IE6600 Data Visualization - Reema

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```
library(dplyr)
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##
       filter, lag
## The following objects are masked from 'package:base':
##
       intersect, setdiff, setequal, union
library(magrittr)
library(tidyr)
## Attaching package: 'tidyr'
## The following object is masked from 'package:magrittr':
##
##
       extract
library(ggplot2)
library(skimr)
## Warning: package 'skimr' was built under R version 4.1.2
library(DataExplorer)
## Warning: package 'DataExplorer' was built under R version 4.1.2
library(plotly)
## Warning: package 'plotly' was built under R version 4.1.2
## Attaching package: 'plotly'
## The following object is masked from 'package:ggplot2':
##
       last_plot
```

```
## The following object is masked from 'package:stats':
##
## filter
```

```
## The following object is masked from 'package:graphics':
##
## layout
```

```
library(ggplot2)
library(IRdisplay)
```

```
## Warning: package 'IRdisplay' was built under R version 4.1.2
```

```
#setwd("C:/Users/18572/Documents/Data Visualization/Assignment/HW6")
#df <- read.csv(file="C:/Users/18572/Documents/Data Visualization/HW6/marketing_campaign.csv")
main_df <- read.csv(file="marketing_campaign.csv", sep = "\t", header = T)</pre>
```

```
#plot_intro(main_df,title='Dataset')
```

head(main_df)

ID <int></int>	_	Education <chr></chr>	Marital_Status <chr></chr>	Income <int></int>	Kidhome <int></int>		Dt_Customer <chr></chr>	Recency <int></int>
1 5524	1957	Graduation	Single	58138	0	0	04-09-2012	58
2 2174	1954	Graduation	Single	46344	1	1	08-03-2014	38
3 4141	1965	Graduation	Together	71613	0	0	21-08-2013	26
4 6182	1984	Graduation	Together	26646	1	0	10-02-2014	26
5 5324	1981	PhD	Married	58293	1	0	19-01-2014	94
6 7446	1967	Master	Together	62513	0	1	09-09-2013	16
6 rows 1-	10 of 30 colum	nns						

skim(main_df)

Data summary

Name	main_df
Number of rows	2240
Number of columns	29
Column type frequency:	
character	3
numeric	26

Group variables None

Variable type: character

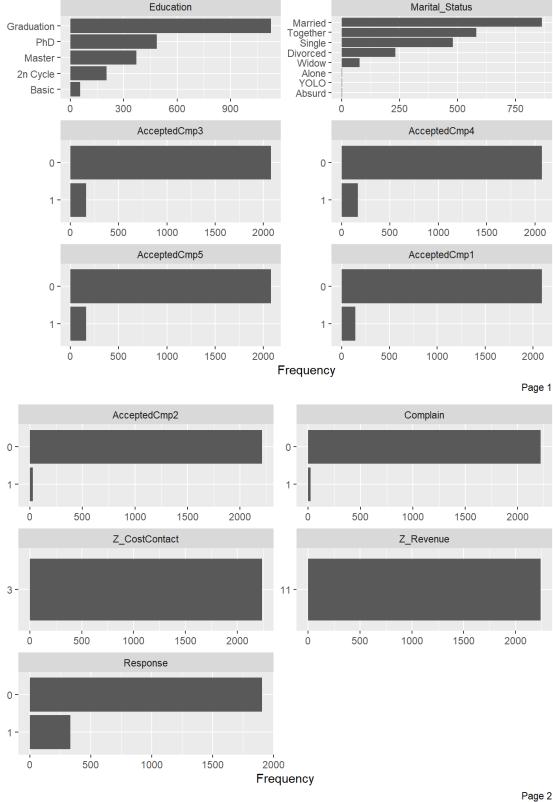
skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
Education	0	1	3	10	0	5	0
Marital_Status	0	1	4	8	0	8	0
Dt_Customer	0	1	10	10	0	663	0

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
ID	0	1.00	5592.16	3246.66	0	2828.25	5458.5	8427.75	11191	
Year_Birth	0	1.00	1968.81	11.98	1893	1959.00	1970.0	1977.00	1996	
Income	24	0.99	52247.25	25173.08	1730	35303.00	51381.5	68522.00	666666	
Kidhome	0	1.00	0.44	0.54	0	0.00	0.0	1.00	2	
Teenhome	0	1.00	0.51	0.54	0	0.00	0.0	1.00	2	
Recency	0	1.00	49.11	28.96	0	24.00	49.0	74.00	99	
MntWines	0	1.00	303.94	336.60	0	23.75	173.5	504.25	1493	
MntFruits	0	1.00	26.30	39.77	0	1.00	8.0	33.00	199	
MntMeatProducts	0	1.00	166.95	225.72	0	16.00	67.0	232.00	1725	
MntFishProducts	0	1.00	37.53	54.63	0	3.00	12.0	50.00	259	
MntSweetProducts	0	1.00	27.06	41.28	0	1.00	8.0	33.00	263	
MntGoldProds	0	1.00	44.02	52.17	0	9.00	24.0	56.00	362	
NumDealsPurchases	0	1.00	2.33	1.93	0	1.00	2.0	3.00	15	
NumWebPurchases	0	1.00	4.08	2.78	0	2.00	4.0	6.00	27	
NumCatalogPurchases	0	1.00	2.66	2.92	0	0.00	2.0	4.00	28	
NumStorePurchases	0	1.00	5.79	3.25	0	3.00	5.0	8.00	13	
NumWebVisitsMonth	0	1.00	5.32	2.43	0	3.00	6.0	7.00	20	
AcceptedCmp3	0	1.00	0.07	0.26	0	0.00	0.0	0.00	1	
AcceptedCmp4	0	1.00	0.07	0.26	0	0.00	0.0	0.00	1	
AcceptedCmp5	0	1.00	0.07	0.26	0	0.00	0.0	0.00	1	
AcceptedCmp1	0	1.00	0.06	0.25	0	0.00	0.0	0.00	1	
AcceptedCmp2	0	1.00	0.01	0.11	0	0.00	0.0	0.00	1	
Complain	0	1.00	0.01	0.10	0	0.00	0.0	0.00	1	
Z_CostContact	0	1.00	3.00	0.00	3	3.00	3.0	3.00	3	
Z_Revenue	0	1.00	11.00	0.00	11	11.00	11.0	11.00	11	
Response	0	1.00	0.15	0.36	0	0.00	0.0	0.00	1	

plot_bar(main_df,ncol=2)

1 columns ignored with more than 50 categories. ## Dt_Customer: 663 categories



#Filling the missing value with median value main_df\$Income[is.na(main_df\$Income)]=median(main_df\$Income,na.rm=T) #Calculating the age for each customer as a vector
current_date= Sys.Date()
current_year = format(current_date,format="%Y")
current_year = as.integer(current_year)
Age= c(current_year - main_df\$Year_Birth)
Age

##	[1]	64	67	56	37	40	54	50	36	47	71	38	45	62	69	34	75	41	75
##	[19]	72	36	39	42	72	67	70	52	45	35	32	56	32	58	51	69	75	70
##	[37]	51	45	48	78	41	36	64	62	46	45	25	53	70	67	64	57	44	44
##	[55]	43	66	55	33	39	53	39	46	69	70	73	50	54	42	63	51	67	48
##	[73]	62	46	69	44	49	45	45	56	36	52	48	58	34	61	51	64	48	54
##	[91]	64	64	48	49	51	38	61	49	70	38	61	62	42	76	62	42	57	52
##	[109]	43	61	42	30	58	30	41	59	51	43	54	52	68	54	36	45	38	56
##	[127]	37	68	60	65	69	63	52	58	57	54	45	62	48	56	29	45	59	47
##	[145]	33	45	46	40	48	55	68	52	49	33	69	72	63	43	44	66	63	76
##	[163]	37	46	48	55	68	62	33	64	56	39	51	62	54	46	73	51	62	70
##	[181]	45	33	75	37	60	38	51	55	45	57	43	32	121	33	48	44	41	67
##	[199]	67	48	69	53	43	44	56	37	33	58	55	67	65	67	53	47	36	44
##	[217]	43	73	67	41	33	52	51	41	59	43	45	69	49	35	55	59	50	70
##	[235]	56	46	39	63	48	128	53	63	50	31	63	57	49	68	33	52	46	36
##	[253]	47	63	54	47	60	57	57	64	42	53	51	43	69	55	58	51	51	51
##	[271]	68	38	46	61	58	58	65	40	35	53	40	45	75	47	46	47	69	65
##	[289]	55	72	37	52	41	50	56	69	33	35	39	56	63	65	43	33	37	60
##	[307]	55	74	57	29	45	54	32	45	55	65	49	36	70	51	50	47	56	60
##	[325]	68	64	45	37	71	35	38	32	65	50	38	61	53	49	56	122	33	35
##	[343]	52	71	48	69	56	51	50	45	64	35	55	47	45	43	66	52	78	73
##	[361]	64	52	43	43	54	52	61	45	59	46	37	46	51	55	49	46	51	32
##	[379]	60	52	52	36	67	48	40	50	53	61	72	53	42	42	28	75	53	30
##	[397]	50	37	34	41	65	56	47	61	66	56	49	50	47	58	39	45	66	34
##	[415]	59	78	46	27	40	50	48	38	39	47	80	68	35	32	32	53	60	32
##	[433]	54	57	51	65	55	72	50	35	32	73	75 	32	47	62	49	57	45	68
##	[451]	66 70	52	50 46	41 41	45 40	49	55	37 65	69 49	39 44	57 49	72 44	63 48	58 49	46 47	52	66 61	51
##	[469]	70 45	50 47	52	69	63	43 45	33 66	57	77	59	49	50	46 72	77	71	46 60	61 31	57 36
##	[487] [505]	65	68	45	32	29	62	40	42	57	62	43 75	46	60	31	62	77	56	34
##	[523]	30	68	34	35	63	44	57	61	46	52	44	59	39	70	54	54	69	40
##	[541]	44	52	37	39	45	31	57	41	53	48	58	32	50	58	72	69	43	39
##	[559]	51	62	43	41	50	51	58	71	59	70	42	51	47	53	43	51	40	44
##	[577]	53	51	55	65	47	70	54	70	38	50	66	60	66	62	37	46	56	44
##	[595]	49	46	52	52	43	40	60	61	66	73	55	35	48	65	46	56	52	77
##	[613]	48	54	52	47	56	45	43	61	60	50	72	43	66	45	46	61	44	44
##	[631]	51	63	51	61	48	59	69	59	71	50	61	73	62	57	74	50	51	51
##	[649]	44	63	61	36	47	71	66	46	68	63	74	55	58	36	46	41	65	62
##	[667]	47	34	53	50	57	59	51	41	46	47	58	42	36	41	58	54	39	66
##	[685]	54	45	49	39	32	52	61	51	63	69	72	60	26	72	60	61	48	43
##	[703]	43	33	53	35	51	70	73	50	35	56	46	68	39	46	61	43	51	63
##	[721]	56	67	37	56	45	55	66	45	56	30	72	68	43	73	48	72	48	69
##	[739]	32	52	68	65	71	43	57	69	46	26	51	67	49	63	46	52	42	43
##	[757]	49	57	42	62	40	54	33	43	69	66	44	34	56	65	42	70	56	49
##	[775]	64	68	56	63	66	50	47	45	51	49	49	35	61	53	43	45	76	64
##	[793]	71	43	60	59	67	56	48	53	51	65	70	77	63	45	50	64	49	49
##	[811]	40	49	46	66	35	51	45	67	49	43	41	49	60	58	62	62	67	59
##	[829]	63	37	45	29	54	41	54	65	49	41	41	44	71	47	33	40	61	51
##	[847]	30	65	58	41	47	67	64	55	47	42	48	36	55	32	52	52	34	32
##	[865]	46	48	55	35	43	42	38	62	45	40	43	68	50	38	65	43	49	46
##	[883]	46	40	49	51	68	62	59	43	48	56	38	30	78	49	65	63	47	35
##	[901]	63	51	54	48	52	44	60	50	47	35	55	29	58	49	27	67	61	39
##	[919]	67	67	66	28	52	73	35	42	43	39	28	45	47	32	70	32	69	50
##	[937] [955]	50 45	51 45	50 56	46 69	69 48	59 64	38 54	68 59	35 52	34 46	39 41	42 62	44 48	46 48	42 47	45 41	48 33	50 53
##	[973]	33	62	50	59	48 62	56	54 69	59 67	61	56	41	43	48 71	48 47	47	52	45	65
##	[991]	55 67	49	40	32	67	26	43	64	48	65	65	34	40	34	43 67	67	68	69
##	[1009]	53	58	42	45	43	53	50	70	56	52	48	45	48	47	68	55	43	54
##	[1027]	43	34	63	57	50	50	52	44	48	41	63	49	50	68	62	67	30	59
	[1045]	35	56	55	61	37	55	56	55	72	51	38	36	47	70	69	34	72	63
	[1063]	34	48	57	60	29	56	65	43	50	55	66	68	63	60	40	45	53	43
	[1081]	56	50	65	39	51	44	51	63	38	63	48	47	62	49	56	42	63	35
		-	-	-					-	-	-					-		-	

## [1099]																		
	39	42	46	42	35	51	49	61	69	51	47	56	67	38	48	61	37	50
## [1117]	38	38	55	43	53	42	48	42	67	59	55	44	36	69	70	54	43	45
## [1135]	36	47	53	59	32	60	68	32	43	59	76	47	40	65	67	35	78	57
1 2 2																		
## [1153]	42	47	61	58	45	47	60	70	56	65	56	27	47	49	53	53	73	52
## [1171]	25	47	31	64	42	61	69	40	40	30	71	64	60	63	50	36	56	69
## [1189]	59	47	51	52	61	69	52	53	56	52	49	60	44	62	63	42	64	65
## [1207]	56	31	64	56	64	66	49	52	49	46	56	58	30	58	35	48	64	40
## [1225]	63	62	66	35	46	66	50	35	43	38	45	50	65	49	32	69	37	54
									_						_			
## [1243]	59	74	43	50	29	53	48	46	56	69	54	49	58	51	66	46	45	52
## [1261]	48	38	39	61	69	46	58	51	73	63	77	58	49	55	53	50	46	57
## [1279]	43	46	38	50	64	70	70	51	49	52	49	50	65	50	48	44	58	67
## [1297]	43	55	75	43	50	68	36	51	42	55	45	56	39	49	61	65	56	66
		59	56	48	49	37	61	63		44	47	59	39	46	39	76	42	52
## [1315]	32								53									
## [1333]	59	73	43	46	39	38	69	39	59	44	72	31	39	46	62	38	45	59
## [1351]	65	28	34	56	39	59	43	75	58	50	53	29	47	71	44	63	45	48
## [1369]	53	63	46	61	56	61	52	61	46	36	50	51	66	65	63	57	48	73
## [1387]	49	45	41	42	49	48	49	46	49	65	47	49	53	52	60	49	68	64
## [1405]	51	54	70	68	71	68	44	49	52	77	31	42	55	73	49	48	49	49
	_	_							_									
## [1423]	55	52	62	51	47	49	63	49	38	48	36	48	54	42	60	35	57	38
## [1441]	69	72	42	73	75	63	50	64	39	48	49	56	68	54	56	52	50	49
## [1459]	51	47	71	62	66	43	35	58	68	69	71	51	51	44	55	52	63	67
## [1477]	65	51	34	60	42	61	40	41	45	45	51	75	66	49	50	71	33	43
	31	62	44	52	62	33	46	48	44	48	66	47	49	46	50	63	33	46
## [1495]				_														
## [1513]	56	35	44	41	59	43	49	51	38	50	45	48	48	45	73	63	34	61
## [1531]	46	63	46	46	33	33	32	62	50	54	32	60	43	68	57	35	34	58
## [1549]	64	46	70	56	65	59	47	54	59	45	60	45	38	45	33	67	36	69
## [1567]	57	67	71	64	75	67	30	35	44	61	39	74	29	45	65	74	71	55
	34	48	69	56	41	34	59	66	33	56	54	48	61	37	50	46	56	65
## [1603]	66	61	60	58	44	31	48	57	33	43	31	46	44	37	38	34	56	65
## [1621]	56	50	39	62	58	69	50	58	39	45	74	52	62	43	73	66	67	76
## [1639]	52	45	52	57	40	42	40	61	47	40	54	71	39	60	58	44	74	43
## [1657]	67	67	49	40	63	53	45	55	32	36	54	62	51	54	36	70	35	66
## [1675]	51	30	46	42	45	41	43	50	66	38	69	52	41	53	50	32	70	34
					_							_						
## [1693]	36	40	31	69	50	38	64	70	45	66	32	48	48	37	65	56	43	48
	50	40	71							45	42	38	30					
## [1711]	35	62	43	55	29	37	65	44	47	45			30	59	39	42	66	56
## [1711] ## [1729]				55 62	29 66	37 55	65 63	44 67	47 54	58	62	50	57	59 38	39 76	42 74	66 52	56 69
## [1729]	35	62	43			_				_		50 50		_				
## [1729] ## [1747]	35 60 74	62 70 75	43 57 52	62 72	66 60	55 47	63 41	67 72	54 50	58 42	62 53	50	57 66	38	76 57	74 42	52 46	69 44
## [1729] ## [1747] ## [1765]	35 60 74 35	62 70 75 65	43 57 52 41	62 72 39	66 60 60	55 47 46	63 41 47	67 72 75	54 50 36	58 42 69	62 53 54	50 66	57 66 36	38 49 44	76 57 48	74 42 37	52 46 42	69 44 45
## [1729] ## [1747] ## [1765] ## [1783]	35 60 74 35 53	62 70 75 65 62	43 57 52 41 50	62 72 39 54	66 60 60 48	55 47 46 38	63 41 47 42	67 72 75 42	54 50 36 71	58 42 69 58	62 53 54 59	50 66 45	57 66 36 69	38 49 44 61	76 57 48 66	74 42 37 44	52 46 42 57	69 44 45 40
## [1729] ## [1747] ## [1765]	35 60 74 35	62 70 75 65	43 57 52 41	62 72 39 54 55	66 60 60	55 47 46	63 41 47	67 72 75	54 50 36	58 42 69	62 53 54 59 55	50 66	57 66 36	38 49 44	76 57 48	74 42 37	52 46 42	69 44 45 40 70
## [1729] ## [1747] ## [1765] ## [1783]	35 60 74 35 53	62 70 75 65 62	43 57 52 41 50	62 72 39 54	66 60 60 48	55 47 46 38	63 41 47 42	67 72 75 42	54 50 36 71	58 42 69 58	62 53 54 59	50 66 45	57 66 36 69	38 49 44 61	76 57 48 66	74 42 37 44	52 46 42 57	69 44 45 40
## [1729] ## [1747] ## [1765] ## [1783] ## [1801]	35 60 74 35 53 45	62 70 75 65 62 47	43 57 52 41 50 70	62 72 39 54 55	66 60 60 48 70	55 47 46 38 63	63 41 47 42 55	67 72 75 42 57	54 50 36 71 65	58 42 69 58 47	62 53 54 59 55	50 66 45 58	57 66 36 69 52	38 49 44 61 29	76 57 48 66 67	74 42 37 44 38	52 46 42 57 39	69 44 45 40 70
## [1729] ## [1747] ## [1765] ## [183] ## [1801] ## [1819] ## [1837]	35 60 74 35 53 45 65	62 70 75 65 62 47 60	43 57 52 41 50 70 59	62 72 39 54 55 50	66 60 60 48 70 50	55 47 46 38 63 53	63 41 47 42 55 43	67 72 75 42 57 52	54 50 36 71 65 56	58 42 69 58 47 35	625354595563	50 66 45 58 46	57 66 36 69 52 34	38 49 44 61 29 62	76 57 48 66 67 59	74 42 37 44 38 47	52 46 42 57 39 44	69 44 45 40 70 43 60
## [1729] ## [1747] ## [1765] ## [1833] ## [1801] ## [1837] ## [1855]	35 60 74 35 53 45 65 51 37	62 70 75 65 62 47 60 64 50	43 57 52 41 50 70 59 66 70	62 72 39 54 55 50 67 45	66 60 60 48 70 50 39 49	55 47 46 38 63 53 68 36	63 41 47 42 55 43 53	67 72 75 42 57 52 64 46	54 50 36 71 65 56 56 42	58 42 69 58 47 35 46 50	6253545955635839	50 66 45 58 46 31 48	57 66 36 69 52 34 55 53	38 49 44 61 29 62 33 37	76 57 48 66 67 59 26 50	74 42 37 44 38 47 46 44	52 46 42 57 39 44 43 54	69 44 45 40 70 43 60 57
## [1729] ## [1747] ## [1765] ## [183] ## [1801] ## [1819] ## [1855] ## [1873]	35 60 74 35 53 45 65 51 37 49	62 70 75 65 62 47 60 64 50 73	43 57 52 41 50 70 59 66 70 69	62 72 39 54 55 50 67 45 34	66 60 48 70 50 39 49 62	55 47 46 38 63 53 68 36 63	63 41 47 42 55 43 53 55 70	67 72 75 42 57 52 64 46 46	54 50 36 71 65 56 42 37	58 42 69 58 47 35 46 50 52	62 53 54 59 55 63 58 39 53	50 66 45 58 46 31 48 52	57 66 36 69 52 34 55 53 36	38 49 44 61 29 62 33 37 37	76 57 48 66 67 59 26 50 64	74 42 37 44 38 47 46 44 50	52 46 42 57 39 44 43 54 46	69 44 45 40 70 43 60 57 39
## [1729] ## [1747] ## [1765] ## [1801] ## [1819] ## [1837] ## [1855] ## [1873] ## [1891]	35 60 74 35 53 45 65 51 37 49	62 70 75 65 62 47 60 64 50 73 32	43 57 52 41 50 70 59 66 70 69 36	62 72 39 54 55 50 67 45 34 53	66 60 48 70 50 39 49 62 47	55 47 46 38 63 53 68 36 63 72	63 41 47 42 55 43 53 55 70 43	67 72 75 42 57 52 64 46 46 67	54 50 36 71 65 56 42 37 76	58 42 69 58 47 35 46 50 52 71	62 53 54 59 55 63 58 39 53	50 66 45 58 46 31 48 52 38	57 66 36 69 52 34 55 53 36 34	38 49 44 61 29 62 33 37 37 50	76 57 48 66 67 59 26 50 64 53	74 42 37 44 38 47 46 44 50 67	52 46 42 57 39 44 43 54 46 50	69 44 45 40 70 43 60 57 39 35
## [1729] ## [1747] ## [1765] ## [183] ## [1801] ## [1819] ## [1855] ## [1873]	35 60 74 35 53 45 65 51 37 49	62 70 75 65 62 47 60 64 50 73	43 57 52 41 50 70 59 66 70 69	62 72 39 54 55 50 67 45 34	66 60 48 70 50 39 49 62	55 47 46 38 63 53 68 36 63	63 41 47 42 55 43 53 55 70	67 72 75 42 57 52 64 46 46	54 50 36 71 65 56 42 37	58 42 69 58 47 35 46 50 52	62 53 54 59 55 63 58 39 53	50 66 45 58 46 31 48 52	57 66 36 69 52 34 55 53 36	38 49 44 61 29 62 33 37 37	76 57 48 66 67 59 26 50 64	74 42 37 44 38 47 46 44 50	52 46 42 57 39 44 43 54 46	69 44 45 40 70 43 60 57 39
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#Adding Age column and then calculating maximum age
main_df['Age']=Age
max(main_df$Age)
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#Calculating median age
median(main_df$Age)
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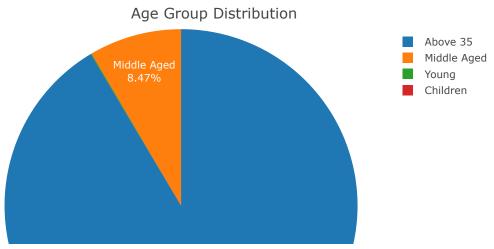
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#Calculating average age
mean(main_df$Age)
```

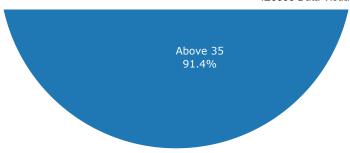
[1] 52.1942

```
#Understanding the income based on Marital_Status
#ggplot(df) +
# geom_point(aes(x = Income, y = Marital_Status), color = '#FF0000') + labs(x="Income")
```

```
children = main_df %>% filter(Age < 15) %>% summarize(n())
young = main_df %>% filter(15 <= Age & Age <= 25) %>% summarize(n())
middle_aged = main_df %>% filter(25 < Age & Age <= 35) %>% summarize(n())
above_35 = main_df %>% filter( Age > 36) %>% summarize(n())
children = as.integer(children)
young = as.integer(young)
middle_aged = as.integer(middle_aged)
above_35 = as.integer(above_35)

count = c(children,young,middle_aged,above_35)
labels_age = c('Children','Young','Middle Aged','Above 35')
```





#Unique Education values
unique(main_df\$Education)

```
## [1] "Graduation" "PhD" "Master" "Basic" "2n Cycle"
```

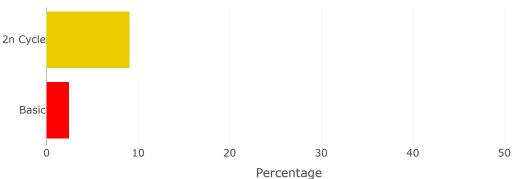
```
#Creating a table for Education
table_ed = sort(table(main_df$Education),decreasing=T)
per_ed = as.vector(prop.table(table_ed)*100)
labels_ed = c('Graduation','PhD','Master','2n Cycle','Basic')
df_ed = data.frame(labels_ed,per_ed)
df_ed
```

labels_ed <chr></chr>	per_ed <dbl></dbl>
Graduation	50.312500
PhD	21.696429
Master	16.517857
2n Cycle	9.062500
Basic	2.410714
5 rows	

```
fig2 = plot_ly(df_ed, y=~labels_ed,x=~per_ed,type='bar',marker= list(color=c('#001889','#74008D','#E06A5A','#EACA0
0',"#FF0000")))
fig2 = fig2 %>% layout(title="Percentage of Edcational Level",xaxis = list(title='Percentage'),
yaxis = list(title='Education',categoryorder = "array",
categoryarray = rev(labels_ed)))
fig2
```

Percentage of Edcational Level





#How many children's customers have?
#Unique values in Kidhome
unique(main_df\$Kidhome)

[1] 0 1 2

#Unique values in Teenhome
unique(main_df\$Teenhome)

[1] 0 1 2

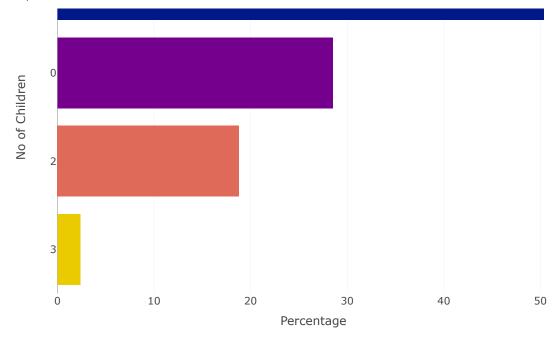
#Merge
main_df['Children']=main_df['Kidhome']+main_df['Teenhome']

#Creating table function for children column
table_cd=sort(table(main_df\$Children),decreasing=T)
per_cd = as.vector(prop.table(table_cd)*100)
labels_cd = c('1','0','2','3')
df_cd = data.frame(labels_cd,per_cd)
df_cd

labels_cd <chr></chr>	per_cd <dbl></dbl>
1	50.357143
0	28.482143
2	18.794643
3	2.366071
4 rows	

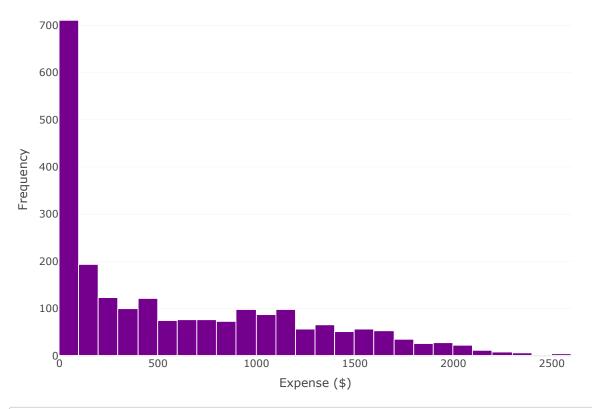
```
fig3 = plot_ly(df_cd, y=~labels_cd,x=~per_cd,type='bar',orientation='h',
marker= list(color=c('#001889','#74008D','#E06A5A','#EACA00')))
fig3 = fig3 %>% layout(title="Percentage of No of Children",xaxis = list(title='Percentage'),
yaxis = list(title='No of Children',categoryorder = "array",
categoryarray = rev(labels_cd)))
fig3
```

Percentage of No of Children



```
main_df['Expenses'] = main_df['MntWines'] + main_df['MntFruits'] + main_df['MntMeatProducts'] +
main_df['MntFishProducts'] + main_df['MntSweetProducts'] + main_df['MntGoldProds']
fig4 = plot_ly(main_df,x=~Expenses,type='histogram',marker = list(color = '#74008D',
line = list(color = '#FFFFFF',width = 1)))
fig4 = fig4 %>% layout(title="Frequency of Customer's Expenses",xaxis=list(title='Expense ($)'),yaxis=list(title='Frequency'),xaxis = list(gridcolor = 'ffff'))
fig4
```

Frequency of Customer's Expenses



#Maximum Income
max(main_df\$Income)

```
## [1] 666666
```

```
#Average Income
mean(main_df$Income)
```

[1] 52237.98

```
fig5= plot_ly(main_df,x=~Income,type='histogram',marker = list(color = '#EACA00',
line = list(color = '#FFFFFF',width = 1)))
fig5 = fig5 %>% layout(title="Frequency of Income",xaxis=list(title='Income'),yaxis=list(title='Frequency'))
fig5
```

Frequency of Income

