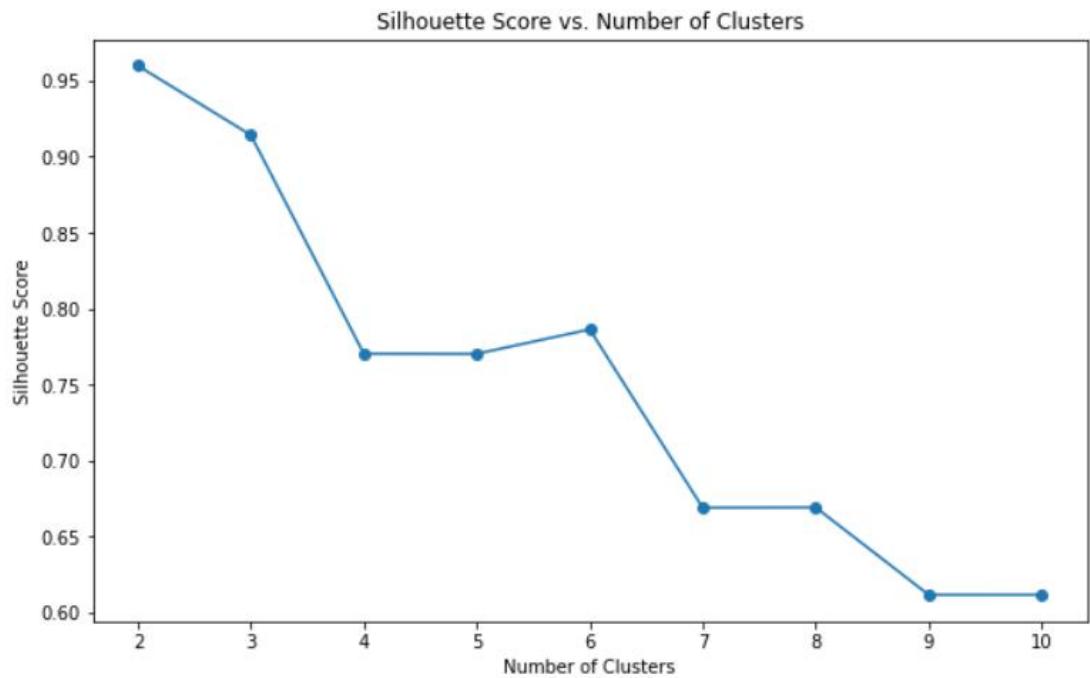
### Top 10 Customer by Quantity Purchased



**Quantity Distribution by Year**



**Price Distribution by Year**



**Silhouette Score vs. No. of Clusters**

Clipboard    Font    Alignment    Number

L1 Cluster

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	CustomerID	NumberOfTrans	TotalQuantity	TotalSpent	Cluster			CustomerID	NumberOfTrans	TotalQuantity	TotalSpent	Cluster	
2	12346	11	70	372.86	0			12748	144	13362	22879.66	1	
3	12347	2	828	1323.32	0			12931	42	34902	50291.38	1	
4	12348	1	373	222.16	0			13089	109	29164	57912.03	1	
5	12349	3	993	2671.14	0			13687	1	87167	11880.84	1	
6	12351	1	261	300.93	0			13694	94	125893	131443.2	1	
7	12352	2	188	343.8	0			13902	5	220600	34095.26	1	
8	12353	1	192	317.76	0			14156	102	108107	196566.7	1	
9	12355	1	303	488.21	0			14277	6	87830	13009.61	1	
10	12356	3	1826	3562.25	0			14298	38	41929	39667.19	1	
11	12357	2	3879	12079.99	0			14606	102	9411	18704.41	1	
12	12358	3	831	2719.01	0			14646	78	170342	248396.5	1	
13	12359	6	1130	2563.36	0			14911	205	69722	152147.6	1	
14	12360	5	1294	1590.83	0			15061	86	51791	83284.38	1	
15	12361	3	144	321.35	0			15311	121	32816	56003.26	1	
16	12362	1	1	130	0			16422	59	32665	28967.07	1	
17	12366	1	296	500.24	0			16684	27	54555	80489.21	1	
18	12368	1	330	917.7	0			16754	29	63551	65500.07	1	
19	12369	3	1241	1791.15	0			17511	31	55107	84541.17	1	
20	12370	3	252	774.62	0			17841	91	14487	29892.5	1	
21	12371	3	845	2179.42	0			17850	155	21052	51208.87	1	
22	12373	2	319	763.05	0			17940	6	75825	26286.75	1	
23	12374	3	1020	2246.29	0			17949	74	30112	60117.6	1	
24	12376	2	240	503.15	0			18102	89	124216	349164.4	1	
25	12377	2	1161	1798.2	0								
26	12378	1	787	1407.7	0								
27	12379	2	408	767.98	0								
28	12380	7	2220	6051.40	0								

< > customer\_segmentation +

Customer segmentation into cluster's '0' and '1'