

Assignment 3 – Individual Assignment

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This document shows the graphs created I R Studio. The .R document has explanations for most graphs.

1) Univariate non-graphical EDA: Categorical data

Simple tabulation of marital status (see R sheet for code). This shows proportion of dataset that are married, divorced etc. (all results total to 1)

	Absurd	Alone	Divorced	Married	Single	Together
Widow	YOLO					
	0.0009025271	0.0013537906	0.1046931408	0.3867328520	0.2125451264	0.2585740072
	0.0342960289	0.0009025271				

Simple tabulation Education (see R sheet for code). This shows proportion of dataset that are education e.g. basic, graduation, masters and PHD etc. (all results total to 1)

2n Cycle	Basic	Graduation	Master	PhD
0.09025271	0.02436823	0.50361011	0.16471119	0.21705776
0	1			
0.990523466	0.009476534			

2) Univariate non-graphical EDA: quantitative data

We can see results such as the mean of a quantitative variable. In this example, we are exploring Income.

Code: `summary(marketing$Income)`

3)	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
4)	1730	35303	51382	52247	68522	666666

Code: `describe(marketing$Income)`

Description:df [1 × 13]

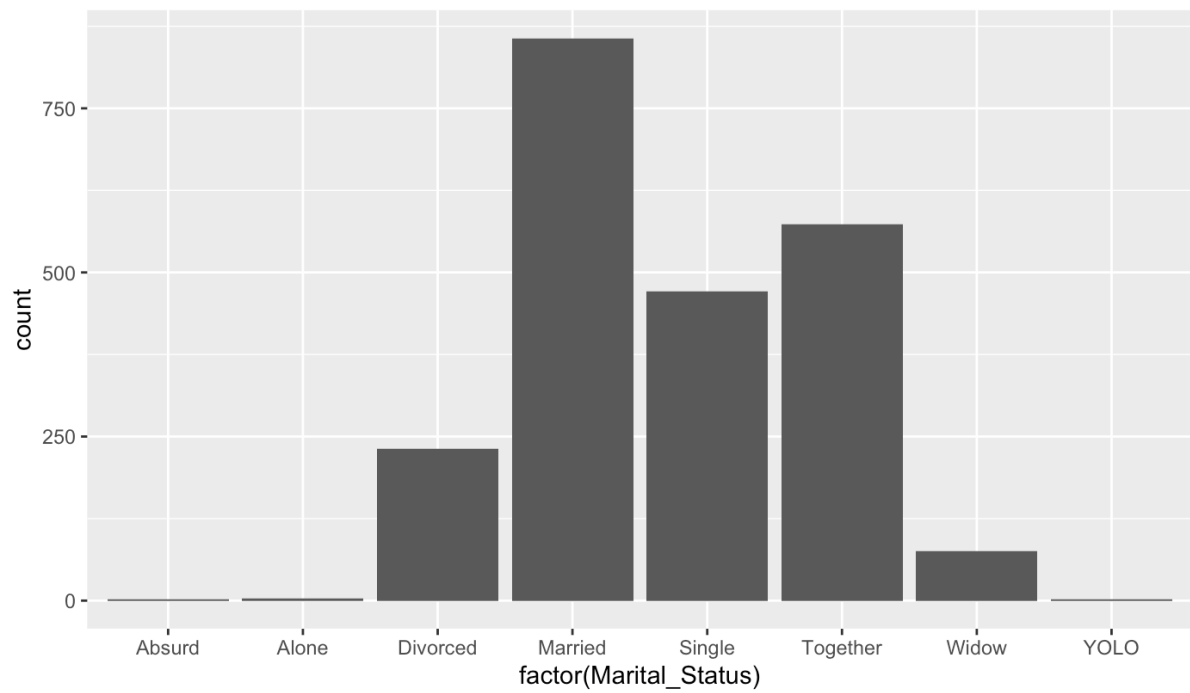
	vars	n	mean	sd	median	trimmed
	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
X1	1	2216	52247.25	25173.08	51381.5	51763.99

1 row | 1-10 of 13 columns

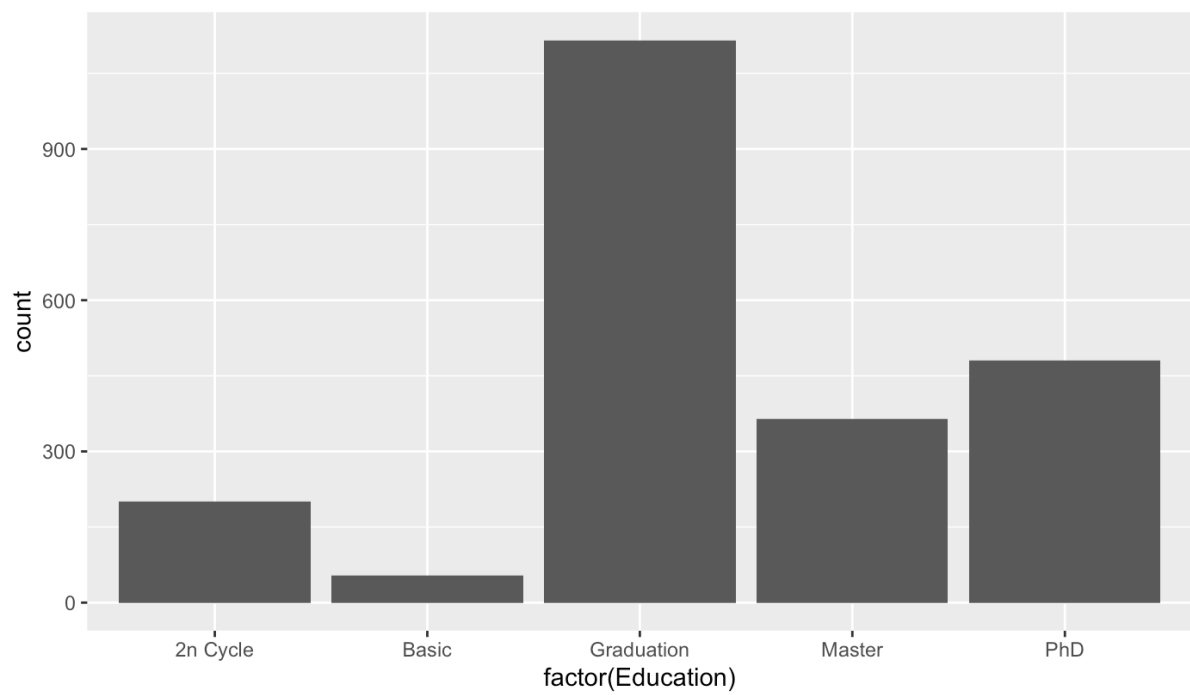
5) Univariate graphical EDA: categorical data

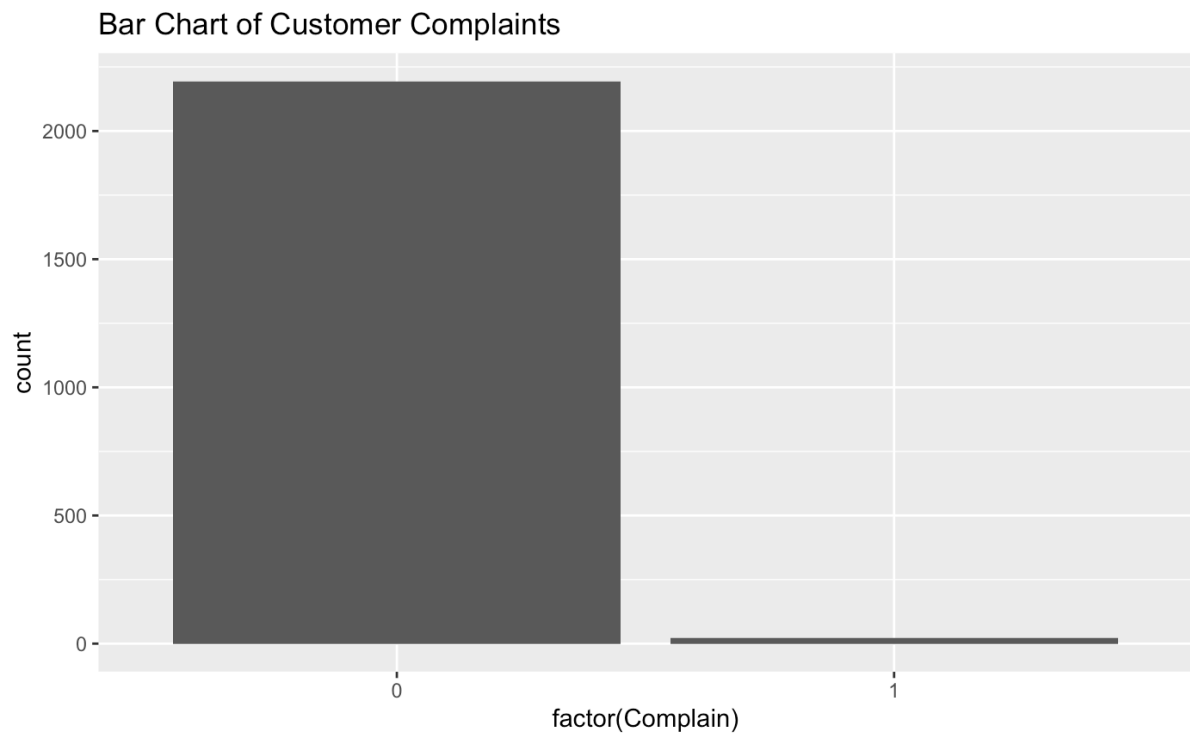
Graphs allow us to understand data more easily as it visually represents the variable.

Bar Chart of Marital Status



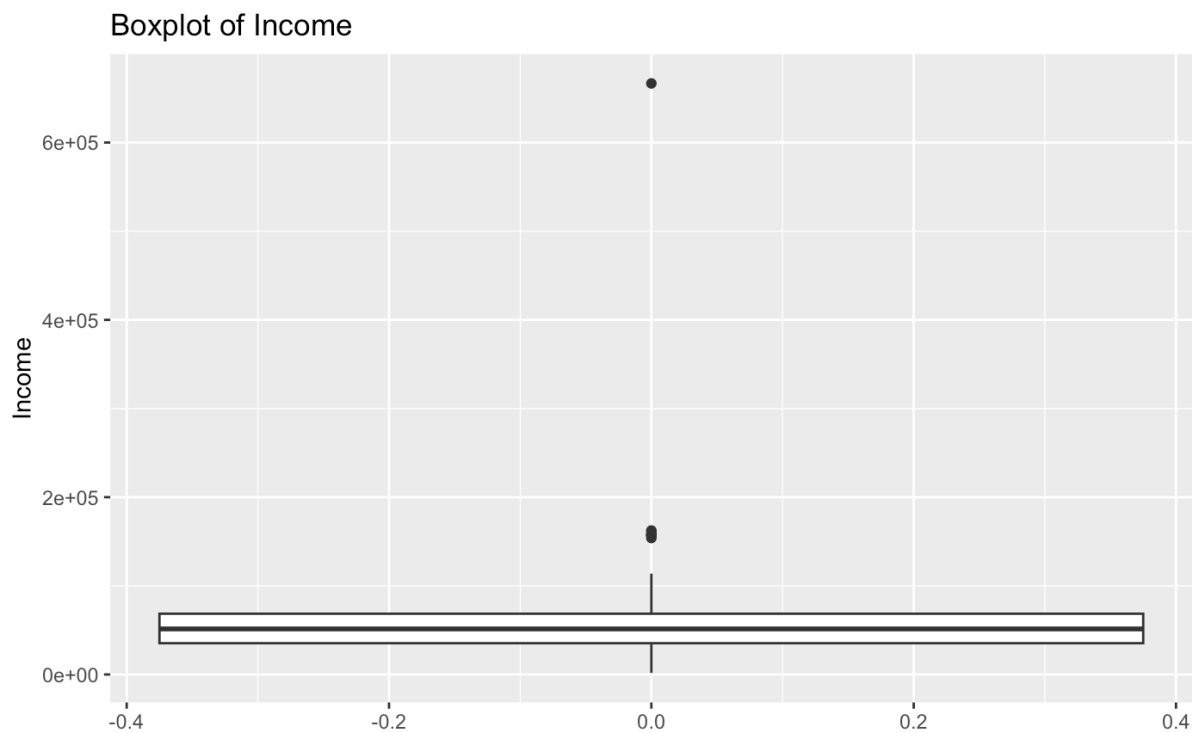
Bar Chart of Education Levels

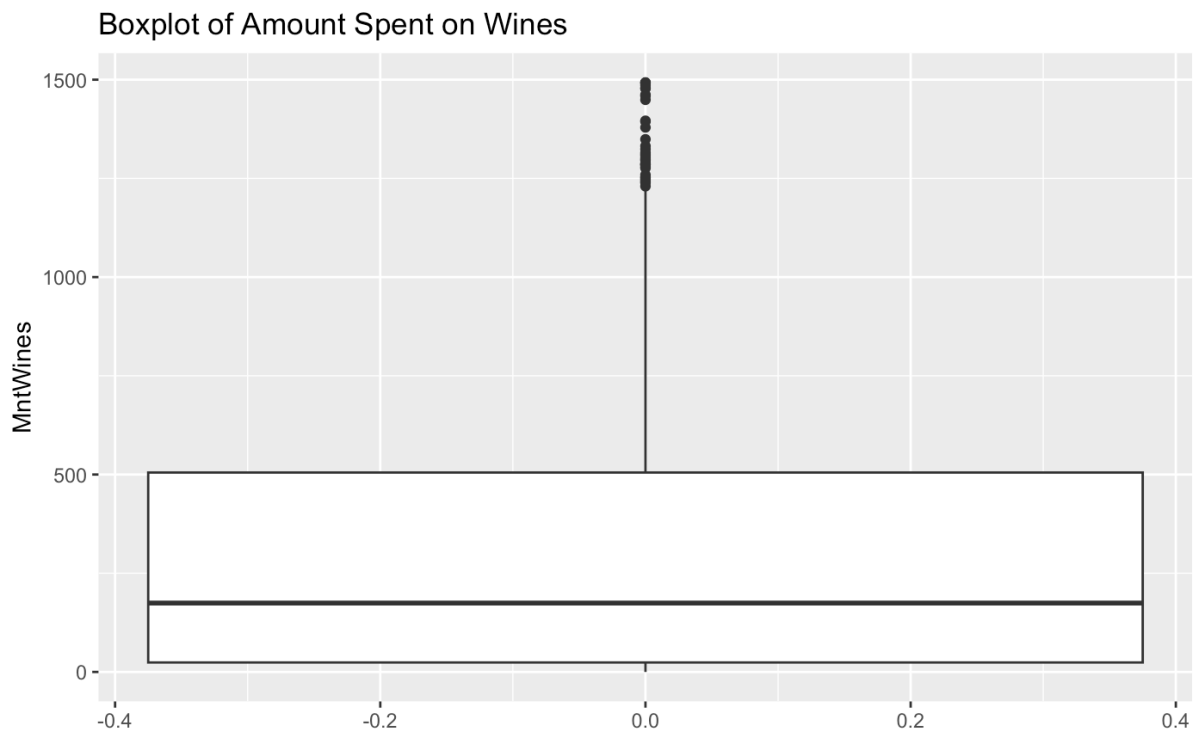




6) Univariate graphical EDA: quantitative data

Box and scatter plots show outliers and the relationship between two variables if more than two variables are used. Further analysis of the data is found in the R Sheet.





7) Multivariate non-graphical EDA: cross-tabulation for categorical variables

Cross-tabulation for 'Education' and 'Complain' variables. It allows us to the number of individuals out of the total in the dataset who are for example masters, phd or basic education level holders.

```
table(marketing$Education, marketing$Complain)
```

	0	1
2n Cycle	196	4
Basic	54	0
Graduation	1102	14
Master	363	2
PhD	480	1

8) Multivariate non-graphical EDA: Covariance and correlation for two quantitative variables

This shows how strongly variables in a dataset are correlated. I have used three different examples below:

Codes:

```
print(cov(marketing$Income, marketing$NumWebVisitsMonth))
print(cor(marketing$Income, marketing$NumWebVisitsMonth))
```

```
print(cov(marketing$Income, marketing$NumStorePurchases))
print(cor(marketing$Income, marketing$NumStorePurchases))
```

```
print(cov(marketing$MntWines, marketing$NumStorePurchases))
print(cor(marketing$MntWines, marketing$NumStorePurchases))
```

```
results:
[1] -33768.09
[1] -0.553088
[1] 43318.9
[1] 0.5293621
[1] 701.8246
[1] 0.6400119
```

MntWines and NumStorePurchases are most strongly correlated ($r = 0.6400119$) compared to the other variables.

Multivariate non-graphical EDA: Covariance and correlation for more than two quantitative variables - I have chosen all numeric variables in the marketing dataset.

The below code finds the covariance and correlation among all numeric variables in the dataset.

```
cov_matrix <- cov(marketing[, sapply(marketing, is.numeric)])
print(cov_matrix)
```

```
cor_matrix <- cor(marketing[, sapply(marketing, is.numeric)])
print(cor_matrix)
```



	ID	Year_Birth	Income	Kidhome	Teenhome	Recency	MntWines	MntFruits
ID	1.055845e+07	9.172579e+01	1.071169e+06	3.028930e+00	-5.357445e+00	-4.174185e+03	-2.310976e+04	9.473270e+02
Year_Birth	9.172579e+01	1.436535e+02	-4.881462e+04	1.503310e+00	-2.287966e+00	-5.653712e+00	-6.446707e+02	-8.464241e+00
Income	1.071169e+06	-4.881462e+04	6.336838e+08	-5.793603e+03	2.621027e+02	-2.892837e+03	4.913652e+06	4.315893e+05
Kidhome	3.028930e+00	1.503310e+00	-5.793603e+03	2.882576e-01	-1.164851e-02	1.786140e-01	-9.007254e+01	-7.977684e+00
Teenhome	-5.357445e+00	-2.287966e+00	2.621027e+02	-1.164851e-02	2.961332e-01	2.179902e-01	6.877656e-01	-3.823374e+00
Recency	-4.174185e+03	-5.653712e+00	-2.892837e+03	1.786140e-01	2.179902e-01	8.380071e+02	1.535171e+02	-6.731815e+00
MntWines	-2.310976e+04	-6.446707e+02	4.913652e+06	-9.007254e+01	6.877656e-01	1.535171e+02	1.137901e+05	5.195253e+03
MntFruits	9.473270e+02	-8.464241e+00	4.315893e+05	-7.977684e+00	-3.823374e+00	-6.731815e+00	5.195253e+03	1.583556e+03
MntMeatProducts	-4.301363e+03	-9.058222e+01	3.300781e+06	-5.289437e+01	-3.187018e+01	1.461987e+02	4.303825e+04	4.889373e+03
MntFishProducts	-4.268427e+03	-2.652832e+01	6.048869e+05	-1.143171e+01	6.115193e+00	8.732037e-01	7.345672e+03	1.292967e+03

MntSweetProducts	-7.922359e+02	-9.946052e+00	4.556893e+05	-8.336016e+00	-
	3.644400e+00	2.985471e+01	5.407866e+03	9.342430e+02	
MntGoldProds	-1.880985e+03	-3.987532e+01	4.251102e+05	-9.876741e+00	-
	5.607598e-01	2.649344e+01	6.864461e+03	8.175316e+02	
NumDealsPurchases	-2.538575e+02	-1.352697e+00	-4.024231e+03	2.240355e-01	
	4.043419e-01	1.178061e-01	5.766284e+00	-1.029719e+01	
NumWebPurchases	-1.645566e+02	-5.028016e+00	2.676286e+04	-5.474030e-01	
	2.417501e-01	-4.475793e-01	5.120301e+02	3.294434e+01	
NumCatalogPurchases	-2.162818e+01	-4.271300e+00	4.340648e+04	-7.927482e-01	-
	1.794819e-01	2.040276e+00	6.266717e+02	5.663321e+01	
NumStorePurchases	-1.380552e+02	-4.982937e+00	4.331890e+04	-8.750212e-01	
	8.798559e-02	-4.082519e-02	7.018246e+02	5.931107e+01	
NumWebVisitsMonth	-6.142249e+01	3.601796e+00	-3.376809e+04	5.826892e-01	
	1.732151e-01	-1.303356e+00	-2.634234e+02	-4.041342e+01	
AcceptedCmp3	-3.044993e+01	1.933523e-01	-1.063120e+02	2.252243e-03	-
	6.041838e-03	-2.438192e-01	5.413575e+00	1.498710e-01	
AcceptedCmp4	-2.036296e+01	-2.074696e-01	1.215450e+03	-2.277791e-02	
	5.468132e-03	1.331502e-01	3.295845e+01	6.664032e-02	
AcceptedCmp5	-5.976632e+00	3.300030e-02	2.201852e+03	-2.869955e-02	-
	2.703262e-02	-3.632926e-03	4.159149e+01	2.205562e+00	
AcceptedCmp1	-1.450076e+01	-2.821507e-02	1.706909e+03	-2.290463e-02	-
	1.930878e-02	-1.493428e-01	2.903702e+01	1.869725e+00	
AcceptedCmp2	-5.631422e+00	-9.305604e-03	2.547302e+02	-5.080637e-03	-
	9.762776e-04	-4.685806e-03	8.039391e+00	-4.590583e-02	
Complain	1.075466e+01	-3.531753e-02	-6.641277e+01	2.132042e-03	
	1.743935e-04	3.825492e-02	-1.290259e+00	-2.053137e-02	
Response	-2.495876e+01	1.014933e-01	1.197060e+03	-1.495037e-02	-
	2.993375e-02	-2.066911e+00	2.969548e+01	1.741506e+00	
MntMeatProducts MntFishProducts MntSweetProducts MntGoldProds					
NumDealsPurchases	NumWebPurchases				
ID	-4.301363e+03	-4.268427e+03	-7.922359e+02	-1.880985e+03	
	-2.538575e+02	-1.645566e+02			
Year_Birth	-9.058222e+01	-2.652832e+01	-9.946052e+00	-3.987532e+01	
	-1.352697e+00	-5.028016e+00			
Income	3.300781e+06	6.048869e+05	4.556893e+05	4.251102e+05	
	-4.024231e+03	2.676286e+04			
Kidhome	-5.289437e+01	-1.143171e+01	-8.336016e+00	-9.876741e+00	
	2.240355e-01	-5.474030e-01			
Teenhome	-3.187018e+01	-6.115193e+00	-3.644400e+00	-5.607598e-01	
	4.043419e-01	2.417501e-01			
Recency	1.461987e+02	8.732037e-01	2.985471e+01	2.649344e+01	
	1.178061e-01	-4.475793e-01			
MntWines	4.303825e+04	7.345672e+03	5.407866e+03	6.864461e+03	
	5.766284e+00	5.120301e+02			
MntFruits	4.889373e+03	1.292967e+03	9.342430e+02	8.175316e+02	
	-1.029719e+01	3.294434e+01			
MntMeatProducts	5.030299e+04	7.043475e+03	4.929552e+03	4.177244e+03	
	-5.233909e+01	1.887836e+02			
MntFishProducts	7.043475e+03	2.997791e+03	1.312988e+03	1.211803e+03	
	-1.508722e+01	4.497494e+01			
MntSweetProducts	4.929552e+03	1.312988e+03	1.686913e+03	7.607121e+02	
	-9.594450e+00	3.759347e+01			
MntGoldProds	4.177244e+03	1.211803e+03	7.607121e+02	2.684837e+03	
	5.173776e+00	5.781290e+01			
NumDealsPurchases	-5.233909e+01	-1.508722e+01	-9.594450e+00	5.173776e+00	
	3.700682e+00	1.273069e+00			
NumWebPurchases	1.887836e+02	4.497494e+01	3.759347e+01	5.781290e+01	
	1.273069e+00	7.512813e+00			

NumCatalogPurchases	4.818935e+02	8.537148e+01	5.951876e+01	6.709421e+01
-6.822921e-02	3.103465e+00			
NumStorePurchases	3.543450e+02	8.147278e+01	6.078002e+01	6.555380e+01
4.134032e-01	4.599825e+00			
NumWebVisitsMonth	-2.934619e+02	-5.928208e+01	-4.207423e+01	-3.112751e+01
1.614558e+00	-3.405414e-01			
AcceptedCmp3	1.079757e+00	-3.130730e-03	1.909364e-02	1.690593e+00
-1.162060e-02	3.074398e-02			
AcceptedCmp4	5.380436e+00	2.308929e-01	3.152431e-01	3.258233e-01
8.097889e-03	1.169357e-01			
AcceptedCmp5	2.200752e+01	2.798060e+00	2.772154e+00	2.447237e+00
-9.228716e-02	1.007599e-01			
AcceptedCmp1	1.719981e+01	3.508558e+00	2.465869e+00	2.159338e+00
-6.002029e-02	1.069476e-01			
AcceptedCmp2	1.128272e+00	1.484015e-02	4.836730e-02	3.038566e-01
-8.445453e-03	1.103446e-02			
Complain	-5.168915e-01	-1.125916e-01	-9.011580e-02	-1.563297e-01
9.269748e-05	-4.420345e-03			
Response	1.905840e+01	2.116328e+00	1.705365e+00	2.598903e+00
2.372852e-03	1.483516e-01			

	NumCatalogPurchases	NumStorePurchases	NumWebVisitsMonth	
AcceptedCmp3	AcceptedCmp4	AcceptedCmp5	AcceptedCmp1	
ID	-2.162818e+01	-1.380552e+02	-6.142249e+01	-
3.044993e+01	-2.036296e+01	-5.976632e+00	-1.450076e+01	
Year_Birth	-4.271300e+00	-4.982937e+00	3.601796e+00	
1.933523e-01	-2.074696e-01	3.300030e-02	-2.821507e-02	
Income	4.340648e+04	4.331890e+04	-3.376809e+04	-
1.063120e+02	1.215450e+03	2.201852e+03	1.706909e+03	
Kidhome	-7.927482e-01	-8.750212e-01	5.826892e-01	
2.252243e-03	-2.277791e-02	-2.869955e-02	-2.290463e-02	
Teenhome	-1.794819e-01	8.798559e-02	1.732151e-01	-
6.041838e-03	5.468132e-03	-2.703262e-02	-1.930878e-02	
Recency	2.040276e+00	-4.082519e-02	-1.303356e+00	-
2.438192e-01	1.331502e-01	-3.632926e-03	-1.493428e-01	
MntWines	6.266717e+02	7.018246e+02	-2.634234e+02	
5.413575e+00	3.295845e+01	4.159149e+01	2.903702e+01	
MntFruits	5.663321e+01	5.931107e+01	-4.041342e+01	
1.498710e-01	6.664032e-02	2.205562e+00	1.869725e+00	
MntMeatProducts	4.818935e+02	3.543450e+02	-2.934619e+02	
1.079757e+00	5.380436e+00	2.200752e+01	1.719981e+01	
MntFishProducts	8.537148e+01	8.147278e+01	-5.928208e+01	-
3.130730e-03	2.308929e-01	2.798060e+00	3.508558e+00	
MntSweetProducts	5.951876e+01	6.078002e+01	-4.207423e+01	
1.909364e-02	3.152431e-01	2.772154e+00	2.465869e+00	
MntGoldProds	6.709421e+01	6.555380e+01	-3.112751e+01	
1.690593e+00	3.258233e-01	2.447237e+00	2.159338e+00	
NumDealsPurchases	-6.822921e-02	4.134032e-01	1.614558e+00	-
1.162060e-02	8.097889e-03	-9.228716e-02	-6.002029e-02	
NumWebPurchases	3.103465e+00	4.599825e+00	-3.405414e-01	
3.074398e-02	1.169357e-01	1.007599e-01	1.069476e-01	
NumCatalogPurchases	8.565770e+00	4.926828e+00	-3.705380e+00	
7.973918e-02	1.074272e-01	2.457306e-01	2.215413e-01	
NumStorePurchases	4.926828e+00	1.056760e+01	-3.409166e+00	-
5.849292e-02	1.515292e-01	1.802434e-01	1.423291e-01	
NumWebVisitsMonth	-3.705380e+00	-3.409166e+00	5.882364e+00	
3.882435e-02	-1.820456e-02	-1.754786e-01	-1.157129e-01	
AcceptedCmp3	7.973918e-02	-5.849292e-02	3.882435e-02	
6.817624e-02	-5.446130e-03	5.455501e-03	6.119663e-03	

AcceptedCmp4		1.074272e-01	1.515292e-01	-1.820456e-02 -
5.446130e-03	6.856109e-02	2.122385e-02	1.557155e-02	
AcceptedCmp5		2.457306e-01	1.802434e-01	-1.754786e-01
5.455501e-03	2.122385e-02	6.779099e-02	2.601315e-02	
AcceptedCmp1		2.215413e-01	1.423291e-01	-1.157129e-01
6.119663e-03	1.557155e-02	2.601315e-02	6.000033e-02	
AcceptedCmp2		3.380096e-02	3.204073e-02	-2.063792e-03
2.164028e-03	8.929925e-03	6.684812e-03	5.001182e-03	
Complain		-5.910432e-03	-5.336726e-03	4.650154e-03
2.055643e-04	-7.016486e-04	-2.416246e-04	-6.075250e-04	
Response		2.300440e-01	4.210808e-02	-1.914865e-03
2.370468e-02	1.686483e-02	3.009306e-02	2.603230e-02	

	AcceptedCmp2	Complain	Response
ID	-5.631422e+00	1.075466e+01	-2.495876e+01
Year_Birth	-9.305604e-03	-3.531753e-02	1.014933e-01
Income	2.547302e+02	-6.641277e+01	1.197060e+03
Kidhome	-5.080637e-03	2.132042e-03	-1.495037e-02
Teenhome	-9.762776e-04	1.743935e-04	-2.993375e-02
Recency	-4.685806e-03	3.825492e-02	-2.066911e+00
MntWines	8.039391e+00	-1.290259e+00	2.969548e+01
MntFruits	-4.590583e-02	-2.053137e-02	1.741506e+00
MntMeatProducts	1.128272e+00	-5.168915e-01	1.905840e+01
MntFishProducts	1.484015e-02	-1.125916e-01	2.116328e+00
MntSweetProducts	4.836730e-02	-9.011580e-02	1.705365e+00
MntGoldProds	3.038566e-01	-1.563297e-01	2.598903e+00
NumDealsPurchases	-8.445453e-03	9.269748e-05	2.372852e-03
NumWebPurchases	1.103446e-02	-4.420345e-03	1.483516e-01
NumCatalogPurchases	3.380096e-02	-5.910432e-03	2.300440e-01
NumStorePurchases	3.204073e-02	-5.336726e-03	4.210808e-02
NumWebVisitsMonth	-2.063792e-03	4.650154e-03	-1.914865e-03
AcceptedCmp3	2.164028e-03	2.055643e-04	2.370468e-02
AcceptedCmp4	8.929925e-03	-7.016486e-04	1.686483e-02
AcceptedCmp5	6.684812e-03	-2.416246e-04	3.009306e-02
AcceptedCmp1	5.001182e-03	-6.075250e-04	2.603230e-02
AcceptedCmp2	1.336066e-02	-1.283504e-04	6.994076e-03
Complain	-1.283504e-04	9.390967e-03	-7.028710e-05
Response	6.994076e-03	-7.028710e-05	1.277471e-01



	ID	Year_Birth	Income	Kidhome
Teenhome	Recency	MntWines	MntFruits	
ID	1.000000000	0.002355230	0.013095483	0.001736197 -
0.003029801	-0.0443759646	-0.021083523	0.007326275	
Year_Birth	0.002355230	1.000000000	-0.161791428	0.233614617 -
0.350790573	-0.0162948997	-0.159451096	-0.017746520	
Income	0.013095483	-0.161791428	1.000000000	-0.428669008
0.019133378	-0.0039697555	0.578649750	0.430841681	
Kidhome	0.001736197	0.233614617	-0.428669008	1.000000000 -
0.039869095	0.0114921489	-0.497335858	-0.373396102	
Teenhome	-0.003029801	-0.350790573	0.019133378	-0.039869095
1.000000000	0.0138378832	0.003746663	-0.176557638	
Recency	-0.044375965	-0.016294900	-0.003969756	0.011492149
0.013837883	1.0000000000	0.015721019	-0.005843750	
MntWines	-0.021083523	-0.159451096	0.578649750	-0.497335858
0.003746663	0.0157210194	1.000000000	0.387023861	
MntFruits	0.007326275	-0.017746520	0.430841681	-0.373396102 -
0.176557638	-0.0058437499	0.387023861	1.000000000	

MntMeatProducts	-0.005902136	-0.033696745	0.584633357	-0.439260529	-
0.261122385	0.0225176351	0.568860003	0.547822166		
MntFishProducts	-0.023992041	-0.040425084	0.438871359	-0.388884220	-
0.205241867	0.0005509232	0.397721050	0.593431050		
MntSweetProducts	-0.005936196	-0.020204415	0.440743792	-0.378026128	-
0.163055777	0.0251097703	0.390325802	0.571606063		
MntGoldProds	-0.011171885	-0.064207693	0.325916446	-0.355029425	-
0.019887234	0.0176626377	0.392730993	0.396486924		
NumDealsPurchases	-0.040611507	-0.058668051	-0.083100896	0.216913048	
0.386246304	0.0021154508	0.008885929	-0.134512099		
NumWebPurchases	-0.018476253	-0.153051375	0.387877811	-0.371976549	
0.162077185	-0.0056408538	0.553785939	0.302038849		
NumCatalogPurchases	-0.002274242	-0.121763972	0.589162442	-0.504500622	-
0.112692198	0.0240814076	0.634752741	0.486263071		
NumStorePurchases	-0.013069664	-0.127890722	0.529362140	-0.501348810	
0.049737024	-0.0004338266	0.640011908	0.458491031		
NumWebVisitsMonth	-0.007793839	0.123903937	-0.553088012	0.447476941	
0.131240022	-0.0185636434	-0.321977901	-0.418728932		
AcceptedCmp3	-0.035889694	0.061783800	-0.016174440	0.016066022	-
0.042521542	-0.0322572663	0.061463221	0.014423960		
AcceptedCmp4	-0.023933266	-0.066108524	0.184400368	-0.162025971	
0.038375728	0.0175662589	0.373143336	0.006395603		
AcceptedCmp5	-0.007064323	0.010574840	0.335943266	-0.205304601	-
0.190791330	-0.0004819997	0.473550447	0.212871075		
AcceptedCmp1	-0.018218551	-0.009610507	0.276819864	-0.174163083	-
0.144855350	-0.0210612209	0.351417108	0.191815763		
AcceptedCmp2	-0.014993538	-0.006716956	0.087544774	-0.081867930	-
0.015520861	-0.0014003821	0.206184929	-0.009980152		
Complain	0.034154007	-0.030407247	-0.027224512	0.040977949	
0.003306980	0.0136366703	-0.039470211	-0.005324099		
Response	-0.021490550	0.023692120	0.133046664	-0.077908722	-
0.153901199	-0.1997663693	0.246298957	0.122442679		

	MntMeatProducts	MntFishProducts	MntSweetProducts	MntGoldProds
NumDealsPurchases				
ID	-0.005902136	-0.0239920406	-0.005936196	-0.01117189
-0.0406115067	-0.018476253			
Year_Birth	-0.033696745	-0.0404250842	-0.020204415	-0.06420769
-0.0586680509	-0.153051375			
Income	0.584633357	0.4388713595	0.440743792	0.32591645
-0.0831008957	0.387877811			
Kidhome	-0.439260529	-0.3888842203	-0.378026128	-0.35502942
0.2169130476	-0.371976549			
Teenhome	-0.261122385	-0.2052418665	-0.163055777	-0.01988723
0.3862463041	0.162077185			
Recency	0.022517635	0.0005509232	0.025109770	0.01766264
0.0021154508	-0.005640854			
MntWines	0.568860003	0.3977210502	0.390325802	0.39273099
0.0088859288	0.553785939			
MntFruits	0.547822166	0.5934310503	0.571606063	0.39648692
-0.1345120994	0.302038849			
MntMeatProducts	1.000000000	0.5735740153	0.535136109	0.35944628
-0.1213077141	0.307090366			
MntFishProducts	0.573574015	1.0000000000	0.583866955	0.42714204
-0.1432410856	0.299687510			
MntSweetProducts	0.535136109	0.5838669550	1.000000000	0.35744975
-0.1214319277	0.333937217			
MntGoldProds	0.359446281	0.4271420401	0.357449747	1.00000000
0.0519048294	0.407065666			

NumDealsPurchases	-0.121307714	-0.1432410856	-0.121431928	0.05190483
1.0000000000	0.241440318			
NumWebPurchases	0.307090366	0.2996875104	0.333937217	0.40706567
0.2414403183	1.0000000000			
NumCatalogPurchases	0.734126598	0.5327567837	0.495135818	0.44242825
-0.0121184280	0.386867640			
NumStorePurchases	0.486005545	0.4577450432	0.455225164	0.38918017
0.0661065938	0.516240183			
NumWebVisitsMonth	-0.539484417	-0.4464232918	-0.422370804	-0.24769056
0.3460483800	-0.051226263			
AcceptedCmp3	0.018437951	-0.0002189921	0.001780434	0.12495786
-0.0231350800	0.042957829			
AcceptedCmp4	0.091618196	0.0161053845	0.029313012	0.02401509
0.0160765205	0.162932258			
AcceptedCmp5	0.376867118	0.1962774512	0.259229874	0.18139738
-0.1842529426	0.141188891			
AcceptedCmp1	0.313076112	0.2616081098	0.245101963	0.17013156
-0.1273738919	0.159291666			
AcceptedCmp2	0.043521399	0.0023448970	0.010188062	0.05073361
-0.0379811505	0.034828595			
Complain	-0.023781944	-0.0212202304	-0.022641200	-0.03113346
0.0004972467	-0.016641779			
Response	0.237746418	0.1081451099	0.116170373	0.14033164
0.0034510733	0.151431233			

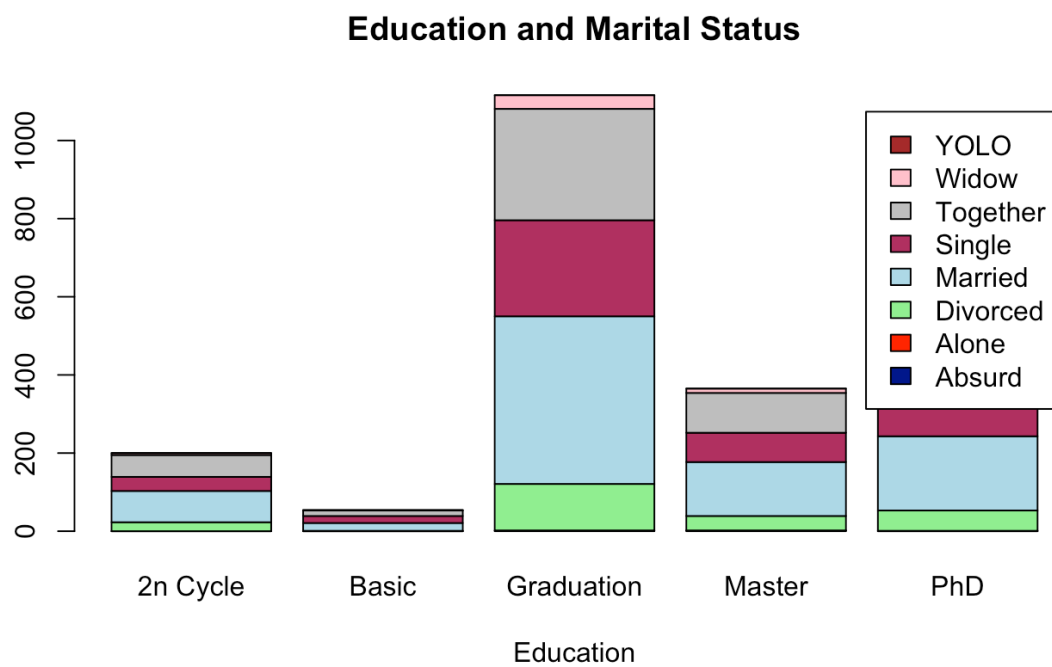
	NumCatalogPurchases	NumStorePurchases	NumWebVisitsMonth	
AcceptedCmp3	AcceptedCmp4	AcceptedCmp5	AcceptedCmp1	
ID		-0.002274242	-0.0130696638	-0.007793839 -
0.0358896940	-0.023933266	-0.0070643232	-0.018218551	
Year_Birth		-0.121763972	-0.1278907218	0.123903937
0.0617838002	-0.066108524	0.0105748401	-0.009610507	
Income		0.589162442	0.5293621403	-0.553088012 -
0.0161744401	0.184400368	0.3359432660	0.276819864	
Kidhome		-0.504500622	-0.5013488097	0.447476941
0.0160660223	-0.162025971	-0.2053046008	-0.174163083	
Teenhome		-0.112692198	0.0497370244	0.131240022 -
0.0425215424	0.038375728	-0.1907913296	-0.144855350	
Recency		0.024081408	-0.0004338266	-0.018563643 -
0.0322572663	0.017566259	-0.0004819997	-0.021061221	
MntWines		0.634752741	0.6400119079	-0.321977901
0.0614632213	0.373143336	0.4735504474	0.351417108	
MntFruits		0.486263071	0.4584910315	-0.418728932
0.0144239596	0.006395603	0.2128710748	0.191815763	
MntMeatProducts		0.734126598	0.4860055453	-0.539484417
0.0184379509	0.091618196	0.3768671185	0.313076112	
MntFishProducts		0.532756784	0.4577450432	-0.446423292 -
0.0002189921	0.016105385	0.1962774512	0.261608110	
MntSweetProducts		0.495135818	0.4552251636	-0.422370804
0.0017804342	0.029313012	0.2592298738	0.245101963	
MntGoldProds		0.442428252	0.3891801722	-0.247690557
0.1249578642	0.024015093	0.1813973755	0.170131561	
NumDealsPurchases		-0.012118428	0.0661065938	0.346048380 -
0.0231350800	0.016076520	-0.1842529426	-0.127373892	
NumWebPurchases		0.386867640	0.5162401827	-0.051226263
0.0429578290	0.162932258	0.1411888909	0.159291666	
NumCatalogPurchases		1.0000000000	0.5178404511	-0.522003774
0.1043450987	0.140181992	0.3224705753	0.309025718	
NumStorePurchases		0.517840451	1.0000000000	-0.432398257 -
0.0689125892	0.178020190	0.2129537102	0.178742890	

NumWebVisitsMonth	-0.522003774	-0.4323982573	1.000000000
0.0613072347	-0.028665890	-0.2778831015	-0.194773181
AcceptedCmp3	0.104345099	-0.0689125892	0.061307235
1.0000000000	-0.079658582	0.0802476149	0.095682869
AcceptedCmp4	0.140181992	0.1780201903	-0.028665890 -
0.0796585824	1.0000000000	0.3113144998	0.242781770
AcceptedCmp5	0.322470575	0.2129537102	-0.277883101
0.0802476149	0.311314500	1.0000000000	0.407877928
AcceptedCmp1	0.309025718	0.1787428896	-0.194773181
0.0956828688	0.242781770	0.4078779280	1.0000000000
AcceptedCmp2	0.099915281	0.0852707767	-0.007361665
0.0717021724	0.295049565	0.2221208209	0.176637073
Complain	-0.020839191	-0.0169407070	0.019785006
0.0081241135	-0.027651942	-0.0095763509	-0.025593647
Response	0.219913612	0.0362411292	-0.002208954
0.2540048632	0.180205293	0.3233738479	0.297344741
	AcceptedCmp2	Complain	Response
ID	-0.014993538	0.0341540067	-0.021490550
Year_Birth	-0.006716956	-0.0304072467	0.023692120
Income	0.087544774	-0.0272245123	0.133046664
Kidhome	-0.081867930	0.0409779490	-0.077908722
Teenhome	-0.015520861	0.0033069800	-0.153901199
Recency	-0.001400382	0.0136366703	-0.199766369
MntWines	0.206184929	-0.0394702112	0.246298957
MntFruits	-0.009980152	-0.0053240986	0.122442679
MntMeatProducts	0.043521399	-0.0237819441	0.237746418
MntFishProducts	0.002344897	-0.0212202304	0.108145110
MntSweetProducts	0.010188062	-0.0226412002	0.116170373
MntGoldProds	0.050733610	-0.0311334593	0.140331644
NumDealsPurchases	-0.037981151	0.0004972467	0.003451073
NumWebPurchases	0.034828595	-0.0166417790	0.151431233
NumCatalogPurchases	0.099915281	-0.0208391906	0.219913612
NumStorePurchases	0.085270777	-0.0169407070	0.036241129
NumWebVisitsMonth	-0.007361665	0.0197850059	-0.002208954
AcceptedCmp3	0.071702172	0.0081241135	0.254004863
AcceptedCmp4	0.295049565	-0.0276519416	0.180205293
AcceptedCmp5	0.222120821	-0.0095763509	0.323373848
AcceptedCmp1	0.176637073	-0.0255936473	0.297344741
AcceptedCmp2	1.0000000000	-0.0114585043	0.169293709
Complain	-0.011458504	1.0000000000	-0.002029294
Response	0.169293709	-0.0020292937	1.000000000

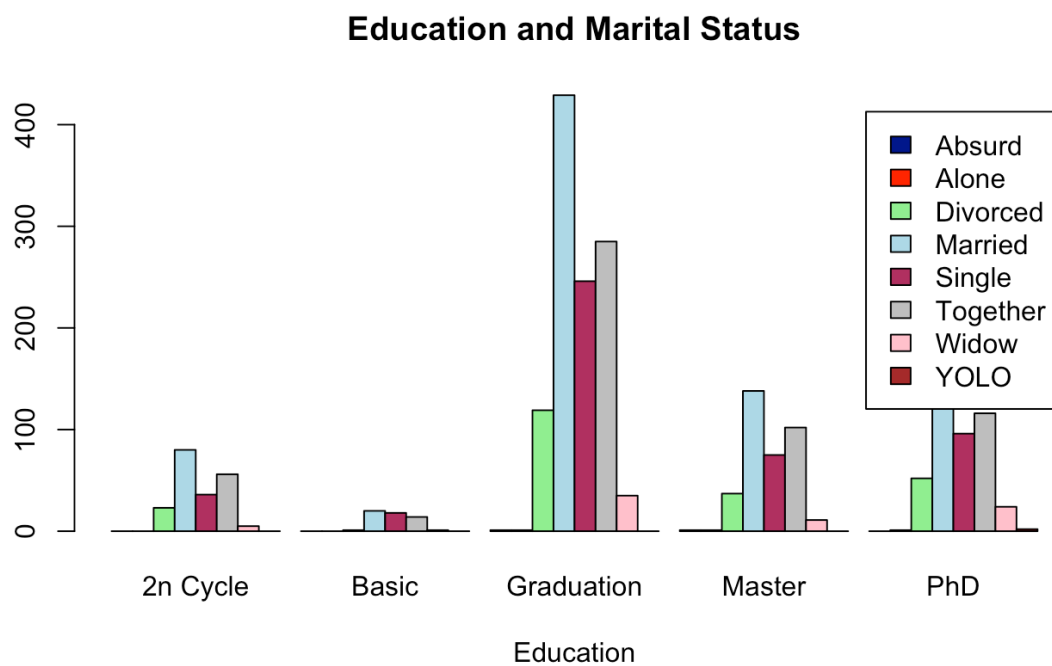
This is useful in helping us see the strength of the correlation of a number of different variables and seeing which are more strongly correlated to further explore whether there is a meaningful relationship.

9) Multivariate graphical EDA: bar plots for categorical variables

Stacked Bar Plot for two categorical variables



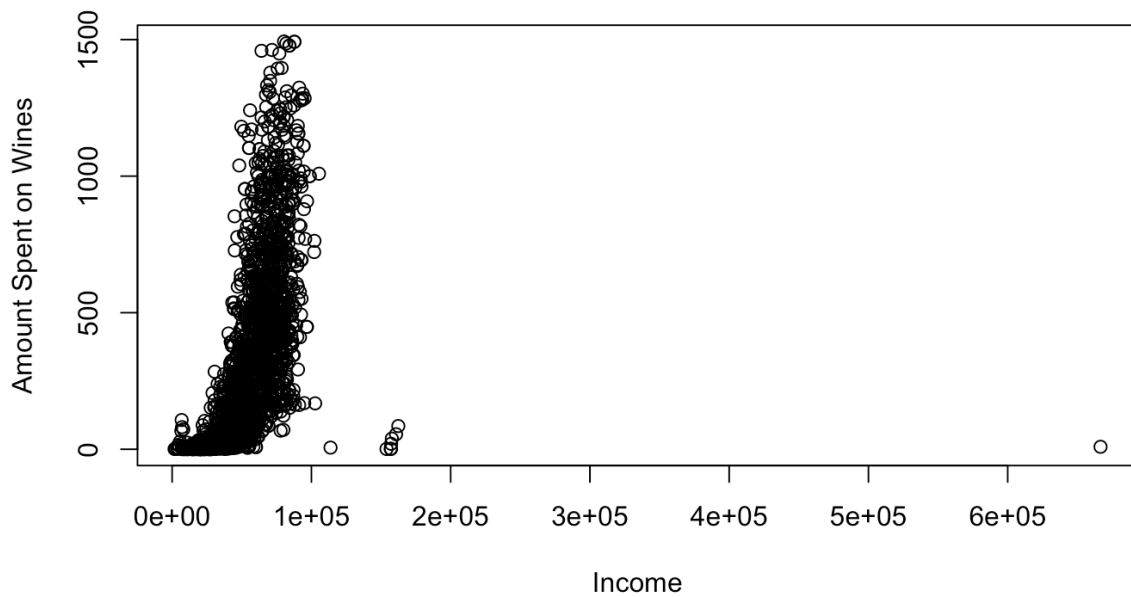
Grouped Bar Plot for two categorical variables



Multivariate graphical EDA: quantitative variables

#scatter plot of two quantitative variables

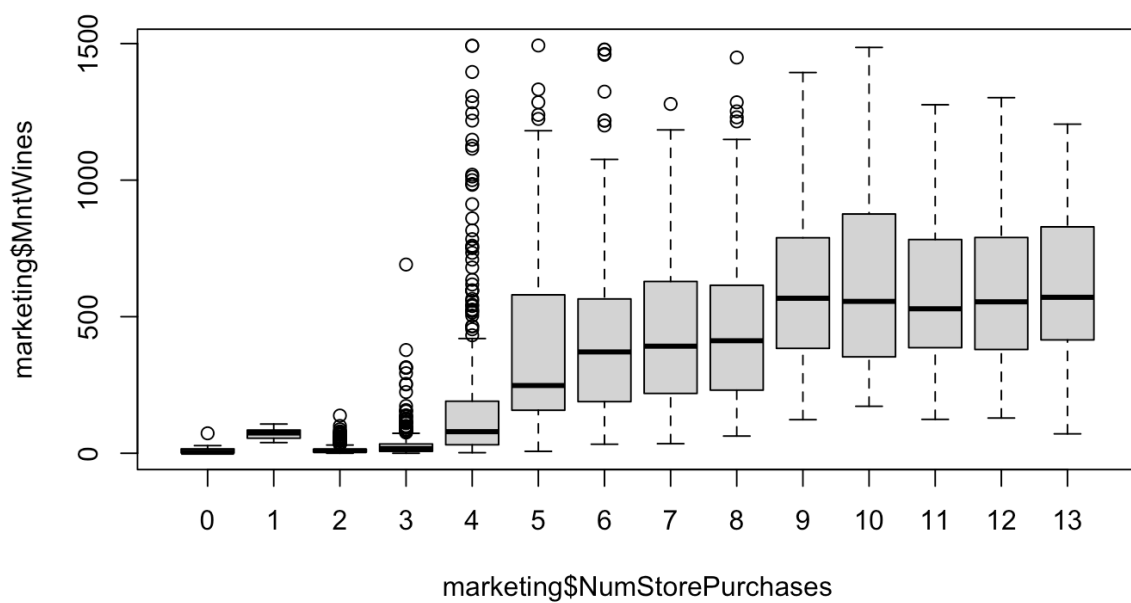
Correlation between income and Wine Spending



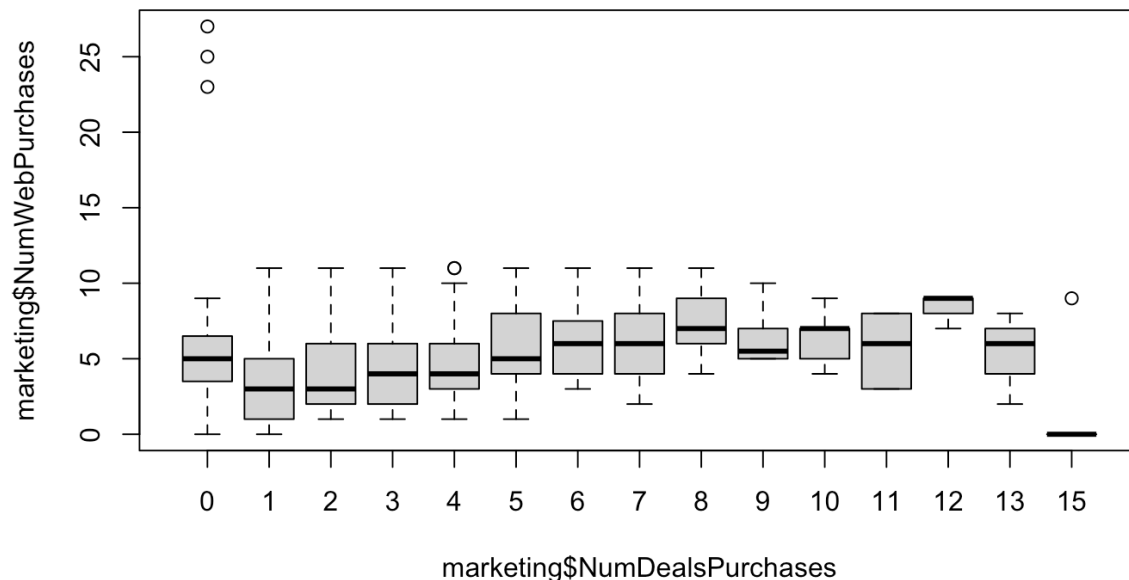
People who purchase in stores are on average more likely to spend more on wine.

Box plot by group – two quantitative variables

```
boxplot(marketing$MntWines ~ marketing$NumStorePurchases)
```



```
boxplot(marketing$NumWebPurchases ~ marketing$NumDealsPurchases)
```



Interesting findings

- Looking at the correlation matrix, I found that none of the variables are strongly correlated. By looking through the results, it seems that the strongest correlation is between the amount spent on wine and number of store purchases at 0.6400119079. This is a positive correlation.
- #Both the graph and correlation tab show a moderate positive relationship between income amount and amount spent on wines (cor = 0.5786498)
- In the Multivariate Graphical EDA – we can see how scattered the data is. The stacked and group bar chart makes it easier to understand visually the relationship between the two variables i.e. Education and Marital Status.
- The cross-tabulation method in the Multivariate Non-Graphical EDA makes the data very streamlined and easy to understand. We can easily comprehend the relationship between the two variables. The statistical computation of co-variance and correlation shows the numerical measures of quantitative variables which is a more accurate depiction of a relationship as opposed to looking at a graph alone.
- The correlation matrix is incredibly useful in finding out the correlations among variables and guiding further analysis – what variables to explore. By indicating a

potential correlation between two variables, we can explore this further for our research purposes.