akshaya-project-12

April 28, 2023

0.1 Budget Sales Analysis

0.1.1 Introduction- Twilearn Internship Project

Project Title: **Budget Sales Analysis**

Technologies: **Business Intelligence**

Domain: **Retail & Sales**

Author: Akshaya

0.1.2 1. Business Task

To analysis the Budget Sales data, extract necessary information about Customers and Products based on combination of features to help potential buyers purchase the domain they want immediately without the hassle of contacting the seller directly.

0.1.3 1.1 Business Objectives

- Performing EDA through Python and find insights.
- Extract various information such as Budget, Sales, Variance.
- Compare attributes of the dataset to extract necessary information about Products and Customers.
- Make Dashboard with extracted information from data.
- Find key metrics and factors and show relationship between attributes.

0.1.4 2. Raw Dataset

The Dataset used was provided in the Project Description Document, Twilearn.

Database list:

AdventureWorks_Database.xlsx

Budget.xlsx

0.1.5 3. Data Preparing And Processing

Using Python for preparing and processing the data.

3.1 Preparing The Environment Filtering out warnings, Importing important libraries, Displaying maximum rows and columns.

[1]:
```
# Importing Warnings
import warnings
warnings.filterwarnings('ignore')

# Importing Libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

from datetime import datetime
from datetime import date

# Displaying maximum rows and columns
pd.set_option('display.max_columns', 600)
pd.set_option('display.max_rows', 600)
```

3.2 Loading Data

[2]:
```
# Loading the Dataset and reading Date Data
df = pd.ExcelFile('F:\Akshaya\Courses\Twilearn\Budget Sales␣
 ↪Analysis\Data\Database1.xlsx')
Date_Data = pd.read_excel(df, 'Date')
Date_Data.head()
```

[2]:

	Date	DateKey	Year	Quarter	MonthNum	Month	FiscalYear	FiscalQuarter	FiscalMonthNum	FiscalMonth	MonthYear	MonthYearLong	MonthYearNum	WeekdayNum	Weekday	WeekdayWeekend
0	2016-04-03	20160403	2016	Q2	4	Apr	FY2016	FQ4	10	Apr	Apr-16	Apr-2016	201604	1	Sun	Weekend
1	2016-04-04	20160404	2016	Q2	4	Apr	FY2016	FQ4	10	Apr	Apr-16	Apr-2016	201604	2	Mon	Weekday
2	2016-04-05	20160405	2016	Q2	4	Apr	FY2016	FQ4	10	Apr	Apr-16	Apr-2016	201604	3	Tue	Weekday
3	2016-04-06	20160406	2016	Q2	4	Apr	FY2016	FQ4	10	Apr	Apr-16	Apr-2016	201604	4	Wed	Weekday
4	2016-04-07	20160407	2016	Q2	4	Apr	FY2016	FQ4	10	Apr	Apr-16	Apr-2016	201604	5	Thu	Weekday

[3]:
```
# Reading and Loading Customer Data
Customer_Data = pd.read_excel(df, 'CustomerData')
Customer_Data.head()
```

[3]:

	CustomerKey	FirstName	LastName	FullName	BirthDate	MaritalStatus	Gender	YearlyIncome	TotalChildren	NumberChildrenAtHome	Education	Occupation	HouseOwnerFlag	NumberCarsOwned	AddressLine1	DateFirstPurchase	CommuteDistance
0	11000	Jon	Yang	Yang, Jon	1966-04-08	M	M	90000	2	0	Bachelors	Professional	1	0	3761 N. 14th St	2014-01-22	1-2 Miles
1	11001	Eugene	Huang	Huang, Eugene	1965-05-14	S	M	60000	3	3	Bachelors	Professional	0	1	2243 W St.	2014-01-18	0-1 Miles
2	11002	Ruben	Torres	Torres, Ruben	1965-08-12	M	M	60000	3	3	Bachelors	Professional	1	1	5844 Linden Land	2014-01-10	2-5 Miles
3	11003	Christy	Zhu	Zhu, Christy	1968-02-15	S	F	70000	0	0	Bachelors	Professional	0	1	1825 Village Pl.	2014-01-01	5-10 Miles
4	11004	Elizabeth	Johnson	Johnson, Elizabeth	1968-08-08	S	F	80000	5	5	Bachelors	Professional	1	4	7553 Harness Circle	2014-01-26	1-2 Miles

[4]:
```
# Reading and Loading Product Data
Product_Data = pd.read_excel(df, 'ProductData')
Product_Data.head()
```

[4]:

	ProductKey	ProductName	SubCategory	Category	StandardCost	Color	ListPrice	DaysToManufacture	ProductLine	ModelName
0	1	Adjustable Race	NaN	NaN	NaN	NaN	NaN	0	NaN	NaN
1	2	Bearing Ball	NaN	NaN	NaN	NaN	NaN	0	NaN	NaN
2	3	BB Ball Bearing	NaN	NaN	NaN	NaN	NaN	1	NaN	NaN
3	4	Headset Ball Bearings	NaN	NaN	NaN	NaN	NaN	0	NaN	NaN
4	5	Blade	NaN	NaN	NaN	NaN	NaN	0	NaN	NaN

```
3        NaN                   0         NaN       NaN
4        NaN                   1         NaN       NaN

                                                 Photo ProductDescription  \
0  http://www.avising.com/me/LearnPBI/DataSources…                 NaN
1  http://www.avising.com/me/LearnPBI/DataSources…                 NaN
2  http://www.avising.com/me/LearnPBI/DataSources…                 NaN
3  http://www.avising.com/me/LearnPBI/DataSources…                 NaN
4  http://www.avising.com/me/LearnPBI/DataSources…                 NaN

   StartDate
0 1998-06-01
1 1998-06-01
2 1998-06-01
3 1998-06-01
4 1998-06-01
```

[5]:
```
# Reading and Loading Sales Data
Sales_Data = pd.read_excel(df, 'SalesData')
Sales_Data.head()
```

[5]:
```
   ProductKey  OrderDate   ShipDate  CustomerKey  PromotionKey  \
0         310 2014-01-01 2014-01-08        21768             1
1         346 2014-01-01 2014-01-08        28389             1
2         346 2014-01-01 2014-01-08        25863             1
3         336 2014-01-01 2014-01-08        14501             1
4         346 2014-01-01 2014-01-08        11003             1

   SalesTerritoryKey SalesOrderNumber  SalesOrderLineNumber  OrderQuantity  \
0                  6          SO43697                     1              2
1                  7          SO43698                     1              2
2                  1          SO43699                     1              2
3                  4          SO43700                     1              2
4                  9          SO43701                     1              2

   UnitPrice  TotalProductCost  SalesAmount    TaxAmt
0  1789.1350         2171.2942    3578.2700  286.2616
1  1699.9950         1912.1544    3399.9900  271.9992
2  1699.9950         1912.1544    3399.9900  271.9992
3   349.5491          413.1463     699.0982   55.9279
4  1699.9950         1912.1544    3399.9900  271.9992
```

[6]:
```
# Reading and Loading Territory Data
Territory_Data = pd.read_excel(df, 'TerritoryData')
Territory_Data.head()
```

[6]:

	SalesTerritoryKey	Region	Country	Group	RegionImage
0	1	Northwest	United States	North America	http://www.avising.com/me/LearnPBI/DataSources…
1	2	Northeast	United States	North America	http://www.avising.com/me/LearnPBI/DataSources…
2	3	Central	United States	North America	http://www.avising.com/me/LearnPBI/DataSources…
3	4	Southwest	United States	North America	http://www.avising.com/me/LearnPBI/DataSources…
4	5	Southeast	United States	North America	http://www.avising.com/me/LearnPBI/DataSources…

[7]:
```
# Reading and Loading Budget Data
Budget_Data = pd.read_excel(df, 'Budget')
Budget_Data = Budget_Data.iloc[2:, :]
Budget_Data.columns = Budget_Data.iloc[0]
Budget_Data = Budget_Data.iloc[1:]
Budget_Data.head()
```

[7]:

2	Category	Subcategory	ProductName	ProductKey	ProductKey Jan, 2016	Feb, 2016	Mar, 2016	Apr, 2016	May, 2016	Jun, 2016	Jul, 2016	Aug, 2016	Sep, 2016	Oct, 2016	Nov, 2016	Dec, 2016	Grand Total
3	Accessories	Bike Racks	Hitch Rack - 4-Bike	483	483	1131	2635	4134	2179	2637	3279	2218	3287	3885	2484	5441	3551	36861
4	Accessories	Bike Stands	All-Purpose Bike Stand	486	486	666	3695	2868	4862	3439	4612	2774	3003	2401	4413	3881	2143	38757
5	Accessories	Bottles and Cages	Water Bottle - 30 oz.	477	477	1892	4727	3656	4449	4051	6257	4871	5231	5461	5529	5220	6025	57369
6	Accessories	Cleaners	Bike Wash - Dissolver	484	484	160	713	555	656	369	582	777	777	239	496	686	455	6465
7	Accessories	Fenders	Fender Set - Mountain	485	485	970	3014	2809	4259	3638	3721	4190	3618	3975	3892	4740	4844	43670

[8]:
```
# Checking Column Names of all Datasets
print('Date Columns:', Date_Data.columns)
print('Customer Columns:', Customer_Data.columns)
print('Product Columns:', Product_Data.columns)
print('Sales Columns:', Sales_Data.columns)
```

```
print('Territory Columns:', Territory_Data.columns)
print('Budget Columns:', Budget_Data.columns)
```

```
Date Columns: Index(['Date', 'DateKey', 'Year', 'Quarter', 'MonthNum', 'Month',
'FiscalYear',
       'FiscalQuarter', 'FiscalMonthNum', 'FiscalMonth', 'MonthYear',
       'MonthYearLong', 'MonthYearNum', 'WeekdayNum', 'Weekday',
       'WeekdayWeekend'],
      dtype='object')
Customer Columns: Index(['CustomerKey', 'FirstName', 'LastName', 'FullName',
'BirthDate',
       'MaritalStatus', 'Gender', 'YearlyIncome', 'TotalChildren',
       'NumberChildrenAtHome', 'Education', 'Occupation', 'HouseOwnerFlag',
       'NumberCarsOwned', 'AddressLine1', 'DateFirstPurchase',
       'CommuteDistance'],
      dtype='object')
Product Columns: Index(['ProductKey', 'ProductName', 'SubCategory', 'Category',
'StandardCost',
       'Color', 'ListPrice', 'DaysToManufacture', 'ProductLine', 'ModelName',
       'Photo', 'ProductDescription', 'StartDate'],
      dtype='object')
Sales Columns: Index(['ProductKey', 'OrderDate', 'ShipDate', 'CustomerKey',
'PromotionKey',
       'SalesTerritoryKey', 'SalesOrderNumber', 'SalesOrderLineNumber',
       'OrderQuantity', 'UnitPrice', 'TotalProductCost', 'SalesAmount',
       'TaxAmt'],
      dtype='object')
Territory Columns: Index(['SalesTerritoryKey', 'Region', 'Country', 'Group',
'RegionImage'], dtype='object')
Budget Columns: Index(['Category', 'Subcategory', 'ProductName', 'ProductKey',
'ProductKey',
       'Jan, 2016', 'Feb, 2016', 'Mar, 2016', 'Apr, 2016', 'May, 2016',
       'Jun, 2016', 'Jul, 2016', 'Aug, 2016', 'Sep, 2016', 'Oct, 2016',
       'Nov, 2016', 'Dec, 2016', 'Grand Total'],
      dtype='object', name=2)
```

3.3 Merging Data

[9]:
```
# Merging Customer and Sales Data
Merged_Data = pd.merge(Sales_Data, Customer_Data, on = 'CustomerKey', how =␣
 ↪'inner')
# Merging Product Data
Merged_Data = pd.merge(Merged_Data, Product_Data, on = 'ProductKey', how =␣
 ↪'inner')
# Merging Territory Data
Merged_Data = pd.merge(Merged_Data, Territory_Data, on = 'SalesTerritoryKey',␣
 ↪how = 'inner')
```

```
# Displaying Merged Data
Merged_Data.head()
```

[9]:

	ProductKey	OrderDate	ShipDate	CustomerKey	PromotionKey	SalesTerritoryKey	SalesOrderNumber	SalesOrderLineNumber	OrderQuantity	UnitPrice	TotalProductCost	SalesAmount	TaxAmt	FirstName	LastName	FullName	BirthDate	MaritalStatus	Gender	YearlyIncome	TotalChildren	NumberChildrenAtHome	Education	Occupation	HouseOwnerFlag	NumberCarsOwned	AddressLine1	DateFirstPurchase	CommuteDistance	ProductName	SubCategory	Category	StandardCost	Color
0	310	2014-01-01	2014-01-08	21768	1	6	SO43697	1	2	1789.1350	2171.2942	3578.27	286.2616	Cole	Watson	Watson, Cole	1946-08-22	S	M	70000	5	0	Bachelors	Management	1	3	601 Asilomar Dr.	2014-01-01	10+ Miles	Road-150 Red, 62	Road Bikes	Bikes	2171.2942	Red
1	310	2014-01-30	2014-02-06	21727	1	6	SO43833	1	4	894.5675	2171.2942	3578.27	286.2616	Arianna	Flores	Flores, Arianna	1973-06-24	M	F	40000	0	0	Graduate Degree	Skilled Manual	1	0	4082 Shell Ct	2014-01-30						
2	310	2014-02-23	2014-02-28	21921	1	6	SO44027	1	1	3578.2700	2171.2942	3578.27	286.2616	Lucas	Collins	Collins, Lucas	1961-08-02	M	M	60000	1	0	Partial College	Skilled Manual	1	1	8108 Abbey Court	2014-02-23						
3	310	2014-02-28	2014-03-06	22050	1	6	SO44064	1	1	3578.2700	2171.2942	3578.27	286.2616	Richard	Bailey	Bailey, Richard	1968-02-18	S	M	90000	4	4	Bachelors	Management	1	1	5826 Limewood Pl.	2014-02-28						
4	310	2014-05-18	2014-05-25	22233	1	6	SO44677	1	2	1789.1350	2171.2942	3578.27	286.2616	Xavier	Martin	Martin, Xavier	1972-04-22	M	M	50000	1	1	Graduate Degree	Skilled Manual	1	0	4539 Leeds Ct	2014-05-18						

```
1       1-2 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942   Red
2       0-1 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942   Red
3       1-2 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942   Red
4       0-1 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942   Red

   ListPrice  DaysToManufacture ProductLine ModelName  \
0    3578.27                  4        Road  Road-150
1    3578.27                  4        Road  Road-150
2    3578.27                  4        Road  Road-150
3    3578.27                  4        Road  Road-150
4    3578.27                  4        Road  Road-150

                                              Photo  \
0  http://www.avising.com/me/LearnPBI/DataSources…
1  http://www.avising.com/me/LearnPBI/DataSources…
2  http://www.avising.com/me/LearnPBI/DataSources…
3  http://www.avising.com/me/LearnPBI/DataSources…
4  http://www.avising.com/me/LearnPBI/DataSources…

                                ProductDescription  StartDate  Region  \
0  This bike is ridden by race winners. Developed… 2005-07-01  Canada
1  This bike is ridden by race winners. Developed… 2005-07-01  Canada
2  This bike is ridden by race winners. Developed… 2005-07-01  Canada
3  This bike is ridden by race winners. Developed… 2005-07-01  Canada
4  This bike is ridden by race winners. Developed… 2005-07-01  Canada

  Country          Group                                        RegionImage
0  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
1  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
2  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
3  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
4  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
```

3.3 Data Handling and Cleaning

[10]:
```
# Checking Data Types in the Dataset
Merged_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 58189 entries, 0 to 58188
Data columns (total 45 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   ProductKey            58189 non-null  int64
 1   OrderDate             58189 non-null  datetime64[ns]
 2   ShipDate              58189 non-null  datetime64[ns]
 3   CustomerKey           58189 non-null  int64
 4   PromotionKey          58189 non-null  int64
```

```
 5   SalesTerritoryKey     58189 non-null  int64
 6   SalesOrderNumber      58189 non-null  object
 7   SalesOrderLineNumber  58189 non-null  int64
 8   OrderQuantity         58189 non-null  int64
 9   UnitPrice             58189 non-null  float64
 10  TotalProductCost      58189 non-null  float64
 11  SalesAmount           58189 non-null  float64
 12  TaxAmt                58189 non-null  float64
 13  FirstName             58189 non-null  object
 14  LastName              58189 non-null  object
 15  FullName              58189 non-null  object
 16  BirthDate             58189 non-null  datetime64[ns]
 17  MaritalStatus         58189 non-null  object
 18  Gender                58189 non-null  object
 19  YearlyIncome          58189 non-null  int64
 20  TotalChildren         58189 non-null  int64
 21  NumberChildrenAtHome  58189 non-null  int64
 22  Education             58189 non-null  object
 23  Occupation            58189 non-null  object
 24  HouseOwnerFlag        58189 non-null  int64
 25  NumberCarsOwned       58189 non-null  int64
 26  AddressLine1          58189 non-null  object
 27  DateFirstPurchase     58189 non-null  datetime64[ns]
 28  CommuteDistance       58189 non-null  object
 29  ProductName           58189 non-null  object
 30  SubCategory           58189 non-null  object
 31  Category              58189 non-null  object
 32  StandardCost          58189 non-null  float64
 33  Color                 30747 non-null  object
 34  ListPrice             58189 non-null  float64
 35  DaysToManufacture     58189 non-null  int64
 36  ProductLine           58189 non-null  object
 37  ModelName             58189 non-null  object
 38  Photo                 58189 non-null  object
 39  ProductDescription    58189 non-null  object
 40  StartDate             58189 non-null  datetime64[ns]
 41  Region                58189 non-null  object
 42  Country               58189 non-null  object
 43  Group                 58189 non-null  object
 44  RegionImage           58189 non-null  object
dtypes: datetime64[ns](5), float64(6), int64(12), object(22)
memory usage: 20.4+ MB
```

[11]:
```
# Checking Shape of the Dataset
Merged_Data.shape
```

[11]: (58189, 45)

[12]:
```
# Checking Quantitative Spread of the Dataset
Merged_Data.describe().transpose()
```

[12]:

	count	mean	std	min	25%	50%	75%	max
ProductKey	58189.0	437.208304	118.099746	214.0000	358.0000	479.0000	529.0000	606.0000
CustomerKey	58189.0	18853.004640	5433.374315	11000.0000	14012.0000	18151.0000	23450.0000	29483.0000
PromotionKey	58189.0	1.043427	0.348948	1.0000	1.0000	1.0000	1.0000	14.0000
SalesTerritoryKey	58189.0	6.261716	2.960248	1.0000	4.0000	7.0000	9.0000	10.0000
SalesOrderLineNumber	58189.0	1.887453	1.018829	1.0000	1.0000	2.0000	2.0000	8.0000
OrderQuantity	58189.0	1.569386	1.047532	1.0000	1.0000	1.0000	2.0000	4.0000
UnitPrice	58189.0	413.888218	833.052938	0.5725	4.9900	24.4900	269.9950	3578.2700
TotalProductCost	58189.0	296.539185	560.171436	0.8565	3.3623	12.1924	343.6496	2171.2942
SalesAmount	58189.0	503.666270	941.462817	2.2900	8.9900	32.6000	539.9900	3578.2700
TaxAmt	58189.0	40.293303	75.317027	0.1832	0.7192	2.6080	43.1992	286.2616
YearlyIncome	58189.0	59769.887779	33128.041818	10000.0000	30000.0000	60000.0000	80000.0000	170000.0000
TotalChildren	58189.0	1.838921	1.614467	0.0000	0.0000	2.0000	3.0000	5.0000
NumberChildrenAtHome	58189.0	1.073502	1.580055	0.0000	0.0000	0.0000	2.0000	5.0000
HouseOwnerFlag	58189.0	0.690560	0.462267	0.0000	0.0000	1.0000	1.0000	1.0000
NumberCarsOwned	58189.0	1.502466	1.155496	0.0000	1.0000	2.0000	2.0000	4.0000
StandardCost	58189.0	296.539185	560.171436	0.8565	3.3623	12.1924	343.6496	2171.2942
ListPrice	58189.0	503.666270	941.462817	2.2900	8.9900	32.6000	539.9900	3578.2700
DaysToManufacture	58189.0	1.045215	1.757395	0.0000	0.0000	0.0000	4.0000	4.0000

[13]:
```
# Checking for Duplicate Values in the Dataset
Merged_Data.duplicated().sum()
```

[13]:
```
0
```

Missing Values

[14]:
```
# Checking Missing Values in the Dataset
Merged_Data.isnull().sum()
```

[14]:
```
ProductKey                0
OrderDate                 0
ShipDate                  0
CustomerKey               0
PromotionKey              0
SalesTerritoryKey         0
SalesOrderNumber          0
SalesOrderLineNumber      0
OrderQuantity             0
UnitPrice                 0
TotalProductCost          0
SalesAmount               0
TaxAmt                    0
FirstName                 0
LastName                  0
FullName                  0
BirthDate                 0
MaritalStatus             0
Gender                    0
YearlyIncome              0
TotalChildren             0
NumberChildrenAtHome      0
Education                 0
Occupation                0
HouseOwnerFlag            0
NumberCarsOwned           0
AddressLine1              0
DateFirstPurchase         0
CommuteDistance           0
ProductName               0
SubCategory               0
Category                  0
StandardCost              0
Color                 27442
ListPrice                 0
DaysToManufacture         0
ProductLine               0
ModelName                 0
Photo                     0
ProductDescription        0
StartDate                 0
Region                    0
Country                   0
```

```
Group                       0
RegionImage                 0
dtype: int64
```

[15]:
```
# Checking Missing Value Percentage in the Dataset
Merged_Data.isnull().sum()*100/len(Merged_Data)
```

[15]:
```
ProductKey                0.000000
OrderDate                 0.000000
ShipDate                  0.000000
CustomerKey               0.000000
PromotionKey              0.000000
SalesTerritoryKey         0.000000
SalesOrderNumber          0.000000
SalesOrderLineNumber      0.000000
OrderQuantity             0.000000
UnitPrice                 0.000000
TotalProductCost          0.000000
SalesAmount               0.000000
TaxAmt                    0.000000
FirstName                 0.000000
LastName                  0.000000
FullName                  0.000000
BirthDate                 0.000000
MaritalStatus             0.000000
Gender                    0.000000
YearlyIncome              0.000000
TotalChildren             0.000000
NumberChildrenAtHome      0.000000
Education                 0.000000
Occupation                0.000000
HouseOwnerFlag            0.000000
NumberCarsOwned           0.000000
AddressLine1              0.000000
DateFirstPurchase         0.000000
CommuteDistance           0.000000
ProductName               0.000000
SubCategory               0.000000
Category                  0.000000
StandardCost              0.000000
Color                    47.160116
ListPrice                 0.000000
DaysToManufacture         0.000000
ProductLine               0.000000
ModelName                 0.000000
Photo                     0.000000
ProductDescription        0.000000
```

```
StartDate                 0.000000
Region                    0.000000
Country                   0.000000
Group                     0.000000
RegionImage               0.000000
dtype: float64
```

[16]:
```
# Dropping the Column with Missing Values
Merged_Data = Merged_Data.drop('Color', axis = 1)
```

[17]:
```
# Checking the Shape of Dataset
Merged_Data.shape
```

[17]:
```
(58189, 44)
```

[18]:
```
# Calculating the Gender Count
Merged_Data.Gender.value_counts()
```

[18]:
```
M    29314
F    28875
Name: Gender, dtype: int64
```

[19]:
```
# Replacing the Gender Values'F' and 'M' to 'Female' and 'Male'
Merged_Data['Gender'] = Merged_Data['Gender'].replace('F', 'Female')
Merged_Data['Gender'] = Merged_Data['Gender'].replace('M', 'Male')
Merged_Data.head()
```

[19]:

	ProductKey	OrderDate	ShipDate	CustomerKey	PromotionKey	SalesTerritoryKey	SalesOrderNumber	SalesOrderLineNumber	OrderQuantity	UnitPrice	TotalProductCost	SalesAmount	TaxAmt	FirstName	LastName
0	310	2014-01-01	2014-01-08	21768	1	6	SO43697	1	2	1789.1350	2171.2942	3578.27	286.2616	Cole	Watson
1	310	2014-01-30	2014-02-06	21727	1	6	SO43833	1	4	894.5675	2171.2942	3578.27	286.2616	Arianna	Flores
2	310	2014-02-23	2014-02-28	21921	1	6	SO44027	1	1	3578.2700	2171.2942	3578.27	286.2616	Lucas	Collins
3	310	2014-02-28	2014-03-06	22050	1	6	SO44064	1	1	3578.2700	2171.2942	3578.27	286.2616	Richard	Bailey
4	310	2014-05-18	2014-05-25	22233	1	6	SO44677	1	2	1789.1350	2171.2942	3578.27	286.2616	Xavier	Martin

```
          FullName  BirthDate MaritalStatus  Gender  YearlyIncome  \
0     Watson, Cole 1946-08-22             S    Male         70000
1  Flores, Arianna 1973-06-24             M  Female         40000
2   Collins, Lucas 1961-08-02             M    Male         60000
3  Bailey, Richard 1968-02-18             S    Male         90000
4   Martin, Xavier 1972-04-22             M    Male         50000

   TotalChildren  NumberChildrenAtHome        Education      Occupation  \
0              5                     0        Bachelors      Management
1              0                     0  Graduate Degree  Skilled Manual
2              1                     0  Partial College  Skilled Manual
3              4                     4        Bachelors      Management
4              1                     1  Graduate Degree  Skilled Manual

   HouseOwnerFlag  NumberCarsOwned       AddressLine1 DateFirstPurchase  \
0               1                3   601 Asilomar Dr.        2014-01-01
1               1                0      4082 Shell Ct        2014-01-30
2               1                1   8108 Abbey Court        2014-02-23
3               1                1  5826 Limewood Pl.        2014-02-28
4               1                0      4539 Leeds Ct        2014-05-18

  CommuteDistance       ProductName SubCategory Category  StandardCost  \
0       10+ Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
1       1-2 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
2       0-1 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
3       1-2 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
4       0-1 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942

   ListPrice  DaysToManufacture ProductLine ModelName  \
0    3578.27                  4        Road  Road-150
1    3578.27                  4        Road  Road-150
2    3578.27                  4        Road  Road-150
3    3578.27                  4        Road  Road-150
4    3578.27                  4        Road  Road-150

                                              Photo  \
0  http://www.avising.com/me/LearnPBI/DataSources…
1  http://www.avising.com/me/LearnPBI/DataSources…
2  http://www.avising.com/me/LearnPBI/DataSources…
3  http://www.avising.com/me/LearnPBI/DataSources…
4  http://www.avising.com/me/LearnPBI/DataSources…

                                ProductDescription  StartDate  Region  \
0  This bike is ridden by race winners. Developed… 2005-07-01  Canada
1  This bike is ridden by race winners. Developed… 2005-07-01  Canada
2  This bike is ridden by race winners. Developed… 2005-07-01  Canada
```

```
3  This bike is ridden by race winners. Developed… 2005-07-01  Canada
4  This bike is ridden by race winners. Developed… 2005-07-01  Canada

  Country          Group                                          RegionImage
0  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
1  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
2  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
3  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
4  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
```

[20]:
```
# Checking Gender Count
Merged_Data.Gender.value_counts()
```

[20]:
```
Male      29314
Female    28875
Name: Gender, dtype: int64
```

[21]:
```
# Checking Marital Status Count
Merged_Data.MaritalStatus.value_counts()
```

[21]:
```
M    31992
S    26197
Name: MaritalStatus, dtype: int64
```

[22]:
```
# Function for changing values 'S' and 'M' to 'Single' and 'Married'
def maritalstatus(row):
    if row == 'S':
        return 'Single'
    elif row == 'M':
        return 'Married'
```

[23]:
```
# Changing Marital Status Values 'S' and 'M' to 'Single' and 'Married'
Merged_Data['MaritalStatus'] = Merged_Data['MaritalStatus'].apply(maritalstatus)
Merged_Data.head()
```

[23]:
```
   ProductKey  OrderDate   ShipDate  CustomerKey  PromotionKey  \
0         310 2014-01-01 2014-01-08        21768             1
1         310 2014-01-30 2014-02-06        21727             1
2         310 2014-02-23 2014-02-28        21921             1
3         310 2014-02-28 2014-03-06        22050             1
4         310 2014-05-18 2014-05-25        22233             1

   SalesTerritoryKey SalesOrderNumber  SalesOrderLineNumber  OrderQuantity  \
0                  6          SO43697                     1              2
1                  6          SO43833                     1              4
2                  6          SO44027                     1              1
3                  6          SO44064                     1              1
```

```
4                  6          SO44677                      1              2

   UnitPrice  TotalProductCost  SalesAmount    TaxAmt FirstName LastName  \
0  1789.1350         2171.2942      3578.27  286.2616      Cole   Watson
1   894.5675         2171.2942      3578.27  286.2616   Arianna   Flores
2  3578.2700         2171.2942      3578.27  286.2616     Lucas  Collins
3  3578.2700         2171.2942      3578.27  286.2616   Richard   Bailey
4  1789.1350         2171.2942      3578.27  286.2616    Xavier   Martin

          FullName  BirthDate MaritalStatus  Gender  YearlyIncome  \
0     Watson, Cole 1946-08-22        Single    Male         70000
1  Flores, Arianna 1973-06-24       Married  Female         40000
2   Collins, Lucas 1961-08-02       Married    Male         60000
3  Bailey, Richard 1968-02-18        Single    Male         90000
4   Martin, Xavier 1972-04-22       Married    Male         50000

   TotalChildren  NumberChildrenAtHome        Education      Occupation  \
0              5                     0        Bachelors      Management
1              0                     0  Graduate Degree  Skilled Manual
2              1                     0  Partial College  Skilled Manual
3              4                     4        Bachelors      Management
4              1                     1  Graduate Degree  Skilled Manual

   HouseOwnerFlag  NumberCarsOwned       AddressLine1 DateFirstPurchase  \
0               1                3   601 Asilomar Dr.        2014-01-01
1               1                0      4082 Shell Ct        2014-01-30
2               1                1   8108 Abbey Court        2014-02-23
3               1                1  5826 Limewood Pl.        2014-02-28
4               1                0      4539 Leeds Ct        2014-05-18

  CommuteDistance       ProductName SubCategory Category  StandardCost  \
0       10+ Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
1       1-2 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
2       0-1 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
3       1-2 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942
4       0-1 Miles  Road-150 Red, 62  Road Bikes    Bikes     2171.2942

   ListPrice  DaysToManufacture ProductLine ModelName  \
0    3578.27                  4        Road  Road-150
1    3578.27                  4        Road  Road-150
2    3578.27                  4        Road  Road-150
3    3578.27                  4        Road  Road-150
4    3578.27                  4        Road  Road-150

                                          Photo  \
0  http://www.avising.com/me/LearnPBI/DataSources…
1  http://www.avising.com/me/LearnPBI/DataSources…
```

```
2  http://www.avising.com/me/LearnPBI/DataSources…
3  http://www.avising.com/me/LearnPBI/DataSources…
4  http://www.avising.com/me/LearnPBI/DataSources…

                                ProductDescription  StartDate  Region  \
0  This bike is ridden by race winners. Developed… 2005-07-01  Canada
1  This bike is ridden by race winners. Developed… 2005-07-01  Canada
2  This bike is ridden by race winners. Developed… 2005-07-01  Canada
3  This bike is ridden by race winners. Developed… 2005-07-01  Canada
4  This bike is ridden by race winners. Developed… 2005-07-01  Canada

  Country          Group                                        RegionImage
0  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
1  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
2  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
3  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
4  Canada  North America  http://www.avising.com/me/LearnPBI/DataSources…
```

[24]:
```
# Checking Marital Status Count
Merged_Data.MaritalStatus.value_counts()
```

[24]:
```
Married    31992
Single     26197
Name: MaritalStatus, dtype: int64
```

[25]:
```
# Checking Education Count
Merged_Data.Education.value_counts()
```

[25]:
```
Bachelors              17602
Partial College        15985
Graduate Degree        10231
High School             9865
Partial High School     4506
Name: Education, dtype: int64
```

[26]:
```
# Checking Occupation Count
Merged_Data.Occupation.value_counts()
```

[26]:
```
Professional      18358
Skilled Manual    13636
Management        10175
Clerical           9315
Manual             6705
Name: Occupation, dtype: int64
```

[27]:
```
# Checking Category Count
Merged_Data.Category.value_counts()
```

[27]:
```
Accessories    34319
Bikes          15205
Clothing        8665
Name: Category, dtype: int64
```

[28]:
```
# Checking SubCategory Count
Merged_Data.SubCategory.value_counts()
```

[28]:
```
Tires and Tubes      16299
Road Bikes            8068
Bottles and Cages     7719
Helmets               6171
Mountain Bikes        4970
Jerseys               3179
Touring Bikes         2167
Caps                  2095
Fenders               2014
Gloves                1363
Shorts                 958
Cleaners               864
Hydration Packs        706
Socks                  543
Vests                  527
Bike Racks             308
Bike Stands            238
Name: SubCategory, dtype: int64
```

[29]:
```
# Correcting ProductName column
Merged_Data['ProductName'] = Merged_Data['ProductName'].str.replace(',', '-')
```

[30]:
```
# Dropping Columns Not Required
New_Data = Merged_Data.loc[:, ~Merged_Data.columns.
 ↪isin(['ProductKey','PromotionKey', 'SalesTerritoryKey', 'SalesOrderNumber',␣
 ↪'SalesOrderLineNumber', 'FirstName', 'LastName', 'FullName', 'AddressLine1',␣
 ↪'DaysToManufacture', 'ProductLine', 'Photo', 'ProductDescription', 'Region',␣
 ↪'Group', 'RegionImage'])]
New_Data.head()
```

[30]:

	OrderDate	ShipDate	CustomerKey	OrderQuantity	UnitPrice	TotalProductCost	SalesAmount	TaxAmt	BirthDate	MaritalStatus	Gender
0	2014-01-01	2014-01-08	21768	2	1789.1350	2171.2942	3578.27	286.2616	1946-08-22	Single	Male
1	2014-01-30	2014-02-06	21727	4	894.5675						
2	2014-02-23	2014-02-28	21921	1	3578.2700						
3	2014-02-28	2014-03-06	22050	1	3578.2700						
4	2014-05-18	2014-05-25	22233	2	1789.1350						

```
1         2171.2942      3578.27  286.2616 1973-06-24       Married  Female
2         2171.2942      3578.27  286.2616 1961-08-02       Married    Male
3         2171.2942      3578.27  286.2616 1968-02-18        Single    Male
4         2171.2942      3578.27  286.2616 1972-04-22       Married    Male

   YearlyIncome  TotalChildren  NumberChildrenAtHome        Education  \
0         70000              5                     0        Bachelors
1         40000              0                     0  Graduate Degree
2         60000              1                     0  Partial College
3         90000              4                     4        Bachelors
4         50000              1                     1  Graduate Degree

       Occupation  HouseOwnerFlag  NumberCarsOwned DateFirstPurchase  \
0      Management               1                3        2014-01-01
1  Skilled Manual               1                0        2014-01-30
2  Skilled Manual               1                1        2014-02-23
3      Management               1                1        2014-02-28
4  Skilled Manual               1                0        2014-05-18

  CommuteDistance       ProductName SubCategory Category  StandardCost  \
0       10+ Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
1       1-2 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
2       0-1 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
3       1-2 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
4       0-1 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942

   ListPrice ModelName  StartDate Country
0    3578.27  Road-150 2005-07-01  Canada
1    3578.27  Road-150 2005-07-01  Canada
2    3578.27  Road-150 2005-07-01  Canada
3    3578.27  Road-150 2005-07-01  Canada
4    3578.27  Road-150 2005-07-01  Canada
```

[31]:
```
# New_Data = Merged_Data.loc[:, ~Merged_Data.columns.
 ↪isin(['OrderDate','ShipDate', 'CustomerKey', 'OrderQuantity', 'UnitPrice',␣
 ↪'TotalProductCost', 'SalesAmount', 'BirthDate', 'MaritalStatus', 'Gender',␣
 ↪'YearlyIncome', 'TotalChildren', 'NumberChildrenAtHome', 'Education',␣
 ↪'Occupation', 'HouseOwnerFlag', 'NumberCarsOwned', 'DateFirstPurchase',␣
 ↪'CommuteDistance', 'ProductName', 'SubCategory', 'Category', 'StandardCost',␣
 ↪'ListPrice', 'ModelName', 'StartDate', 'Country'])]
# New_Data.head()
```

[32]:
```
# Checking the Shape of Dataset
New_Data.shape
```

[32]: (58189, 28)

Adding Columns

[33]:
```
# Converting OrderDate
# New_Data['OrderDate'] = pd.to_datetime(New_Data['OrderDate'])

# Extracting year from OrderDate
New_Data['Sale_Year'] = New_Data['OrderDate'].dt.year

# Extracting month from OrderDate
New_Data['Sale_Month'] = New_Data['OrderDate'].dt.month

# Extracting day from OrderDate
New_Data['Sale_Day'] = New_Data['OrderDate'].dt.day

# Extracting day_of_week from OrderDate
New_Data['Sale_Week'] = New_Data['OrderDate'].dt.dayofweek

# Extracting day_of_week from OrderDate
New_Data['Sale_Day_Name'] = New_Data['OrderDate'].dt.day_name()
```

[34]:
```
# Calculating Total Invoice Amount and Profit
New_Data['Total_Invoice_Amount'] = New_Data['SalesAmount'] + New_Data['TaxAmt']
New_Data['Profit'] = (New_Data['UnitPrice'] * New_Data['OrderQuantity']) -␣
 ↪New_Data['TotalProductCost']
```

[35]:
```
# Calculating Age of the customer
New_Data['Age'] = New_Data['OrderDate'].dt.year - New_Data['BirthDate'].dt.year
```

[36]:
```
# Reading the Data Set
New_Data.head()
```

[36]:

	OrderDate	ShipDate	CustomerKey	OrderQuantity	UnitPrice	TotalProductCost	SalesAmount	TaxAmt	BirthDate	MaritalStatus	Gender	YearlyIncome	TotalChildren	NumberChildrenAtHome	Education
0	2014-01-01	2014-01-08	21768	2	1789.1350	2171.2942	3578.27	286.2616	1946-08-22	Single	Male	70000	5	0	Bachelors
1	2014-01-30	2014-02-06	21727	4	894.5675	2171.2942	3578.27	286.2616	1973-06-24	Married	Female	40000	0	0	Graduate Degree
2	2014-02-23	2014-02-28	21921	1	3578.2700	2171.2942	3578.27	286.2616	1961-08-02	Married	Male				
3	2014-02-28	2014-03-06	22050	1	3578.2700	2171.2942	3578.27	286.2616	1968-02-18	Single	Male				
4	2014-05-18	2014-05-25	22233	2	1789.1350	2171.2942	3578.27	286.2616	1972-04-22	Married	Male				

```
2         60000              1                    0  Partial College
3         90000              4                    4        Bachelors
4         50000              1                    1  Graduate Degree

       Occupation  HouseOwnerFlag  NumberCarsOwned DateFirstPurchase  \
0      Management               1                3        2014-01-01
1  Skilled Manual               1                0        2014-01-30
2  Skilled Manual               1                1        2014-02-23
3      Management               1                1        2014-02-28
4  Skilled Manual               1                0        2014-05-18

  CommuteDistance       ProductName SubCategory Category  StandardCost  \
0       10+ Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
1       1-2 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
2       0-1 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
3       1-2 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
4       0-1 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942

   ListPrice ModelName  StartDate Country  Sale_Year  Sale_Month  Sale_Day  \
0    3578.27  Road-150 2005-07-01  Canada       2014           1         1
1    3578.27  Road-150 2005-07-01  Canada       2014           1        30
2    3578.27  Road-150 2005-07-01  Canada       2014           2        23
3    3578.27  Road-150 2005-07-01  Canada       2014           2        28
4    3578.27  Road-150 2005-07-01  Canada       2014           5        18

   Sale_Week Sale_Day_Name  Total_Invoice_Amount     Profit  Age
0          2     Wednesday             3864.5316  1406.9758   68
1          3      Thursday             3864.5316  1406.9758   41
2          6        Sunday             3864.5316  1406.9758   53
3          4        Friday             3864.5316  1406.9758   46
4          6        Sunday             3864.5316  1406.9758   42
```

[37]:
```
# Checking the Dataset Shape
New_Data.shape
```

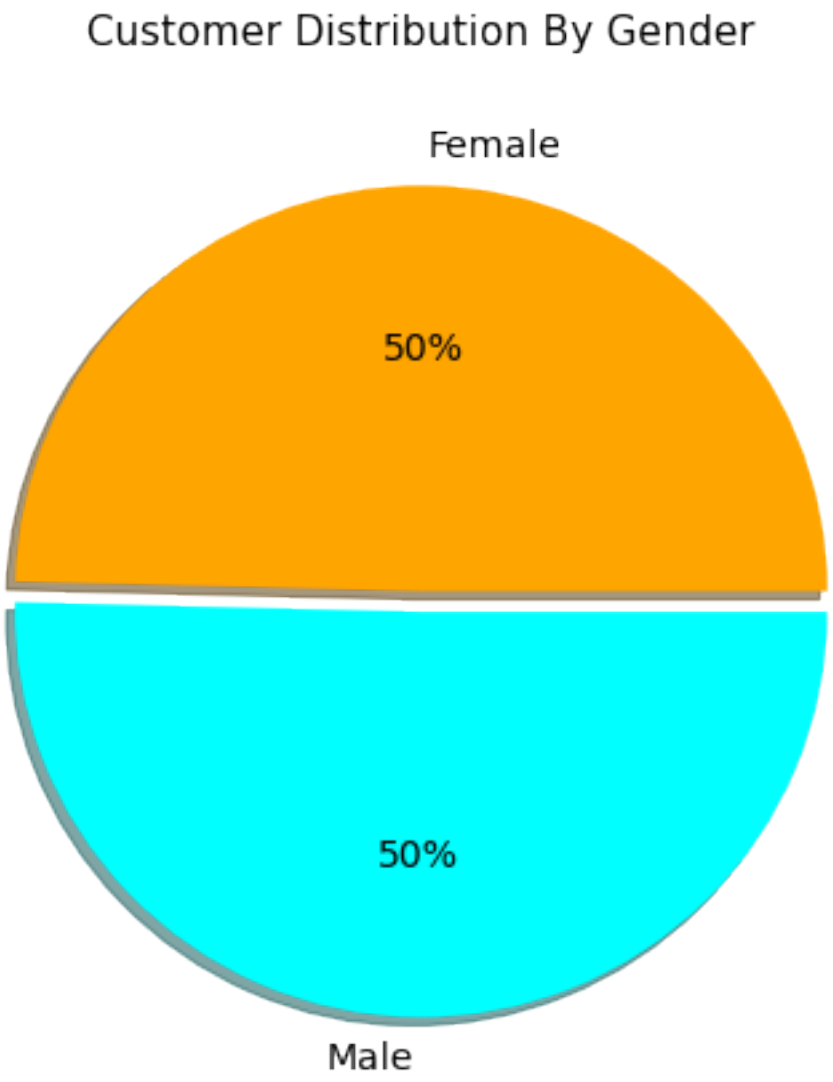
[37]:
```
(58189, 36)
```

0.1.6 3. EDA on Data

[38]:
```
# Customer Distribution by Gender
G = New_Data.groupby('Gender')['CustomerKey'].count()
G
```

[38]:
```
Gender
Female    28875
Male      29314
Name: CustomerKey, dtype: int64
```

[39]:
```
# Plotting Gender Attribute
plt.figure(figsize=(12,7))
explode = (0, 0.05)
plt.pie(G, colors = ( "orange", "cyan"), explode = explode, shadow = True,␣
 ↪labels = ['Female','Male'], autopct='%0.0f%%', textprops={'fontsize': 14})
plt.title('Customer Distribution By Gender', fontsize=15, pad = 15)
plt.show()
```

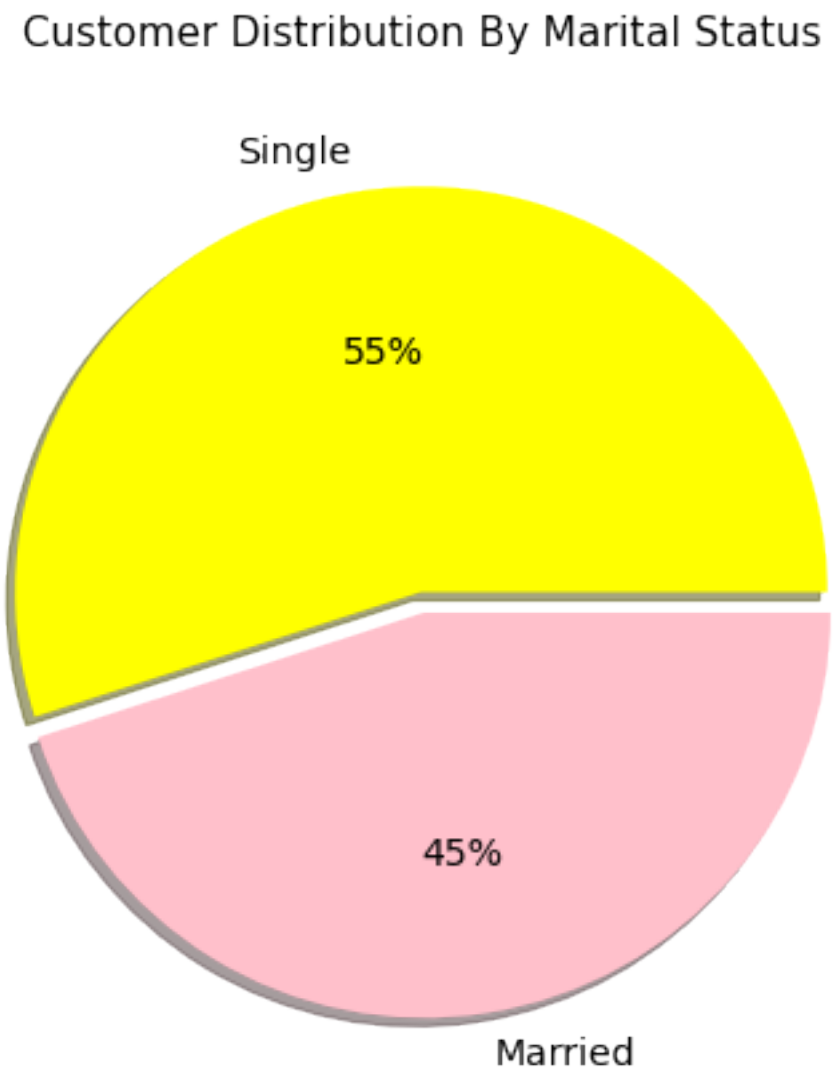


OBSERVATION: Male and Female customers are equal

[40]:
```
# Customer Distribution by Marital Status
M = New_Data.groupby('MaritalStatus')['CustomerKey'].count()
M
```

[40]:
```
MaritalStatus
Married    31992
Single     26197
Name: CustomerKey, dtype: int64
```

[41]:
```
# Plotting Marital Status Attribute
plt.figure(figsize=(12,7))
explode = (0, 0.05)
plt.pie(M, colors = ( "yellow", "pink"), explode = explode, shadow = True,␣
 ↪labels = ['Single','Married'], autopct='%0.0f%%', textprops={'fontsize': 14})
plt.title('Customer Distribution By Marital Status', fontsize=15, pad = 15)
plt.show()
```

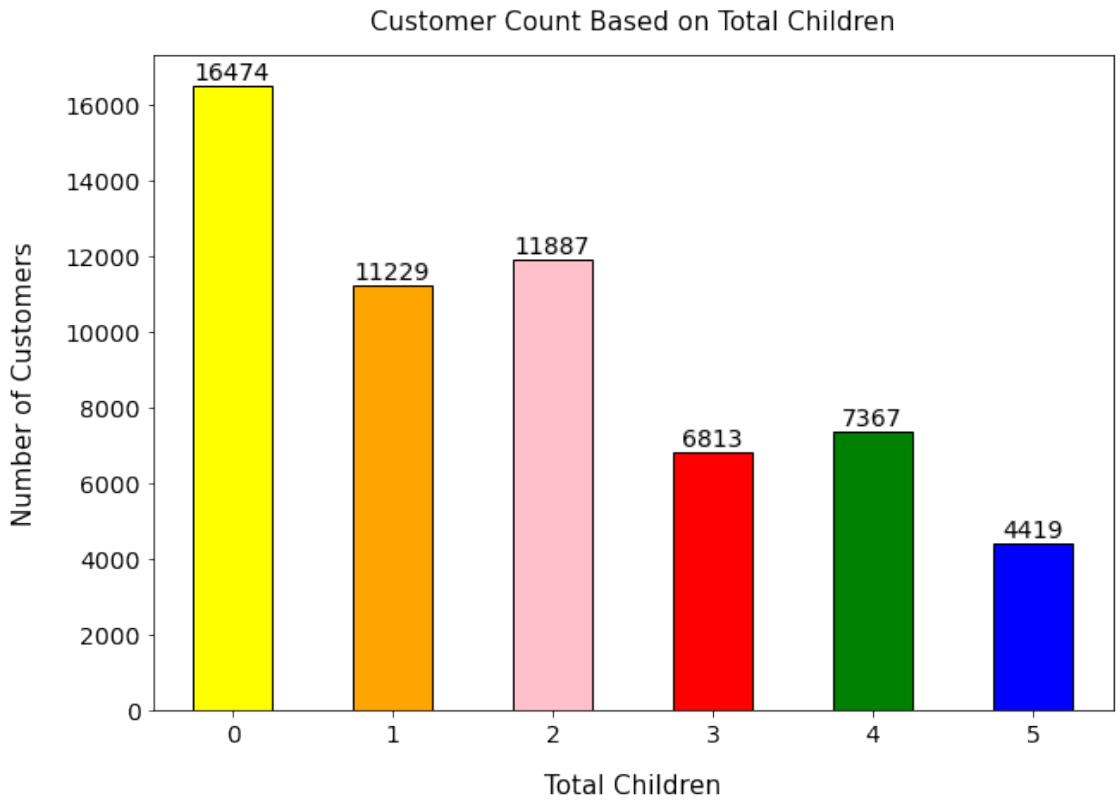


OBSERVATION: Married Customer are more than Single Customers

[42]:
```
# Customer Distribution by TotalChildren
C = New_Data.groupby('TotalChildren')['CustomerKey'].count()
C
```

[42]:
```
TotalChildren
0    16474
1    11229
2    11887
3     6813
4     7367
5     4419
Name: CustomerKey, dtype: int64
```

[43]:
```
# Plotting TotalChildren Attribute
plt.rcParams["figure.figsize"] = (10, 7)
c = ['yellow', 'orange', 'pink', 'red', 'green', 'blue']
ax = C.plot(kind ='bar', stacked = False, color = c, rot = 0, edgecolor =␣
 ↪'Black', fontsize = 14)
ax.set_title("Customer Count Based on Total Children", y = 1, fontsize = 15,␣
 ↪pad = 15)
ax.set_xlabel('Total Children', fontsize = 15, labelpad = 15)
ax.set_ylabel('Number of Customers',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('0', '1', '2', '3', '4', '5'), fontsize = 14)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```



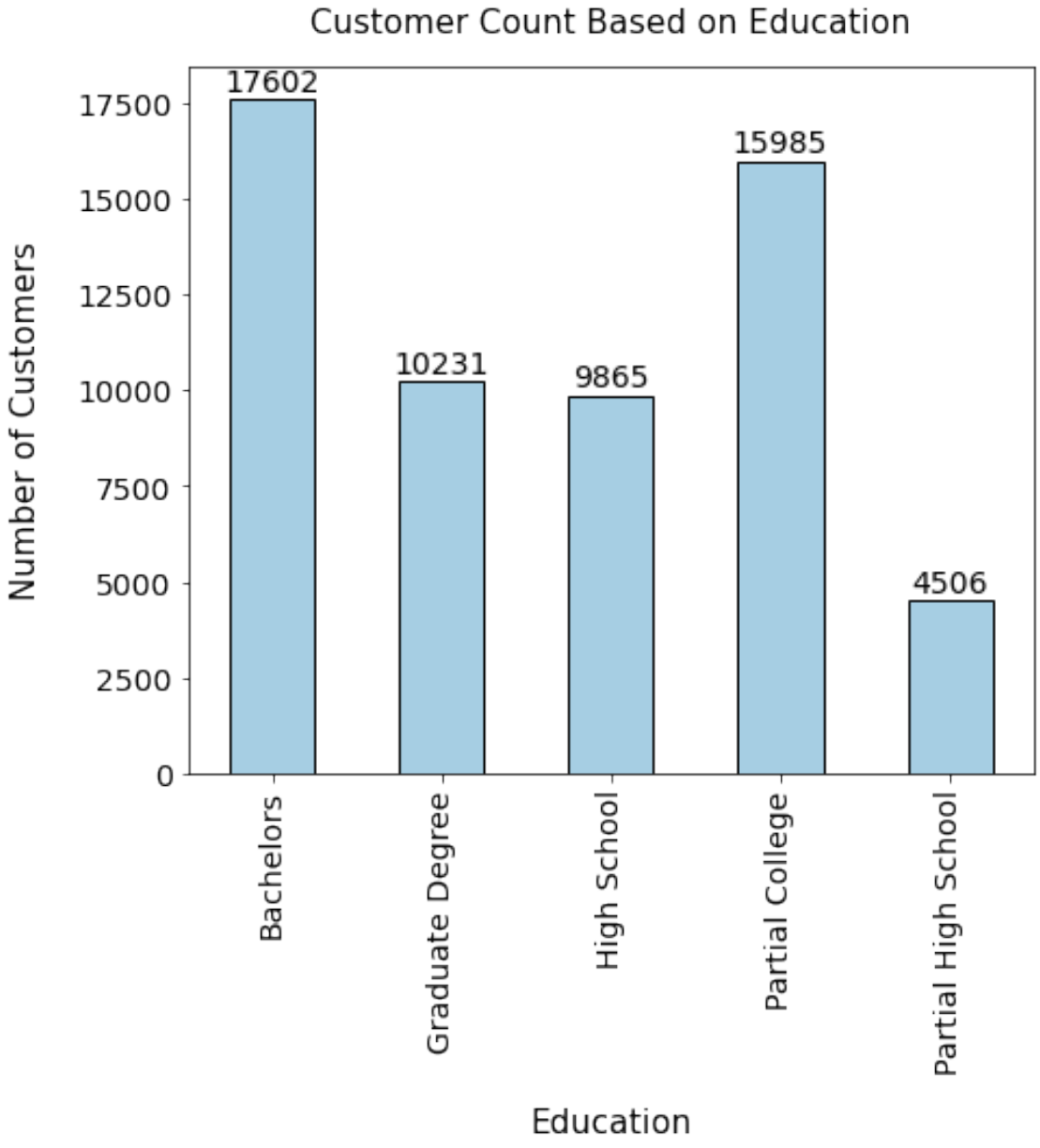
OBSERVATION: Customers having children less than 3 are more

[44]:
```
# Customer Distribution by Education
E = New_Data.groupby('Education')['CustomerKey'].count()
E
```

[44]:
```
Education
Bachelors              17602
Graduate Degree        10231
High School             9865
Partial College        15985
Partial High School     4506
Name: CustomerKey, dtype: int64
```

[45]:
```
# Plotting Education Attribute
plt.rcParams["figure.figsize"] = (7, 6)
# c = ['yellow', 'orange', 'pink', 'red', 'green', 'blue']
ax = E.plot(kind ='bar', stacked = False, colormap = 'Paired', rot = 90,␣
 ↪edgecolor = 'Black', fontsize = 14)
ax.set_title("Customer Count Based on Education", y = 1, fontsize = 15, pad =␣
 ↪15)
ax.set_xlabel('Education', fontsize = 15, labelpad = 15)
```

```
ax.set_ylabel('Number of Customers',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('Bachelors', 'Graduate Degree', 'High School', 'Partial␣
 ↪College', 'Partial High School'), fontsize = 14)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```

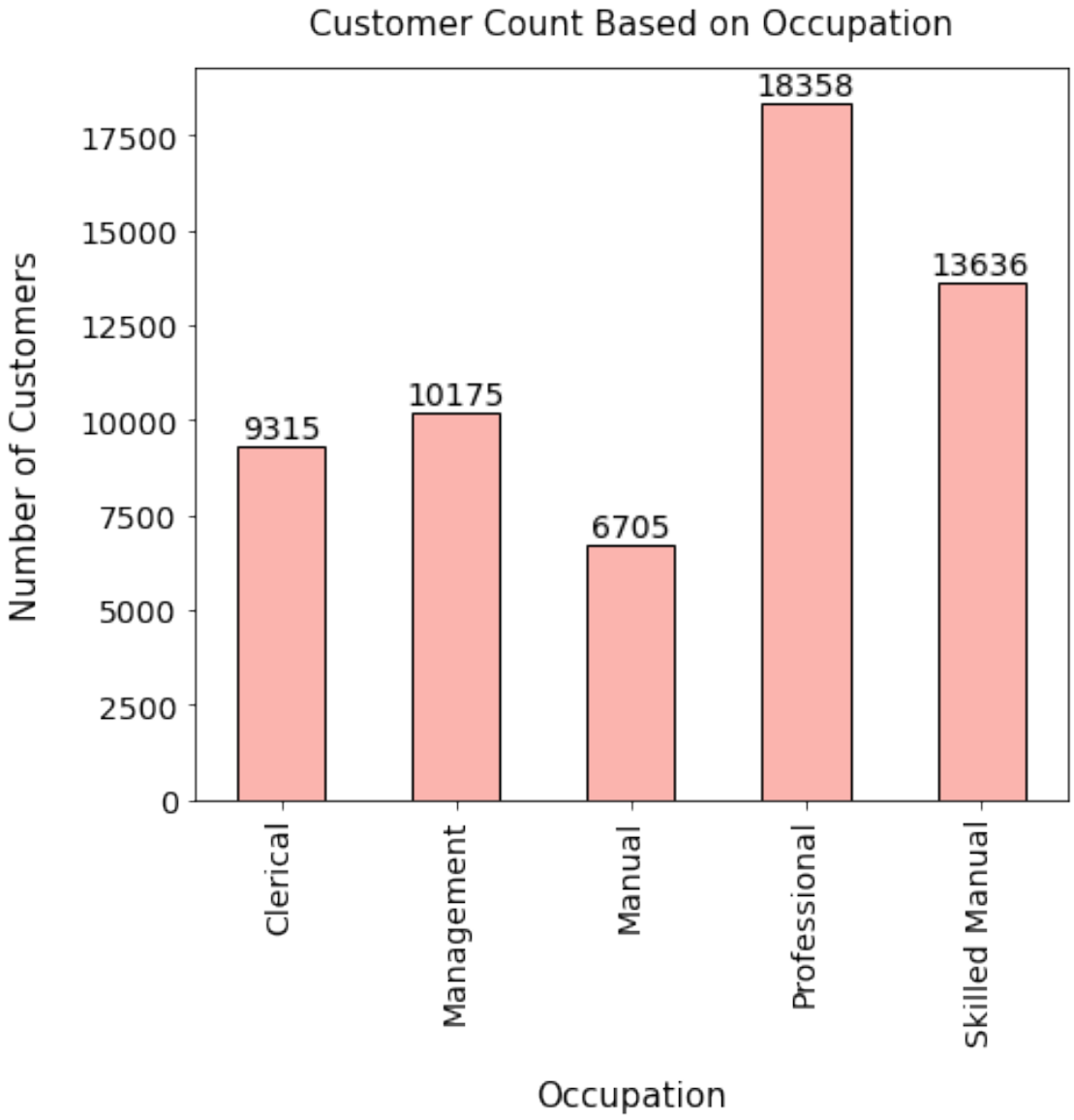


OBSERVATION: Most of the Customers education is Bachelors or Partial College education

[46]:
```
# Customer Distribution by Occupation
O = New_Data.groupby('Occupation')['CustomerKey'].count()
O
```

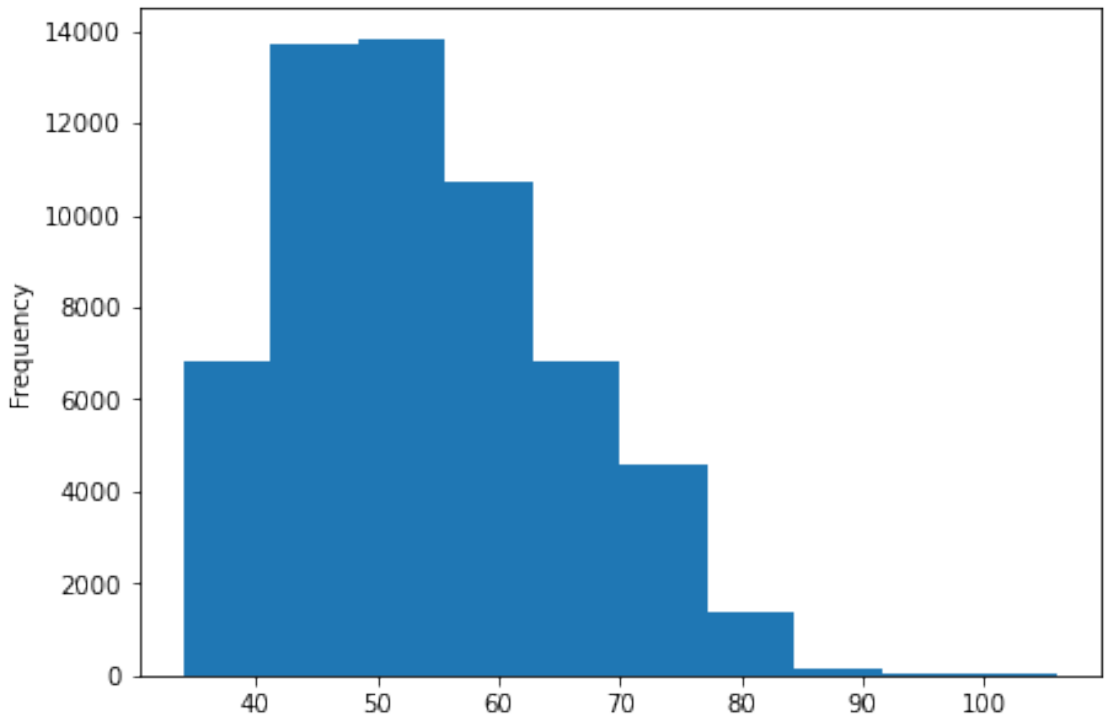
[46]:
```
Occupation
Clerical            9315
Management         10175
Manual              6705
Professional       18358
Skilled Manual     13636
Name: CustomerKey, dtype: int64
```

[47]:
```
# Plotting Occupation Attribute
plt.rcParams["figure.figsize"] = (7, 6)
# c = ['yellow', 'orange', 'pink', 'red', 'green', 'blue']
ax = O.plot(kind ='bar', stacked = False, colormap = 'Pastel1', rot = 90,␣
 ↪edgecolor = 'Black', fontsize = 14)
ax.set_title("Customer Count Based on Occupation", y = 1, fontsize = 15, pad =␣
 ↪15)
ax.set_xlabel('Occupation', fontsize = 15, labelpad = 15)
ax.set_ylabel('Number of Customers',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('Clerical', 'Management', 'Manual', 'Professional',␣
 ↪'Skilled Manual'), fontsize = 14)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```



OBSERVATION: Most of the Customers belong to Professional, Skilled Manual and Management occupations

[48]:
```
plt.figure(figsize=(7, 5))
New_Data['Age'].plot(kind="hist")
plt.show()
```



[49]:
```
# Function for age groups
def age_group(row):
    if row >= 10 and row < 40:
        return 'Young Age'
    elif row >= 40 and row < 60:
        return 'Middle Age'
    elif row > 60:
        return 'Old Age'
```

[50]:
```
# Adding Age Group Column to the dataset
New_Data['Age_Group'] = New_Data['Age'].apply(age_group)
New_Data.head()
```

[50]:

	OrderDate	ShipDate	CustomerKey	OrderQuantity	UnitPrice	\
0	2014-01-01	2014-01-08	21768	2	1789.1350	
1	2014-01-30	2014-02-06	21727	4	894.5675	
2	2014-02-23	2014-02-28	21921	1	3578.2700	
3	2014-02-28	2014-03-06	22050	1	3578.2700	
4	2014-05-18	2014-05-25	22233	2	1789.1350	

	TotalProductCost	SalesAmount	TaxAmt	BirthDate	MaritalStatus	Gender	\
0	2171.2942	3578.27	286.2616	1946-08-22	Single	Male	
1	2171.2942	3578.27	286.2616	1973-06-24	Married	Female	

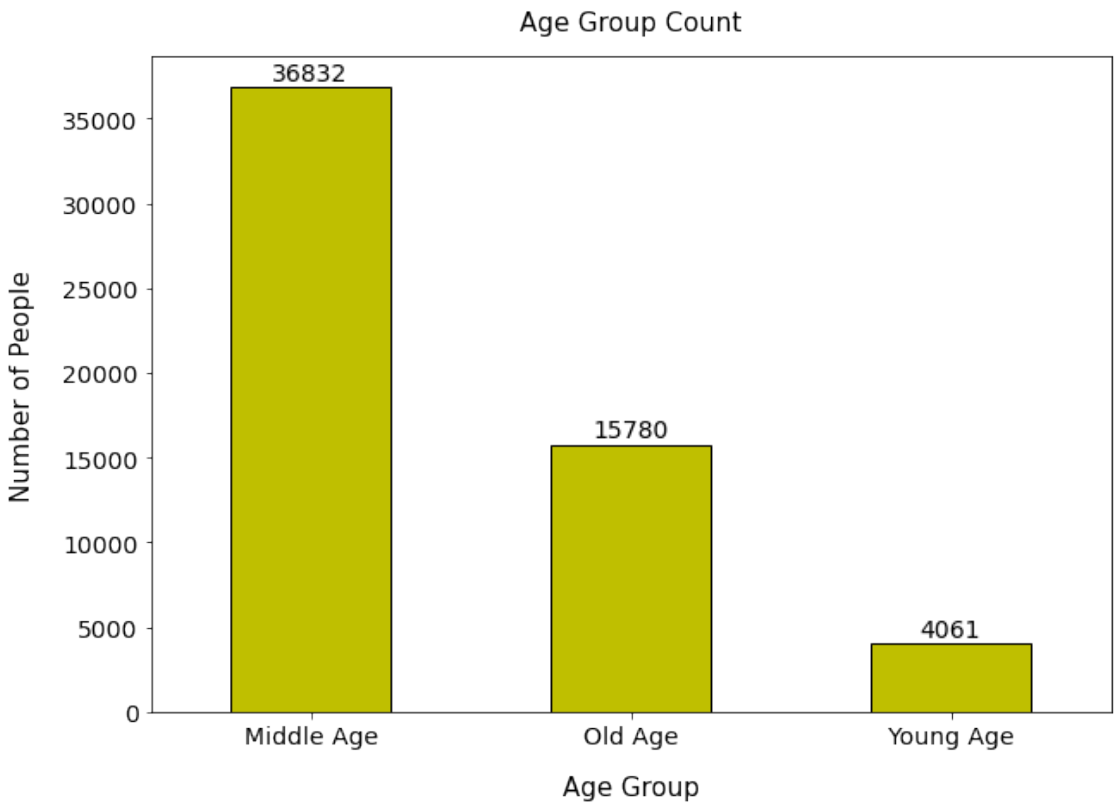
```
2         2171.2942      3578.27  286.2616 1961-08-02       Married    Male
3         2171.2942      3578.27  286.2616 1968-02-18        Single    Male
4         2171.2942      3578.27  286.2616 1972-04-22       Married    Male

   YearlyIncome  TotalChildren  NumberChildrenAtHome        Education  \
0         70000              5                     0       Bachelors
1         40000              0                     0  Graduate Degree
2         60000              1                     0  Partial College
3         90000              4                     4       Bachelors
4         50000              1                     1  Graduate Degree

       Occupation  HouseOwnerFlag  NumberCarsOwned DateFirstPurchase  \
0      Management               1                3        2014-01-01
1  Skilled Manual               1                0        2014-01-30
2  Skilled Manual               1                1        2014-02-23
3      Management               1                1        2014-02-28
4  Skilled Manual               1                0        2014-05-18

  CommuteDistance       ProductName SubCategory Category  StandardCost  \
0       10+ Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
1       1-2 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
2       0-1 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
3       1-2 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942
4       0-1 Miles  Road-150 Red- 62  Road Bikes    Bikes     2171.2942

   ListPrice ModelName  StartDate Country  Sale_Year  Sale_Month  Sale_Day  \
0    3578.27  Road-150 2005-07-01  Canada       2014           1         1
1    3578.27  Road-150 2005-07-01  Canada       2014           1        30
2    3578.27  Road-150 2005-07-01  Canada       2014           2        23
3    3578.27  Road-150 2005-07-01  Canada       2014           2        28
4    3578.27  Road-150 2005-07-01  Canada       2014           5        18

   Sale_Week Sale_Day_Name  Total_Invoice_Amount     Profit  Age   Age_Group
0          2     Wednesday             3864.5316  1406.9758   68     Old Age
1          3      Thursday             3864.5316  1406.9758   41  Middle Age
2          6        Sunday             3864.5316  1406.9758   53  Middle Age
3          4        Friday             3864.5316  1406.9758   46  Middle Age
4          6        Sunday             3864.5316  1406.9758   42  Middle Age
```

[51]:
```
# Customer Distribution by Age
AG = New_Data.groupby('Age_Group')['CustomerKey'].count()
AG
```

[51]:
```
Age_Group
Middle Age    36832
Old Age       15780
Young Age      4061
```

```
Name: CustomerKey, dtype: int64
```

[52]:
```
# Plotting AgeGroup Attribute
plt.figure(figsize=(10, 7))
ax = AG.plot(kind='bar', rot=0, color="y", edgecolor = 'Black', fontsize = 14)
ax.set_title("Age Group Count", y = 1, fontsize = 15, pad = 15)
ax.set_xlabel('Age Group', fontsize = 15, labelpad = 15)
ax.set_ylabel('Number of People',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('Middle Age', 'Old Age', 'Young Age'), fontsize = 14)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```

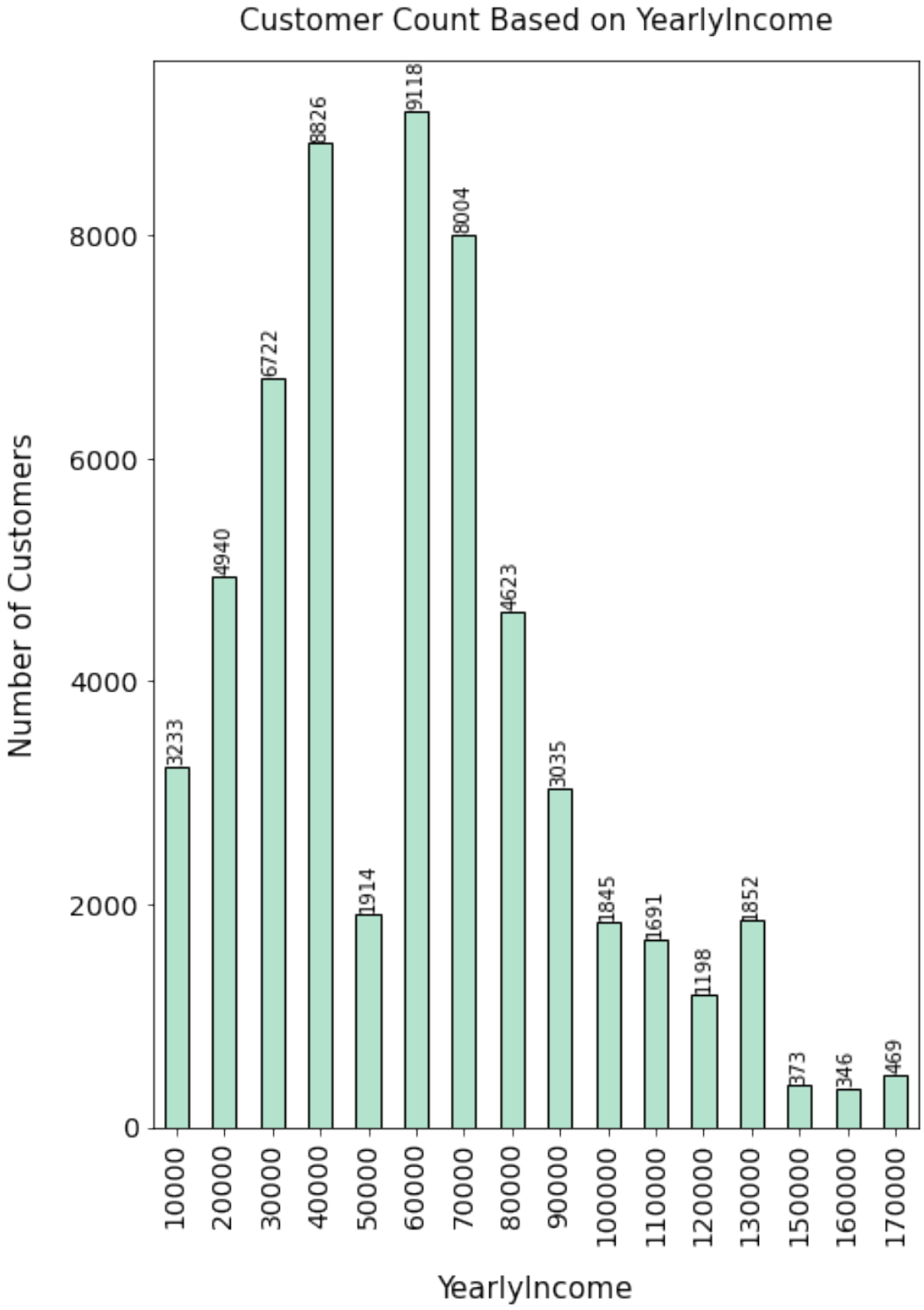


OBSERVATION: Most of the customers belong to middle age group i.e. 40-60 years

[53]:
```
# Customer Distribution by YearlyIncome
Y = New_Data.groupby('YearlyIncome')['CustomerKey'].count()
Y
```

[53]:
```
YearlyIncome
10000     3233
20000     4940
30000     6722
40000     8826
50000     1914
60000     9118
70000     8004
80000     4623
90000     3035
100000    1845
110000    1691
120000    1198
130000    1852
150000     373
160000     346
170000     469
Name: CustomerKey, dtype: int64
```

[54]:
```
# Plotting YearlyIncome Attribute
plt.rcParams["figure.figsize"] = (7, 10)
# c = ['yellow', 'orange', 'pink', 'red', 'green', 'blue']
ax = Y.plot(kind ='bar', stacked = False, colormap = 'Pastel2', rot = 90,␣
 ↪edgecolor = 'Black', fontsize = 14)
ax.set_title("Customer Count Based on YearlyIncome", y = 1, fontsize = 15, pad␣
 ↪= 15)
ax.set_xlabel('YearlyIncome', fontsize = 15, labelpad = 15)
ax.set_ylabel('Number of Customers',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('10000', '20000', '30000', '40000', '50000', '60000',␣
 ↪'70000', '80000', '90000', '100000', '110000', '120000', '130000', '150000',␣
 ↪'160000', '170000'), fontsize = 14)
# ax.set_xticklabels(ax.get_xticklabels(), rotation=90)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10,␣
 ↪rotation = 90)
plt.show()
```


Customer Count Based on YearlyIncome
Number of Customers
YearlyIncome
0
2000
4000
6000
8000
10000
20000
30000
40000
50000
60000
70000
80000
90000
100000
110000
120000
130000
150000
160000
170000
3233
4940
6722
8826
1914
9118
8004
4623
3035
1845
1691
1198
1852
373
346
469

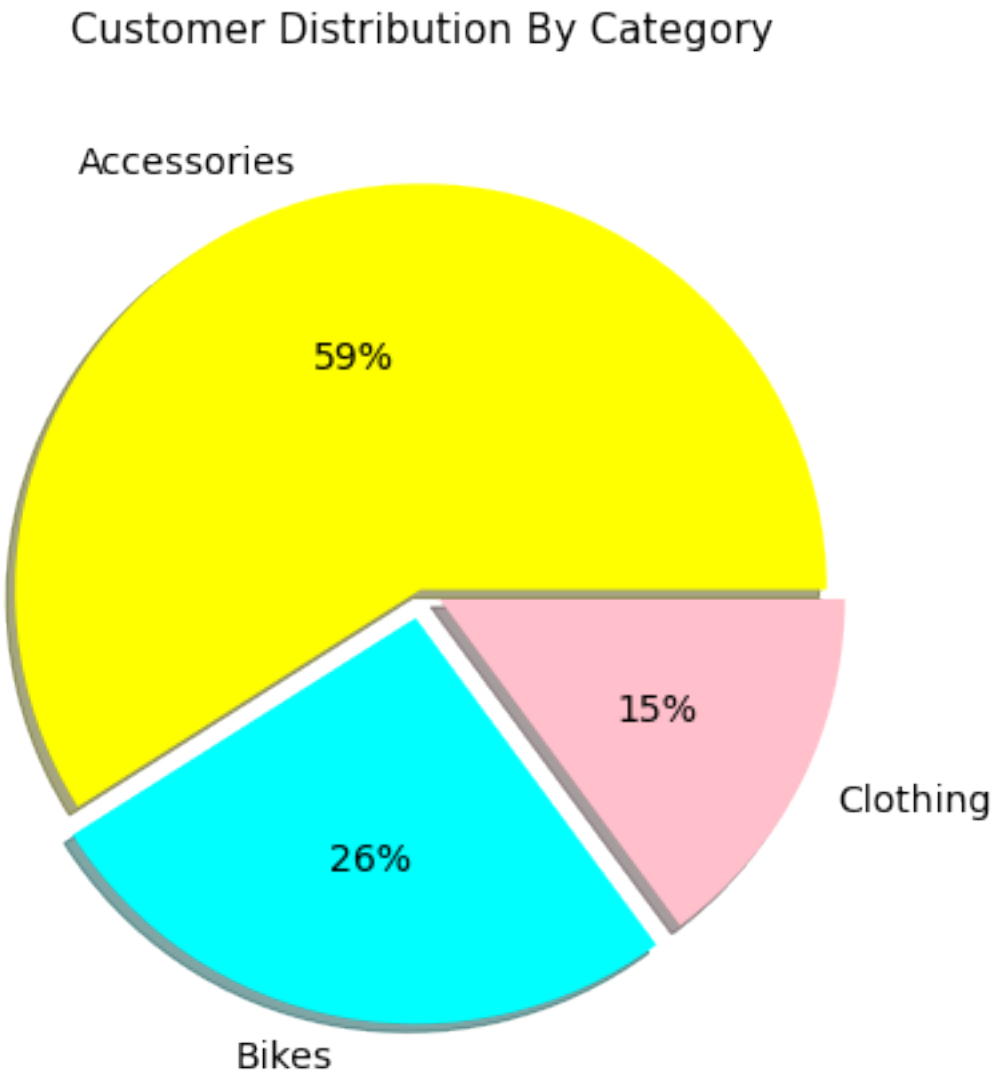
OBSERVATION: Most of the Customers YearlyIncome is below 100K

There are more customers in YearlyIncome Between 10K-40K and 60K-70K

[55]:
```
# Customer Distribution by Category
C = New_Data.groupby('Category')['CustomerKey'].count()
C
```

[55]:
```
Category
Accessories    34319
Bikes          15205
Clothing        8665
Name: CustomerKey, dtype: int64
```

[56]:
```
# Plotting Category Attribute
plt.figure(figsize=(12,7))
explode = (0, 0.07, 0.05)
plt.pie(C,  colors = ( "yellow", "cyan", "pink"), explode = explode, shadow =␣
 ↪True, labels = ['Accessories','Bikes', 'Clothing'], autopct='%0.0f%%',␣
 ↪textprops={'fontsize': 14})
plt.title('Customer Distribution By Category', fontsize=15, pad = 15)
plt.show()
```



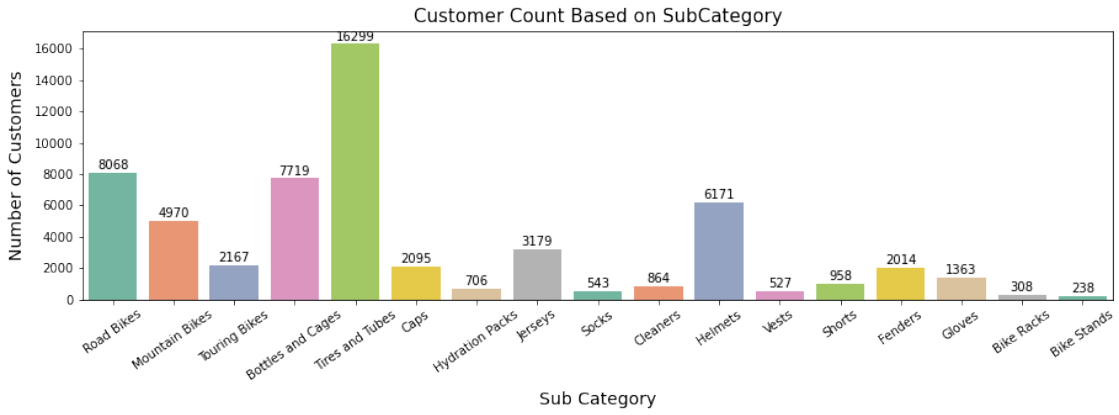
OBSERVATION: Most of the Customers buy from Accessories Category

[57]:
```
# Customer Distribution by SubCategory
SC = New_Data.groupby('SubCategory')['CustomerKey'].count()
SC
```

[57]:
```
SubCategory
Bike Racks              308
Bike Stands             238
Bottles and Cages      7719
Caps                   2095
Cleaners                864
Fenders                2014
```

```
Gloves                 1363
Helmets                6171
Hydration Packs         706
Jerseys                3179
Mountain Bikes         4970
Road Bikes             8068
Shorts                  958
Socks                   543
Tires and Tubes       16299
Touring Bikes          2167
Vests                   527
Name: CustomerKey, dtype: int64
```

[58]:
```
# Plotting SubCategory Attribute
plt.figure(figsize=(15,4))
ax = sns.countplot(x="SubCategory", data = New_Data, palette = 'Set2')
plt.title('Customer Count Based on SubCategory', fontsize = 15, pad = 7)
plt.xlabel('Sub Category', fontsize = 14, labelpad = 7)
plt.ylabel('Number of Customers', fontsize = 14, labelpad = 7)
ax.set_xticklabels(ax.get_xticklabels(), rotation=35)
for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10, ␣
 ↪rotation = 0)
plt.show()
```

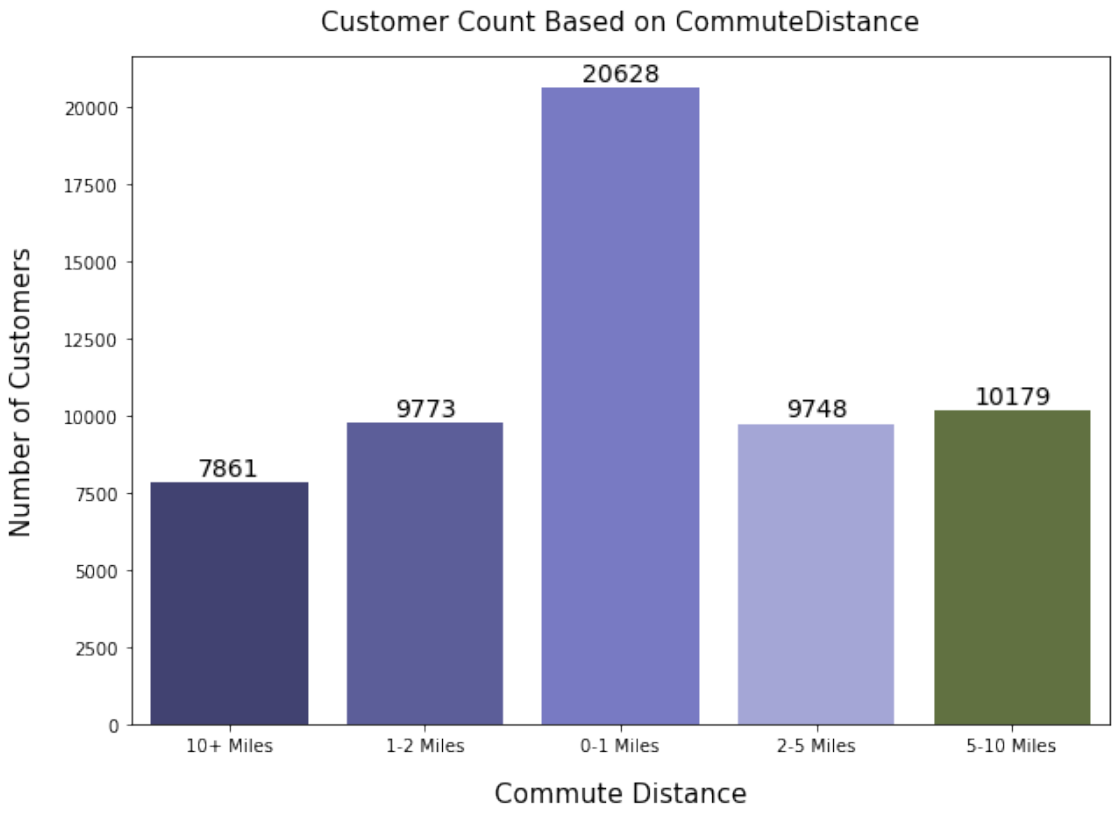


OBSERVATION: Most of the Customers are interested to buy Tires and Tubes, Road Bikes, Bottles and Cages, Helmets

[59]:
```
# Customer Distribution by CommuteDistance
CD = New_Data.groupby('CommuteDistance')['CustomerKey'].count()
CD
```

[59]:
```
CommuteDistance
0-1 Miles     20628
1-2 Miles      9773
10+ Miles      7861
2-5 Miles      9748
5-10 Miles    10179
Name: CustomerKey, dtype: int64
```

[60]:
```
# Plotting CommuteDistance Attribute
plt.figure(figsize=(10,7))
ax = sns.countplot(x="CommuteDistance", data = New_Data, palette = 'tab20b')
plt.title('Customer Count Based on CommuteDistance', fontsize = 15, pad = 15)
plt.xlabel('Commute Distance', fontsize = 15, labelpad = 15)
plt.ylabel('Number of Customers', fontsize = 15, labelpad = 15)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```



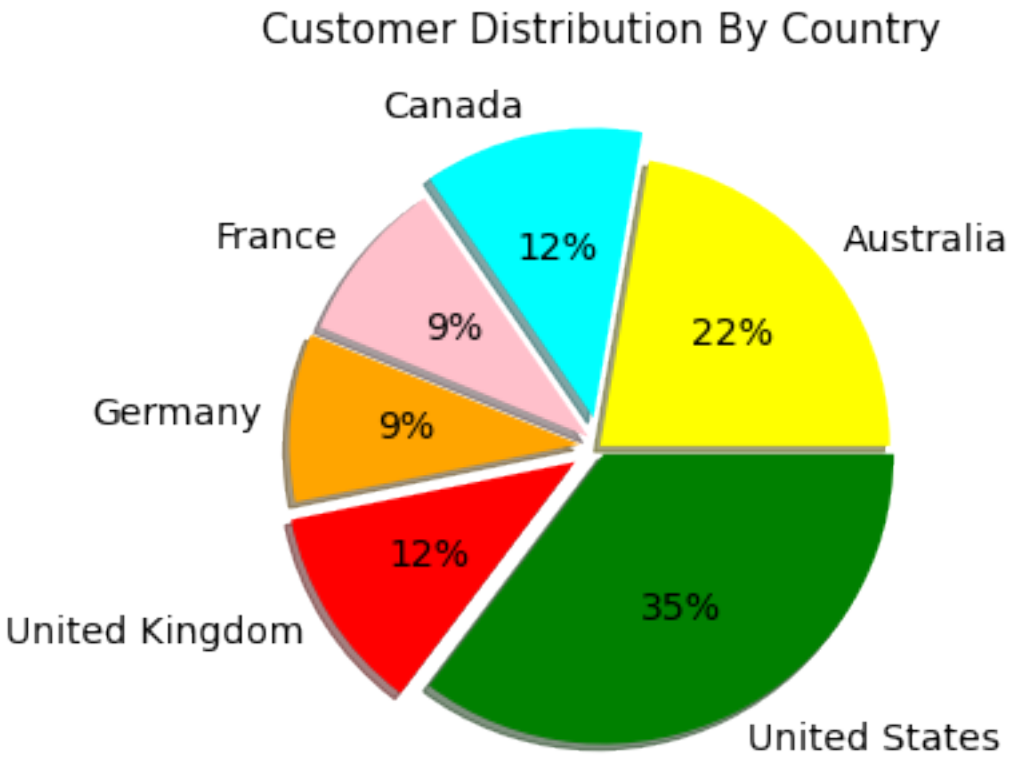
OBSERVATION: Commute Distance 0-1 Miles have more Customer count

[61]:
```
# Customer Distribution by Country
country = New_Data.groupby('Country')['CustomerKey'].count()
country
```

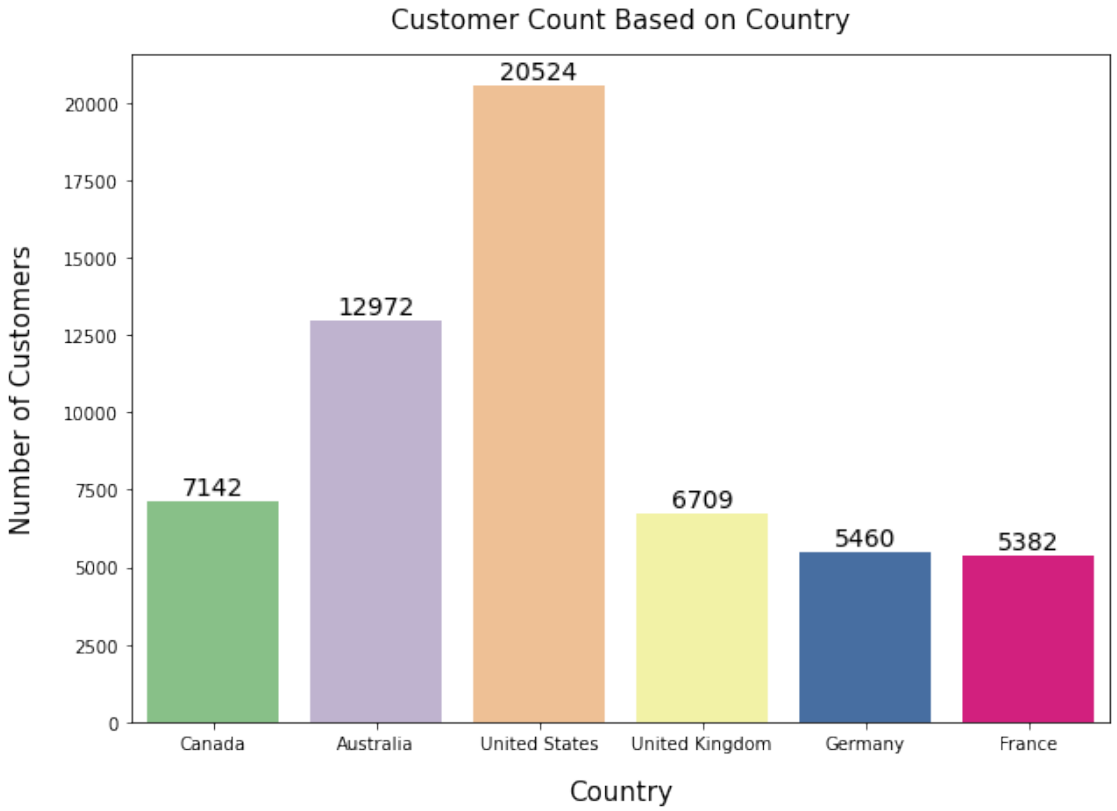
[61]:
```
Country
Australia         12972
Canada             7142
France             5382
Germany            5460
United Kingdom     6709
United States     20524
Name: CustomerKey, dtype: int64
```

[62]:
```
# Plotting Country Attribute
plt.figure(figsize=(10,5))
explode = (0, 0.1, 0.05, 0.07, 0.1, 0.03)
plt.pie(country,  colors = ( "yellow", "cyan", "pink", "orange", "red",␣
 ↪"green"), explode = explode, shadow = True, labels = ['Australia','Canada',␣
 ↪'France', 'Germany', 'United Kingdom', 'United States'], autopct='%0.0f%%',␣
 ↪textprops={'fontsize': 14})
```

```
plt.title('Customer Distribution By Country', fontsize=15, pad = 15)
plt.show()
```



[63]:
```
# Plotting Country Attribute
plt.figure(figsize=(10,7))
ax = sns.countplot(x="Country", data = New_Data, palette = 'Accent')
plt.title('Customer Count Based on Country', fontsize = 15, pad = 15)
plt.xlabel('Country', fontsize = 15, labelpad = 15)
plt.ylabel('Number of Customers', fontsize = 15, labelpad = 15)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```

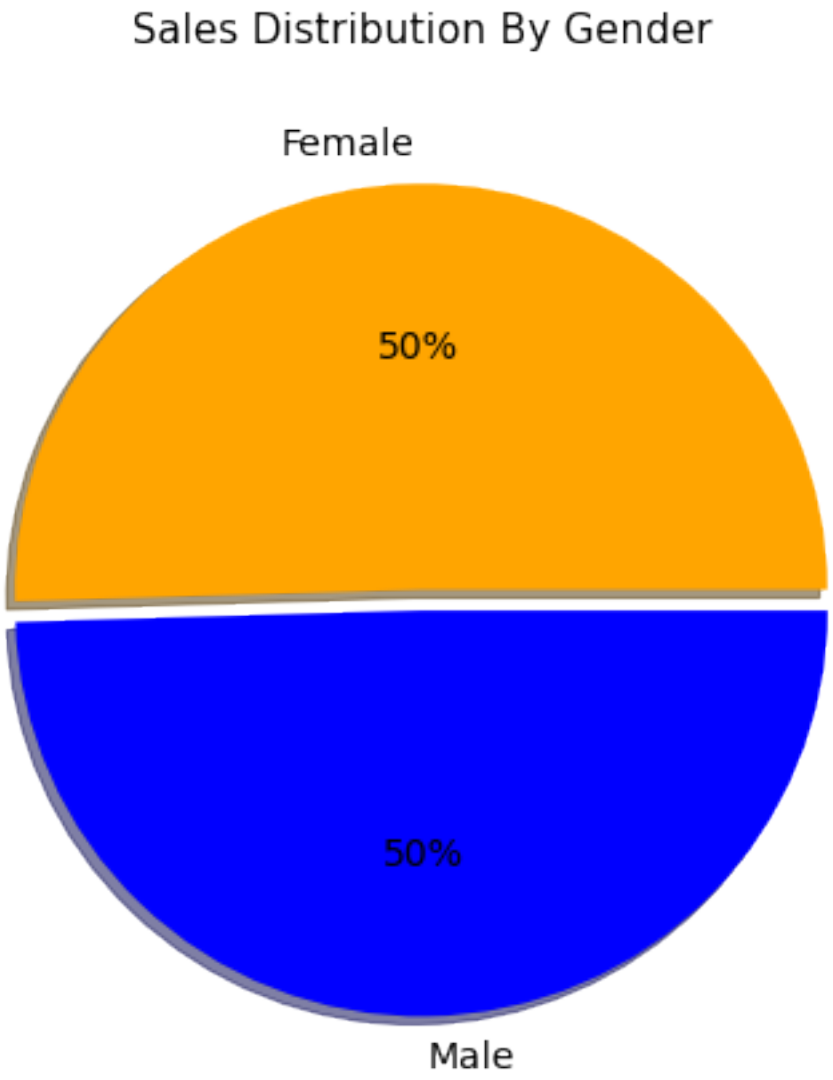


OBSERVATION: Customers from United States and Austrailia is more than 50%

[64]:
```
# Sales Distribution by Gender
Gs = New_Data.groupby('Gender')['SalesAmount'].sum()
Gs
```

[64]:
```
Gender
Female    1.478780e+07
Male      1.452004e+07
Name: SalesAmount, dtype: float64
```

[65]:
```
# Plotting Gender Attribute
plt.figure(figsize=(12,7))
explode = (0, 0.05)
plt.pie(Gs, colors = ( "orange", "blue"), explode = explode, shadow = True,␣
 ↪labels = ['Female','Male'], autopct='%0.0f%%', textprops={'fontsize': 14})
plt.title('Sales Distribution By Gender', fontsize=15, pad = 15)
plt.show()
```



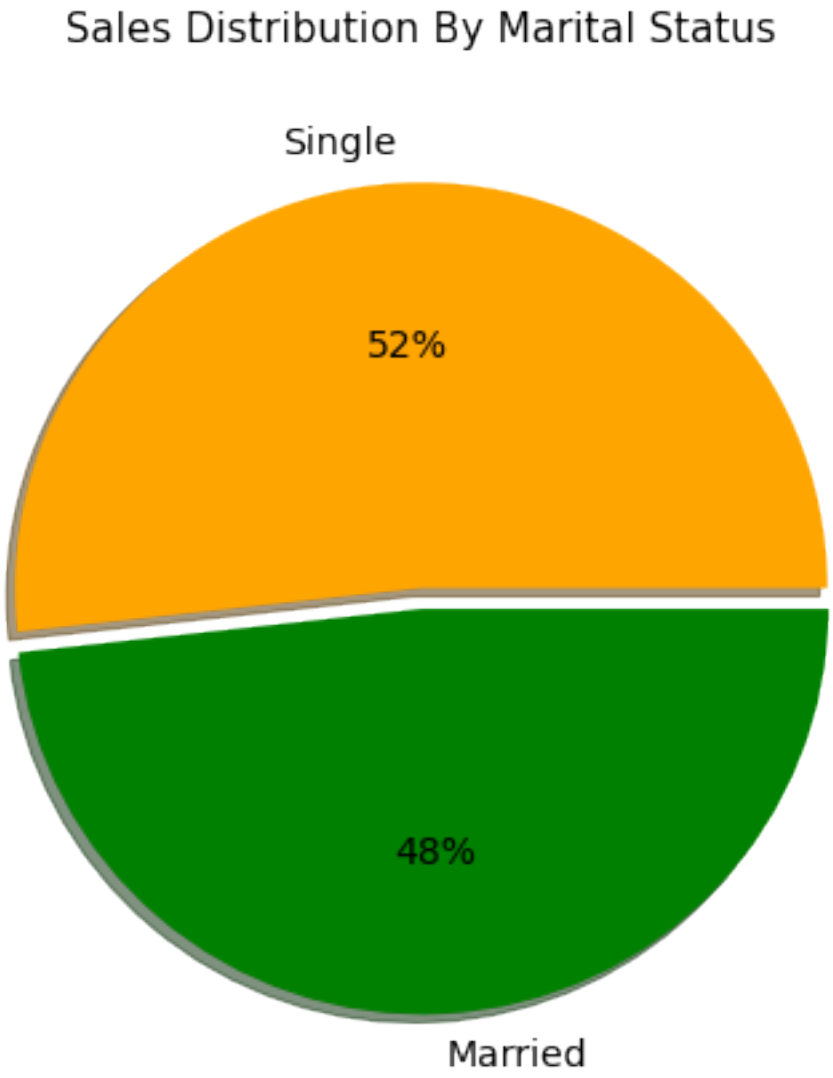
OBSERVATION: Sales Distribution is almost same for both Male and Female

[66]:
```
# Sales Distribution by MaritalStatus
Ms = New_Data.groupby('MaritalStatus')['SalesAmount'].sum()
Ms
```

[66]:
```
MaritalStatus
Married    1.515764e+07
Single     1.415020e+07
Name: SalesAmount, dtype: float64
```

[67]:
```
# Plotting MaritalStatus Attribute
plt.figure(figsize=(12,7))
```

```
explode = (0, 0.05)
plt.pie(Ms, colors = ( "orange", "green"), explode = explode, shadow = True,␣
 ↪labels = ['Single','Married'], autopct='%0.0f%%', textprops={'fontsize': 14})
plt.title('Sales Distribution By Marital Status', fontsize=15, pad = 15)
plt.show()
```

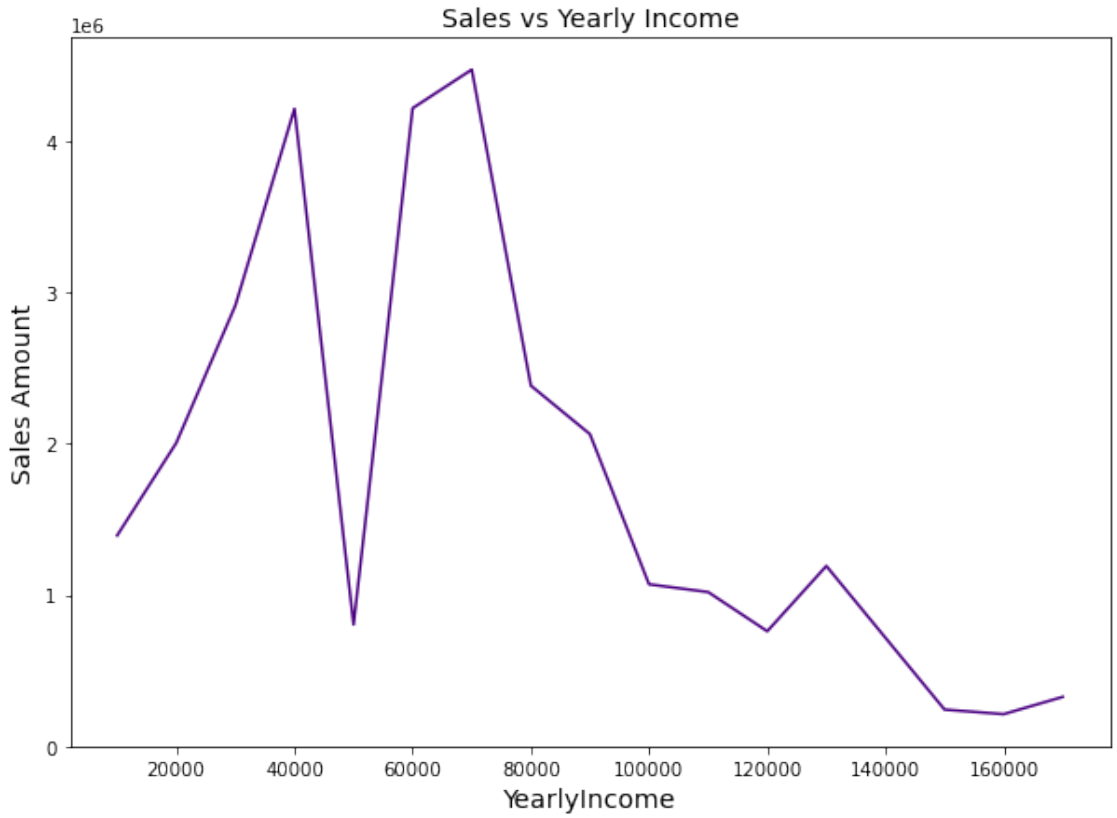


OBSERVATION: Sales are slightly more in married customers 52% than in single customers 48%

[68]:
```
# Sales Distribution by YearlyIncome
Ys = New_Data.groupby('YearlyIncome')['SalesAmount'].sum()
Ys
```

[68]:
```
YearlyIncome
10000     1.393820e+06
20000     2.006527e+06
30000     2.916437e+06
40000     4.218440e+06
50000     8.037913e+05
60000     4.222501e+06
70000     4.477908e+06
80000     2.385863e+06
90000     2.064437e+06
100000    1.070330e+06
110000    1.019157e+06
120000    7.597552e+05
130000    1.191725e+06
150000    2.411063e+05
160000    2.108731e+05
170000    3.251670e+05
Name: SalesAmount, dtype: float64
```

[69]:
```
# Plotting YearlyIncome Attribute
plt.figure(figsize = (10, 7))
plt.xlabel('Yearly Income', size = 14)
plt.ylabel('Sales Amount', size = 14)
plt.title('Sales vs Yearly Income', fontsize = 14)
ax = Ys.plot(kind = 'line', color = 'indigo')
plt.show()

# plot(x, y, color='green', linestyle='dashed', marker='o',
#      markerfacecolor='blue', markersize=12).
```



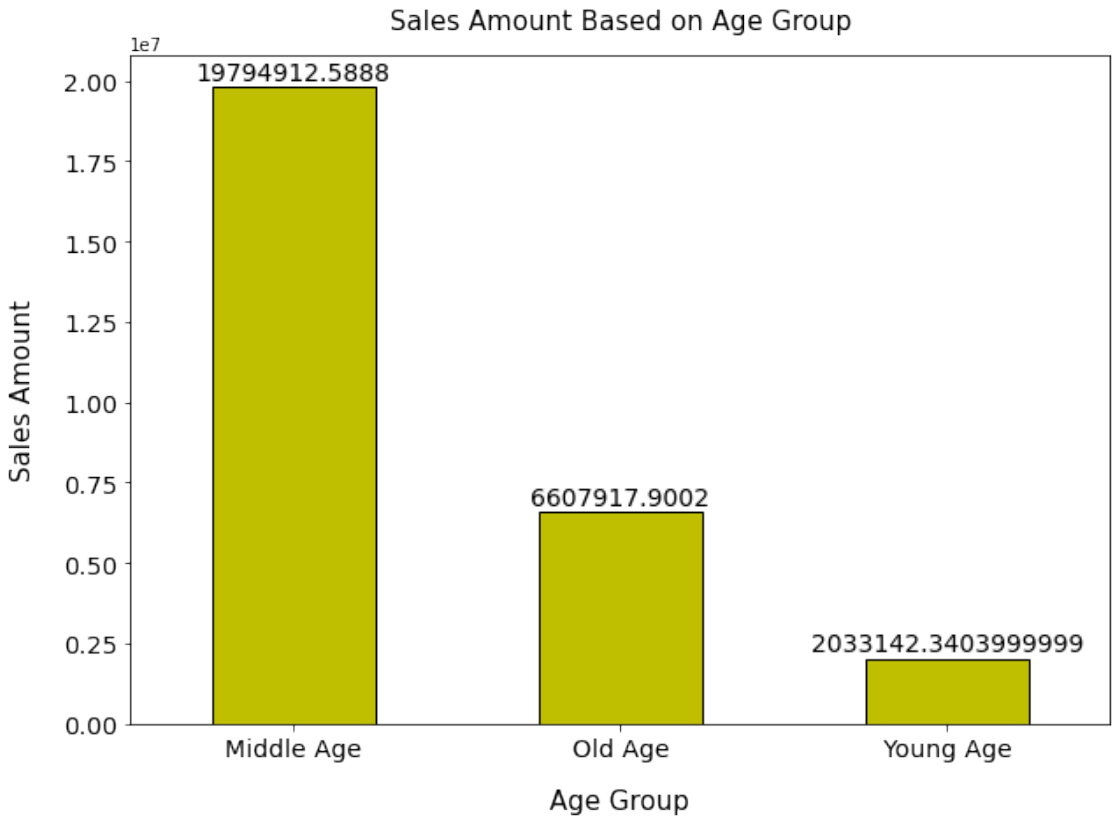
OBSERVATION: Sales come from most of the middle class families having Income between 30K-70K with a drop in sales seen near 50K salary customers

[70]:
```
# Sales Distribution by Age Group
AGs = New_Data.groupby('Age_Group')['SalesAmount'].sum()
AGs
```

[70]:
```
Age_Group
Middle Age    1.979491e+07
Old Age       6.607918e+06
Young Age     2.033142e+06
Name: SalesAmount, dtype: float64
```

[71]:
```
# Plotting Age Group Attribute
plt.figure(figsize=(10, 7))
ax = AGs.plot(kind='bar', rot=0, color="y", edgecolor = 'Black', fontsize = 14)
ax.set_title("Sales Amount Based on Age Group", y = 1, fontsize = 15, pad = 15)
ax.set_xlabel('Age Group', fontsize = 15, labelpad = 15)
ax.set_ylabel('Sales Amount',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('Middle Age', 'Old Age', 'Young Age'), fontsize = 14)
```

```
for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 14)
plt.show()
```



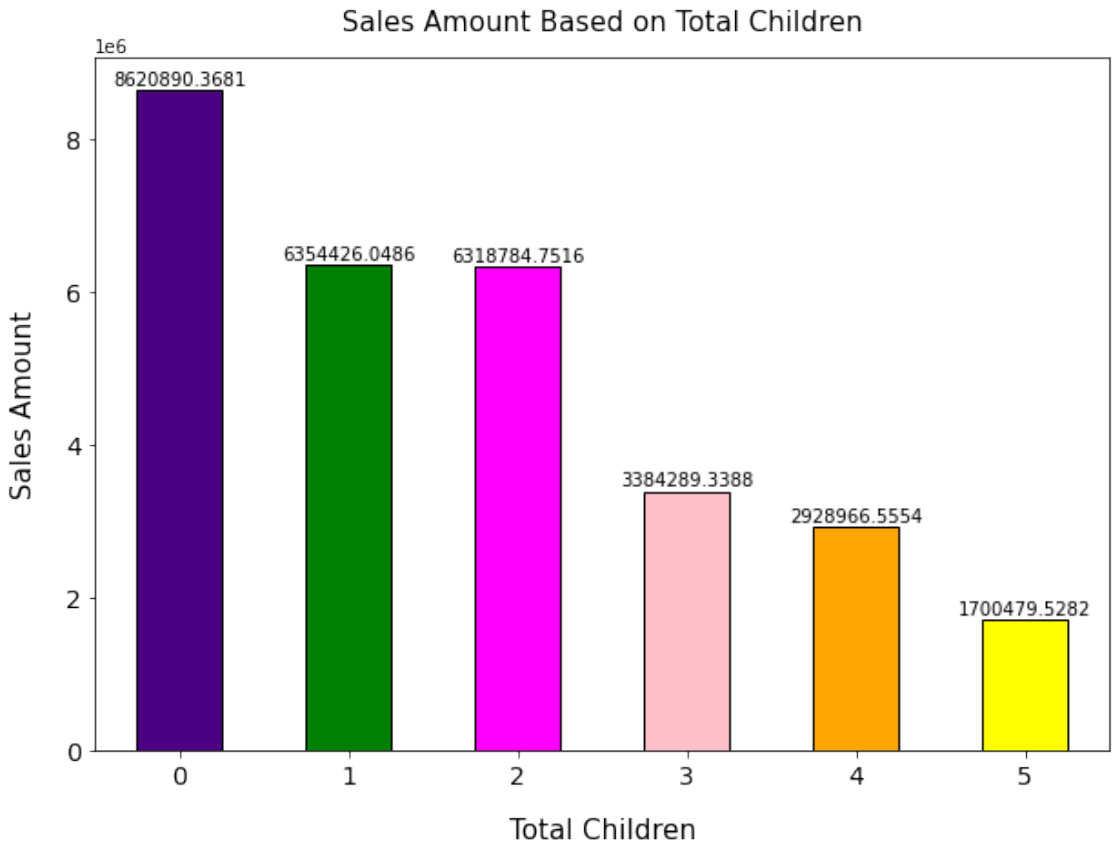
OBSERVATION: Most of the Sales come from Middle Age group Customers

[72]:
```
# Sales Distribution by TotalChildren
Cs = New_Data.groupby('TotalChildren')['SalesAmount'].sum()
Cs
```

[72]:
```
TotalChildren
0    8.620890e+06
1    6.354426e+06
2    6.318785e+06
3    3.384289e+06
4    2.928967e+06
```

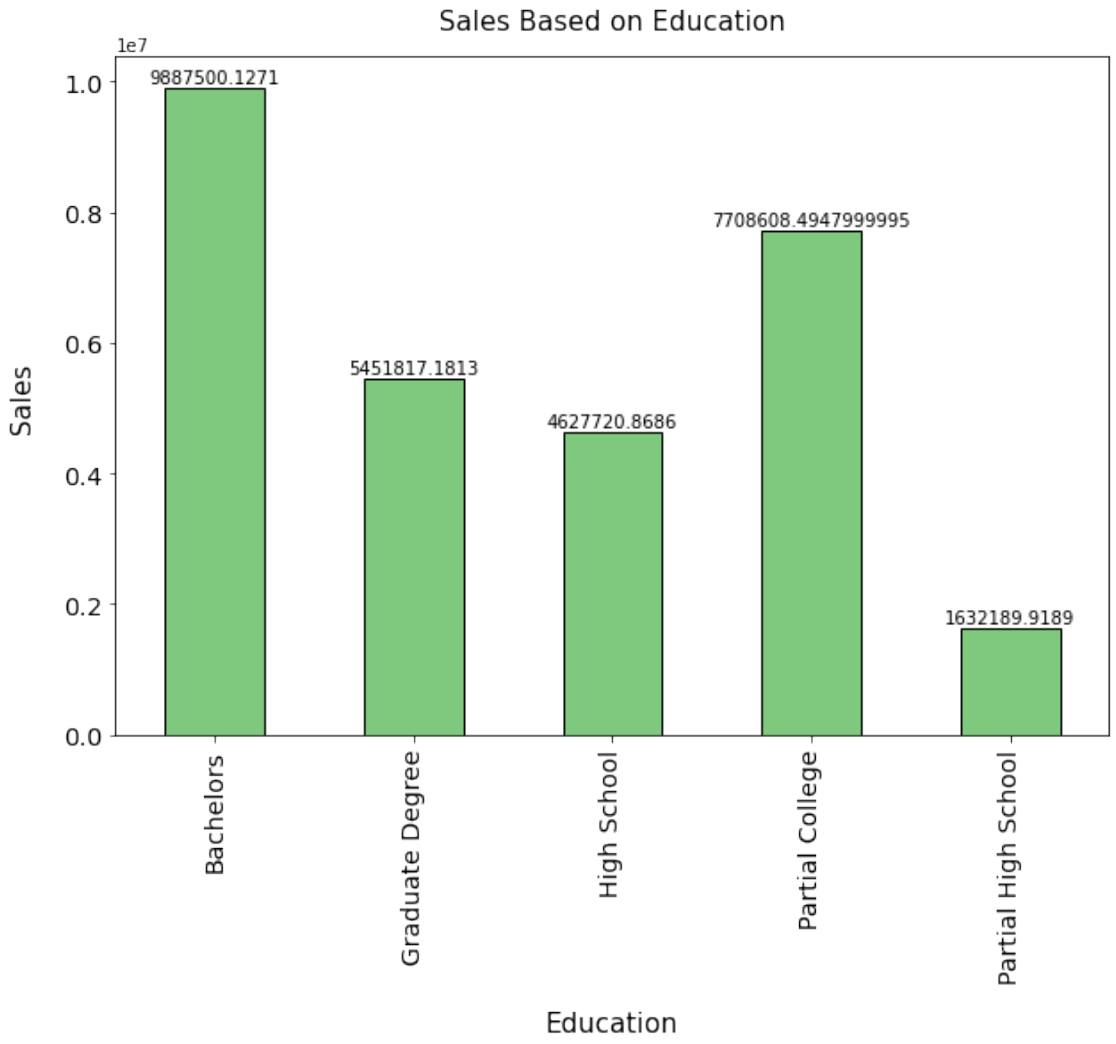
```
5    1.700480e+06
Name: SalesAmount, dtype: float64
```

[73]:
```
# Plotting TotalChildren Attribute
plt.rcParams["figure.figsize"] = (10, 7)
c = ['indigo', 'green', 'magenta', 'pink', 'orange', 'yellow']
ax = Cs.plot(kind ='bar', stacked = False, color = c, rot = 0, edgecolor =␣
 ↪'Black', fontsize = 14)
ax.set_title("Sales Amount Based on Total Children", y = 1, fontsize = 15, pad␣
 ↪= 15)
ax.set_xlabel('Total Children', fontsize = 15, labelpad = 15)
ax.set_ylabel('Sales Amount',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('0', '1', '2', '3', '4', '5'), fontsize = 14)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10)
plt.show()
```



OBSERVATION: Most Sales amount come from Customers having children 0-2

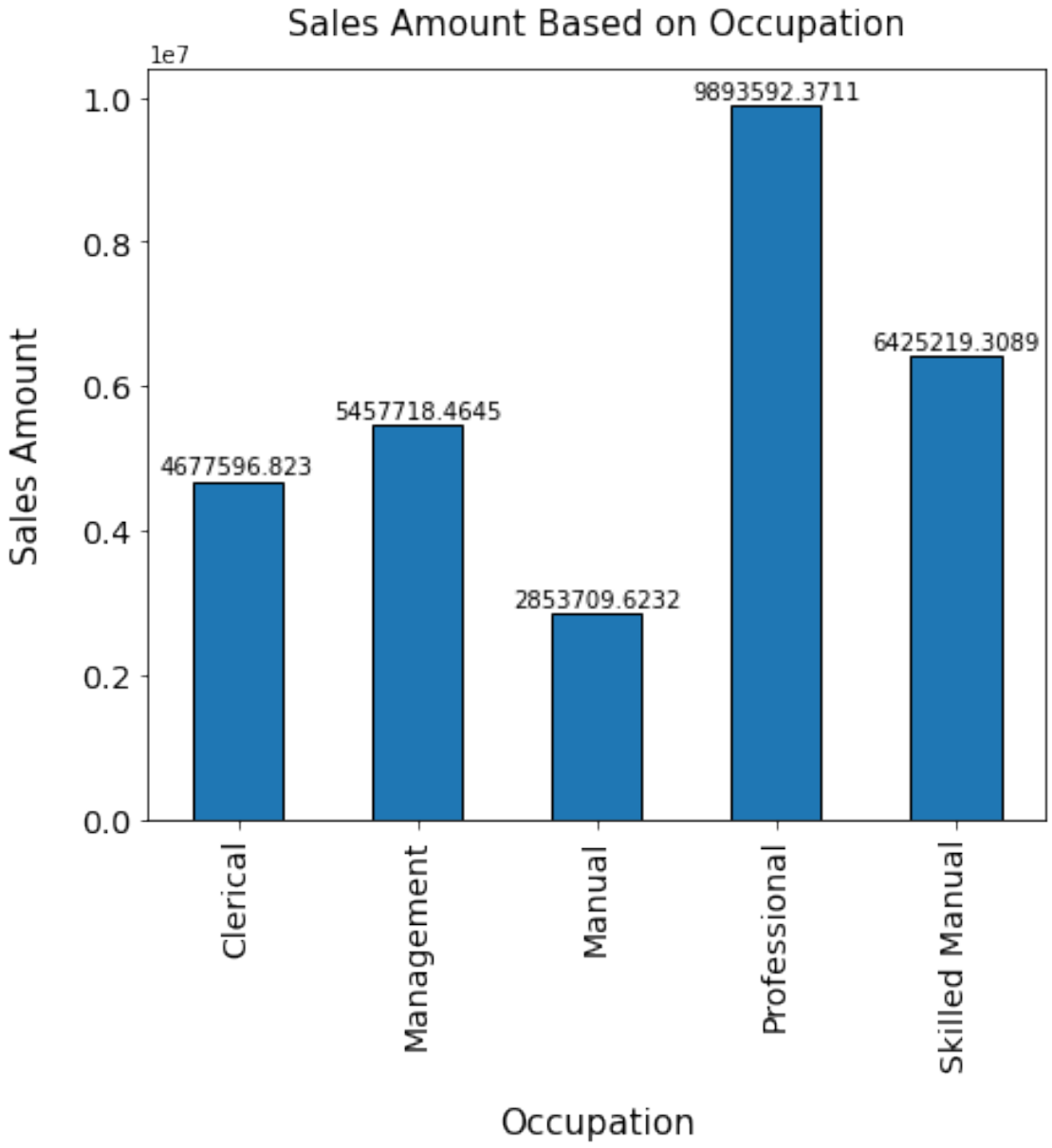
[74]:
```
# Plotting Sales Distribution by Education
Es = New_Data.groupby('Education')['SalesAmount'].sum()
plt.rcParams["figure.figsize"] = (10, 7)
# c = ['indigo', 'green', 'magenta', 'pink', 'orange', 'yellow']
ax = Es.plot(kind ='bar', stacked = False, colormap = 'Accent', rot = 90,␣
 ↪edgecolor = 'Black', fontsize = 14)
ax.set_title("Sales Based on Education", y = 1, fontsize = 15, pad = 15)
ax.set_xlabel('Education', fontsize = 15, labelpad = 15)
ax.set_ylabel('Sales',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('Bachelors', 'Graduate Degree', 'High School', 'Partial␣
 ↪College', 'Partial High School'), fontsize = 14)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10)
plt.show()
```



OBSERVATION: Most of the Sales come from customers with education background as Bachelors and Partial College

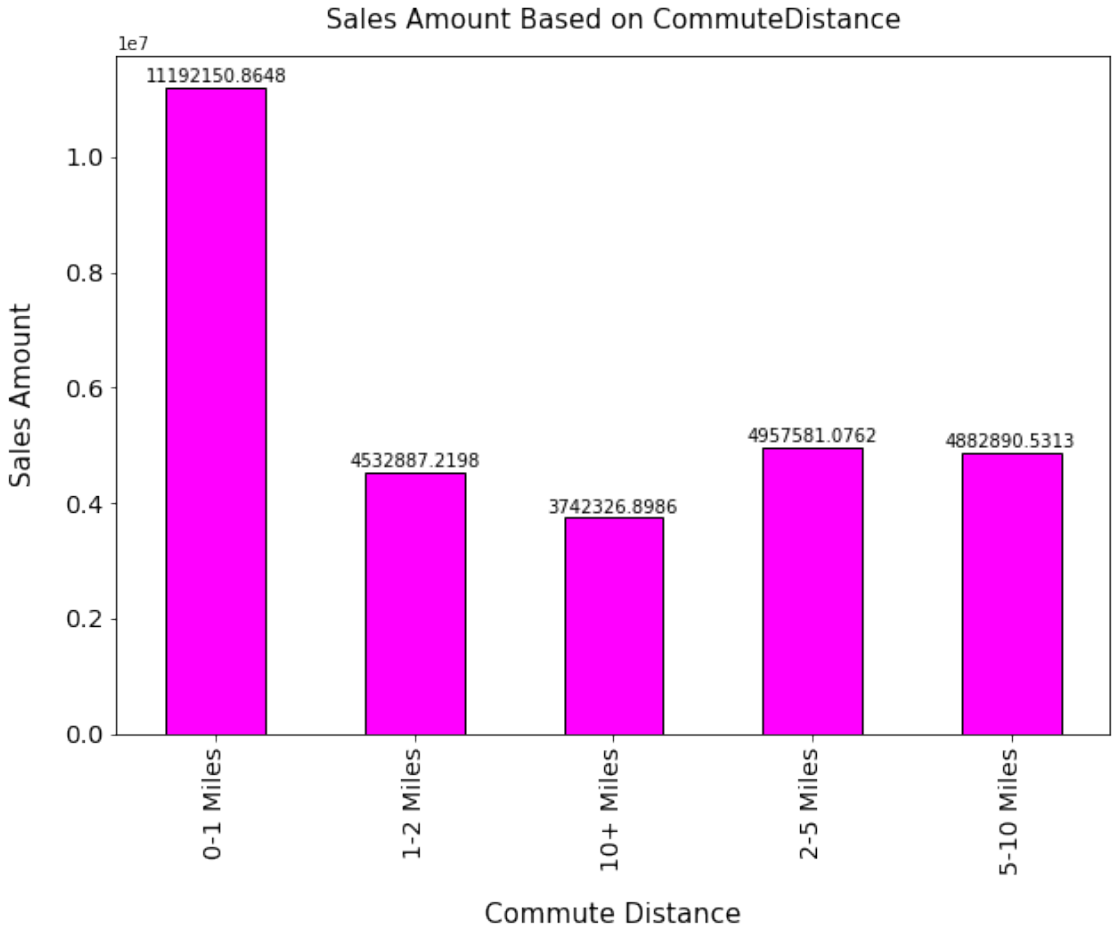
[75]:
```
# Plotting Sales Distribution by Occupation
Os = New_Data.groupby('Occupation')['SalesAmount'].sum()
plt.rcParams["figure.figsize"] = (7, 6)
# c = ['yellow', 'orange', 'pink', 'red', 'green', 'blue']
ax = Os.plot(kind ='bar', stacked = False, colormap = 'tab20', rot = 90,␣
 ↪edgecolor = 'Black', fontsize = 14)
ax.set_title("Sales Amount Based on Occupation", y = 1, fontsize = 15, pad = 15)
ax.set_xlabel('Occupation', fontsize = 15, labelpad = 15)
ax.set_ylabel('Sales Amount',fontsize = 15, labelpad = 15)
ax.set_xticklabels(('Clerical', 'Management', 'Manual', 'Professional',␣
 ↪'Skilled Manual'), fontsize = 14)
```

```
for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10)
plt.show()
```



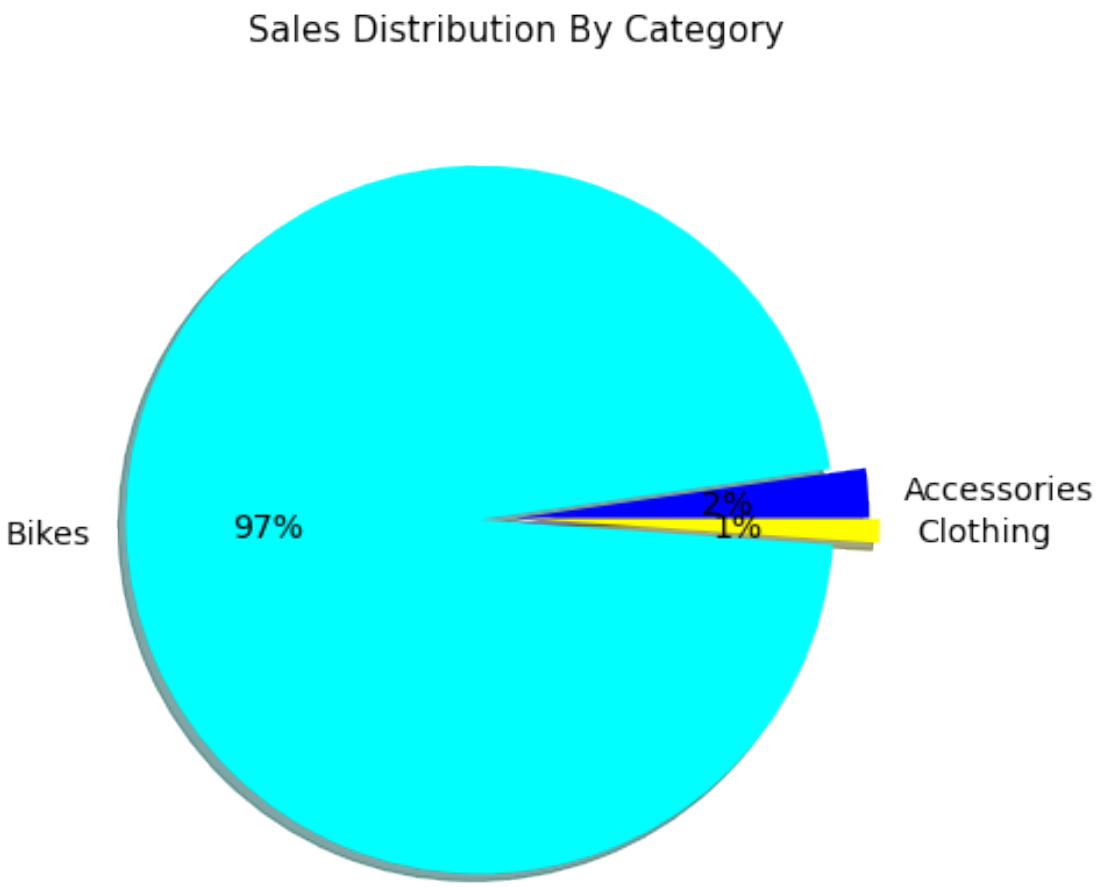
OBSERVATION: Most of the Sales are from customers belonging to Professional Occupation

[76]:
```
# Plotting Sales Distribution by CommuteDistance
CDs = New_Data.groupby('CommuteDistance')['SalesAmount'].sum()
plt.figure(figsize=(10,7))
ax = CDs.plot(kind ='bar', stacked = False, colormap = 'spring', rot = 90,␣
 ↪edgecolor = 'Black', fontsize = 14)
# ax = sns.countplot(x="CommuteDistance", data = New_Data, palette = 'tab20b')
plt.title('Sales Amount Based on CommuteDistance', fontsize = 15, pad = 15)
plt.xlabel('Commute Distance', fontsize = 15, labelpad = 15)
plt.ylabel('Sales Amount', fontsize = 15, labelpad = 15)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
 ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10)
plt.show()
```



OBSERVATION: More Sales if Commute Distance is smaller i.e 0-1 Miles Distance

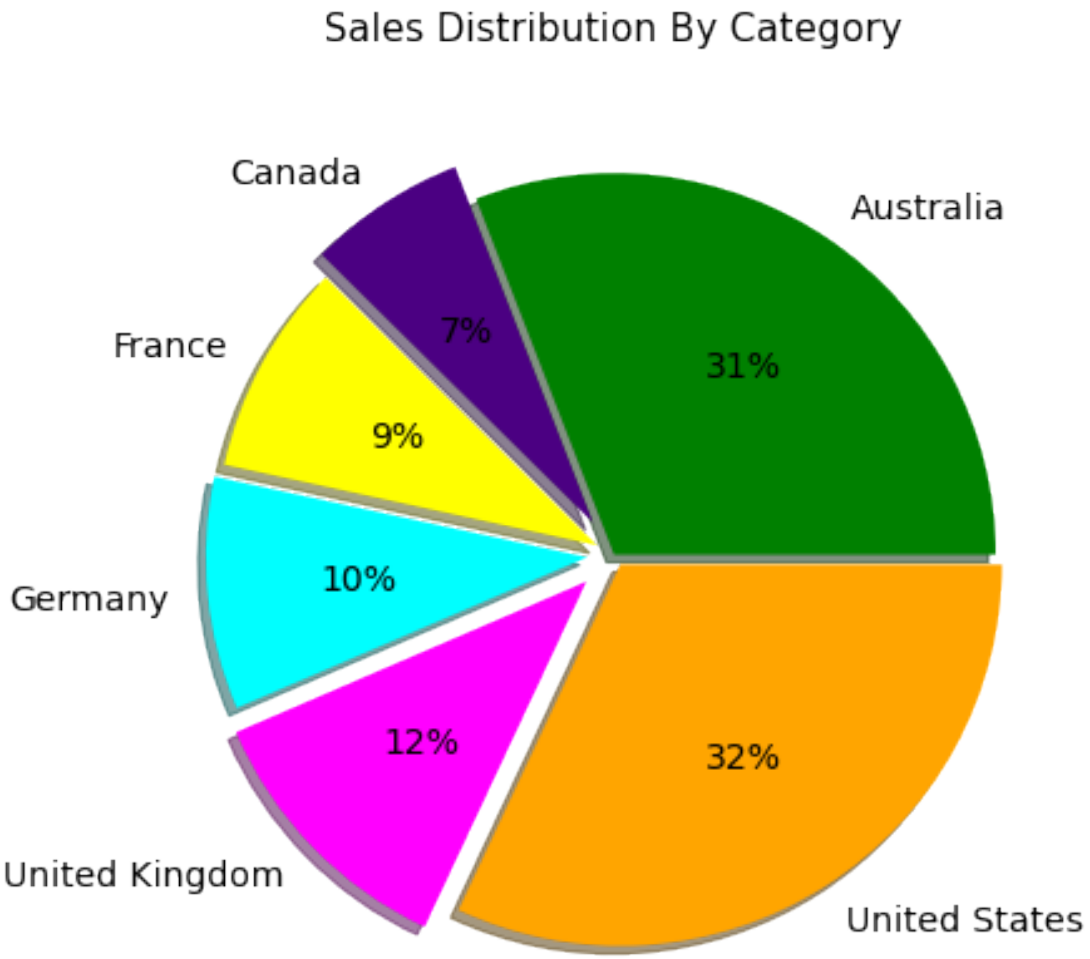
[77]:
```
# Plotting Sales Distribution by Category
Category_s = New_Data.groupby('Category')['SalesAmount'].sum()
plt.figure(figsize=(12,7))
explode = (0, 0.1, 0.03)
plt.pie(Category_s,  colors = ("blue", "cyan", "yellow"), explode = explode,␣
 ↪shadow = True, labels = ['Accessories','Bikes', 'Clothing'], autopct='%0.
 ↪0f%%', textprops={'fontsize': 14})
plt.title('Sales Distribution By Category', fontsize=15, pad = 15)
plt.show()
```



[78]:
```
# SubCategory_s = New_Data.groupby('SubCategory')['SalesAmount'].sum()
# plt.figure(figsize=(12,7))
```

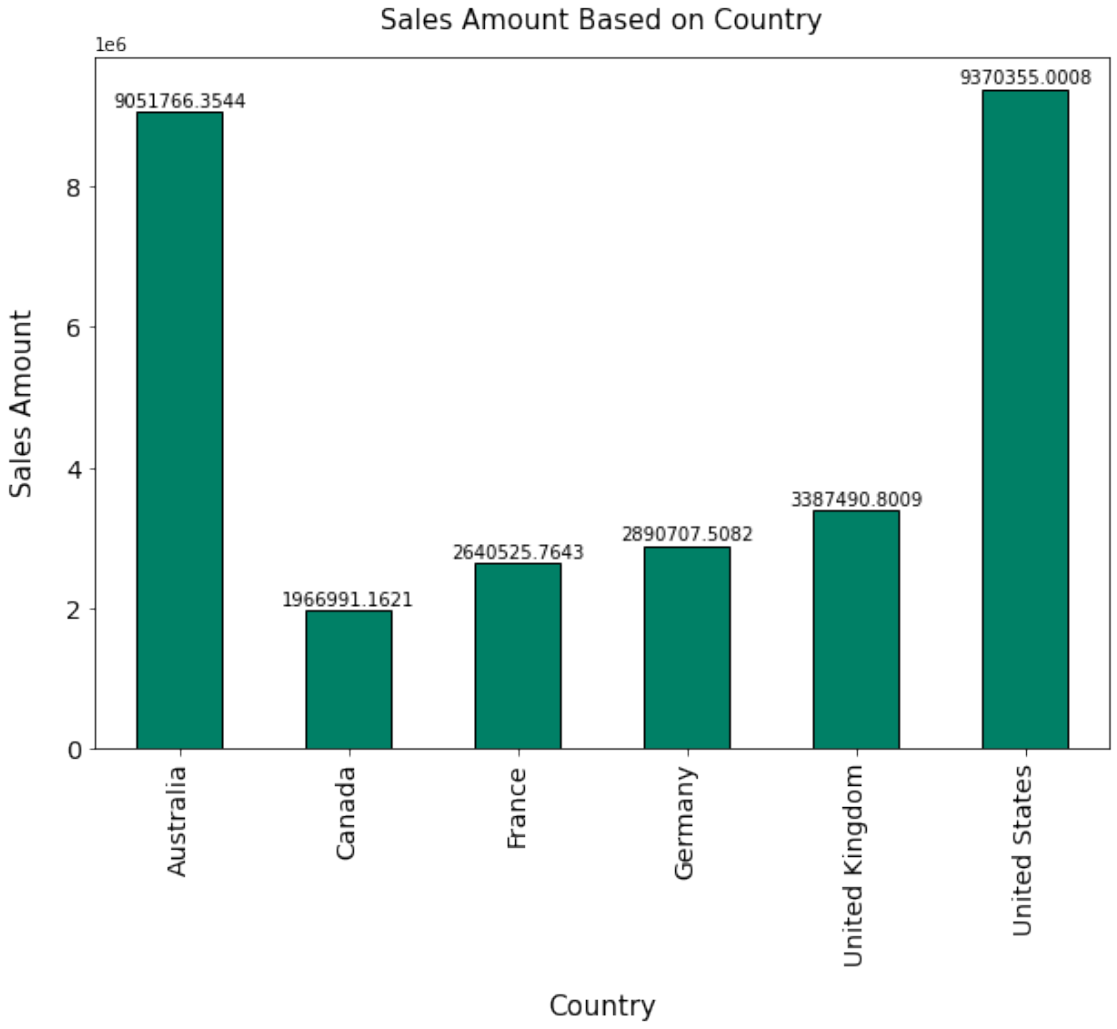
```
# plt.pie(SubCategory_s, labels = ['Road Bikes', 'Mountain Bikes', 'Touring␣
 ↪Bikes', 'Bottles and Cages', 'Tires and Tubes', 'Caps', 'Hydration Packs',␣
 ↪'Jerseys', 'Socks', 'Cleaners', 'Helmets', 'Vests', 'Shorts', 'Fenders',␣
 ↪'Gloves', 'Bike Racks', 'Bike Stands'], autopct='%0.0f%%',␣
 ↪textprops={'fontsize': 14})
# SubCategory_s.plot(kind="pie", label="", autopct='%0.0f%%', textprops={'size':
 ↪ 'x-large'}, wedgeprops={'linewidth': 1.0, 'edgecolor': 'white'})
# plt.title('Sales Distribution By SubCategory', fontsize=15, pad = 15)
# plt.legend(title = "Sub Category:", loc="right", bbox_to_anchor=(1, 0, 0.5,␣
 ↪1))
# plt.show()

# textprops={'fontsize': 14}
```

[79]:
```
# Plotting Sales Distribution by Country
country_s = New_Data.groupby('Country')['SalesAmount'].sum()
plt.figure(figsize=(12,7))
explode = (0, 0.1, 0.05, 0.07, 0.1, 0.03)
plt.pie(country_s,  colors = ("green", "indigo", "yellow", "cyan", "magenta",␣
 ↪"orange", ), explode = explode, shadow = True, labels =␣
 ↪['Australia','Canada', 'France', 'Germany', 'United Kingdom', 'United␣
 ↪States'], autopct='%0.0f%%', textprops={'fontsize': 14})
plt.title('Sales Distribution By Category', fontsize=15, pad = 15)
plt.show()
```



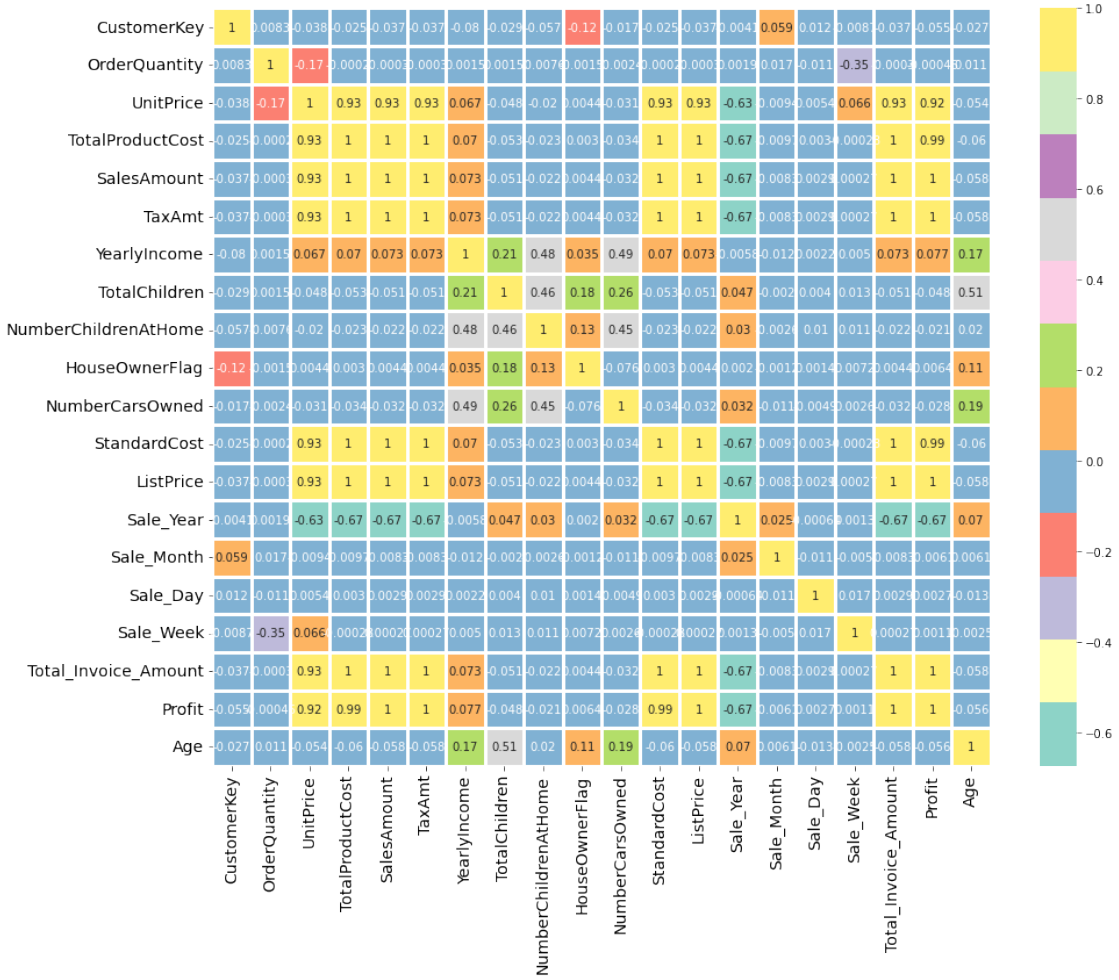
[80]:
```
# Plotting Sales Distribution by Country
plt.figure(figsize=(10,7))
# ax = sns.countplot(x="Country", data = New_Data, palette = 'Accent')
ax = country_s.plot(kind ='bar', stacked = False, colormap = 'summer', rot =␣
 ↪90, edgecolor = 'Black', fontsize = 14)
plt.title('Sales Amount Based on Country', fontsize = 15, pad = 15)
plt.xlabel('Country', fontsize = 15, labelpad = 15)
plt.ylabel('Sales Amount', fontsize = 15, labelpad = 15)

for rect in ax.patches:
    y_value = rect.get_height()
    x_value = rect.get_x() + rect.get_width() / 2
    space = 1
    label = format(y_value)
```

```
    ax.annotate(label, (x_value, y_value), xytext=(0, space),␣
  ↪textcoords="offset points", ha='center', va='bottom', fontsize = 10)
plt.show()
```



OBSERVATION: Most Sales is from US and Austrailia almost 63%

[81]:
```
# Plotting Correlation Between the attributes
plt.figure(figsize = (15,12))
plt.xticks(fontsize = 14)
plt.yticks(fontsize = 14)
sns.heatmap(New_Data.corr(), annot = True, linewidth = 3, cmap='Set3')
plt.show()
```



Summary:

- Nearly 61% of Sales comes from only two Countries i.e. United States and Australia
- Customers from Middle Age group i.e. 40-60 years contribute more to Sales generation
- Nearly 56% of the Sale happens of Black and Red color Products and 34% of Sale from products of color Silver and Yellow
- Both Gender customers are almost same in number i.e. 50%
- Marital Status segmentation of customers is nearly same i.e. Married 51.72% and Single 48.28%
- Sales is more from customers of Professional and Skilled Manual Occupation
- Customers with education as Bachelors and Partial College contribute more in Sales
- Sales come from category Bike nearly 96.62%