1) Import all necessary libraries

In [ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

2) Import the CSV

In [ ]:
```
a=pd.read_csv("dim_customers.csv")  #Loading Dataset into vaariable a and b
b=pd.read_csv("fact_spends.csv")
```

3) Check the dim_customers file and using describe function we get insight of the data

In [ ]:
```
a.head()    # Top 5 data
```

Out[ ]:

	customer_id	age_group	city	occupation	gender	marital status	avg_income
0	ATQCUS0001	21-24	Mumbai	Salaried IT Employees	Male	Married	49767
1	ATQCUS0002	21-24	Mumbai	Salaried IT Employees	Male	Married	47336
2	ATQCUS0003	21-24	Mumbai	Salaried IT Employees	Male	Married	48851
3	ATQCUS0004	21-24	Mumbai	Salaried IT Employees	Male	Married	45425
4	ATQCUS0005	21-24	Mumbai	Salaried IT Employees	Male	Married	46732

In [ ]:
```
a.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4000 entries, 0 to 3999
Data columns (total 7 columns):
 #   Column          Non-Null Count  Dtype 
---  ------          --------------  ----- 
 0   customer_id     4000 non-null   object
 1   age_group       4000 non-null   object
 2   city            4000 non-null   object
 3   occupation      4000 non-null   object
 4   gender          4000 non-null   object
 5   marital status  4000 non-null   object
 6   avg_income      4000 non-null   int64 
dtypes: int64(1), object(6)
memory usage: 218.9+ KB
```

In [ ]:
```
a.describe(exclude='int')
```

Out[ ]:

	customer_id	age_group	city	occupation	gender	marital status
count	4000	4000	4000	4000	4000	4000
unique	4000	4	5	5	2	2
top	ATQCUS0001	25-34	Mumbai	Salaried IT Employees	Male	Married
freq	1	1498	1078	1294	2597	3136

In [ ]:
```
a.describe()
```

Out[ ]:

	avg_income
count	4000.000000
mean	51657.032250
std	14690.140645
min	24816.000000
25%	38701.000000
50%	50422.000000
75%	64773.250000
max	86600.000000

4) Check the fact_spends file to get insights using describe function we get insight of the data

In [ ]:
```
b.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 864000 entries, 0 to 863999
Data columns (total 5 columns):
 #   Column        Non-Null Count   Dtype 
---  ------        --------------   ----- 
 0   customer_id   864000 non-null  object
 1   month         864000 non-null  object
 2   category      864000 non-null  object
 3   payment_type  864000 non-null  object
 4   spend         864000 non-null  int64 
dtypes: int64(1), object(4)
memory usage: 33.0+ MB
```

In [ ]:
```
b.describe()
```

Out[ ]:

	spend
count	864000.000000
mean	614.464994
std	661.571676
min	6.000000
25%	191.000000
50%	395.000000
75%	793.000000
max	10313.000000

In [ ]:
```
b.describe(exclude=int)
```

Out[ ]:

	customer_id	month	category	payment_type
count	864000	864000	864000	864000
unique	4000	6	9	4
top	ATQCUS0001	May	Groceries	Net Banking
freq	216	144000	96000	216000

After seeing b.describe we can see there are 6 unique months, there are 864000 rows of data , 4 different payment types and 9 different catogories payment made.

And more importantly no non null values

Since we have Data of customer's average income permonth in Dataset A and Dataset B has the Spending data. Now we group the Dataset B based on the customer_id and we aggregate the columns on Spending data to sum it and month column on unique and Nunique

Grouping on Customer_id
Month - Unique (Generate column with list of all unique months as list)
Month - Nunique (Generate column with no of unique months)
Spend - Sum (Sum of all the spending total of a individual customer)

The purpose of nunique of months is to divide the spending column and get average spending of a customer
avg_spend = spend /month_nunique

And using Average Spend we can merge the dataframe to dataset A

In [ ]:
```
c = b.groupby(by='customer_id').agg({'month':'unique','spend':'sum'})   # Grouping Dataframe B and Aggregating 
c.reset_index(inplace=True)
```

In [ ]:
```
c
```

Out[ ]:

	customer_id	month	spend
0	ATQCUS0001	[May, June, July, August, September, October]	170545
1	ATQCUS0002	[May, June, July, August, September, October]	168514
2	ATQCUS0003	[May, June, July, August, September, October]	157534
3	ATQCUS0004	[May, June, July, August, September, October]	162655
4	ATQCUS0005	[May, June, July, August, September, October]	157296
...	...	...	...
3995	ATQCUS3996	[May, June, July, August, September, October]	99589
3996	ATQCUS3997	[May, June, July, August, September, October]	56264
3997	ATQCUS3998	[May, June, July, August, September, October]	59760
3998	ATQCUS3999	[May, June, July, August, September, October]	67142
3999	ATQCUS4000	[May, June, July, August, September, October]	53549

4000 rows × 3 columns

In [ ]:
```
a_grp = b.groupby(by='customer_id')['month'].nunique().reset_index()    # Grouping dataset B and aggregating on
```

In [ ]:
```
a_grp
```

Out[ ]:

	customer_id	month
0	ATQCUS0001	6
1	ATQCUS0002	6
2	ATQCUS0003	6
3	ATQCUS0004	6
4	ATQCUS0005	6
...	...	...
3995	ATQCUS3996	6
3996	ATQCUS3997	6
3997	ATQCUS3998	6
3998	ATQCUS3999	6
3999	ATQCUS4000	6

4000 rows × 2 columns

In [ ]:
```
a_grp=pd.merge(left=c,right=a_grp,on='customer_id',how='inner')  # Merging unique , nunique of months and spend
```

In [ ]:
```
a_grp['spend_avg']=a_grp['spend']/a_grp['month_y']   # Dividing the spend column and nunique months
a_grp
```

Out[ ]:

	customer_id	month_x	spend	month_y	spend_avg
0	ATQCUS0001	[May, June, July, August, September, October]	170545	6	28424.166667
1	ATQCUS0002	[May, June, July, August, September, October]	168514	6	28085.666667
2	ATQCUS0003	[May, June, July, August, September, October]	157534	6	26255.666667
3	ATQCUS0004	[May, June, July, August, September, October]	162655	6	27109.166667
4	ATQCUS0005	[May, June, July, August, September, October]	157296	6	26216.000000
...	...	...	...	...	...
3995	ATQCUS3996	[May, June, July, August, September, October]	99589	6	16598.166667
3996	ATQCUS3997	[May, June, July, August, September, October]	56264	6	9377.333333
3997	ATQCUS3998	[May, June, July, August, September, October]	59760	6	9960.000000
3998	ATQCUS3999	[May, June, July, August, September, October]	67142	6	11190.333333
3999	ATQCUS4000	[May, June, July, August, September, October]	53549	6	8924.833333

4000 rows × 5 columns

In [ ]:
```
a_grp
```

Out[ ]:

	customer_id	month_x	spend	month_y	spend_avg
0	ATQCUS0001	[May, June, July, August, September, October]	170545	6	28424.166667
1	ATQCUS0002	[May, June, July, August, September, October]	168514	6	28085.666667
2	ATQCUS0003	[May, June, July, August, September, October]	157534	6	26255.666667
3	ATQCUS0004	[May, June, July, August, September, October]	162655	6	27109.166667
4	ATQCUS0005	[May, June, July, August, September, October]	157296	6	26216.000000
...	...	...	...	...	...
3995	ATQCUS3996	[May, June, July, August, September, October]	99589	6	16598.166667
3996	ATQCUS3997	[May, June, July, August, September, October]	56264	6	9377.333333
3997	ATQCUS3998	[May, June, July, August, September, October]	59760	6	9960.000000
3998	ATQCUS3999	[May, June, July, August, September, October]	67142	6	11190.333333
3999	ATQCUS4000	[May, June, July, August, September, October]	53549	6	8924.833333

4000 rows × 5 columns

In [ ]:
```
b.groupby(by='customer_id').agg({'month':'unique','month':'nunique','spend':'sum'}).reset_index()  # We can do
```

Out[ ]:

	customer_id	month	spend
0	ATQCUS0001	6	170545
1	ATQCUS0002	6	168514
2	ATQCUS0003	6	157534
3	ATQCUS0004	6	162655
4	ATQCUS0005	6	157296
...	...	...	...
3995	ATQCUS3996	6	99589
3996	ATQCUS3997	6	56264
3997	ATQCUS3998	6	59760
3998	ATQCUS3999	6	67142
3999	ATQCUS4000	6	53549

4000 rows × 3 columns

In [ ]:
```
test = b.groupby(by='customer_id').agg({'month':['unique','nunique'],'spend':'sum'}).reset_index()  # Or by thi
test
```

Out[ ]:

	customer_id	month	spend
		unique	nunique	sum
0	ATQCUS0001	[May, June, July, August, September, October]	6	170545
1	ATQCUS0002	[May, June, July, August, September, October]	6	168514
2	ATQCUS0003	[May, June, July, August, September, October]	6	157534
3	ATQCUS0004	[May, June, July, August, September, October]	6	162655
4	ATQCUS0005	[May, June, July, August, September, October]	6	157296
...	...	...	...	...
3995	ATQCUS3996	[May, June, July, August, September, October]	6	99589
3996	ATQCUS3997	[May, June, July, August, September, October]	6	56264
3997	ATQCUS3998	[May, June, July, August, September, October]	6	59760
3998	ATQCUS3999	[May, June, July, August, September, October]	6	67142
3999	ATQCUS4000	[May, June, July, August, September, October]	6	53549

4000 rows × 4 columns

In [ ]:
```
test.columns=['customer_id' , 'num_month','unique_month','spend']        # Selecting the columns to the datafra
test
```

Out[ ]:

	customer_id	num_month	unique_month	spend
0	ATQCUS0001	[May, June, July, August, September, October]	6	170545
1	ATQCUS0002	[May, June, July, August, September, October]	6	168514
2	ATQCUS0003	[May, June, July, August, September, October]	6	157534
3	ATQCUS0004	[May, June, July, August, September, October]	6	162655
4	ATQCUS0005	[May, June, July, August, September, October]	6	157296
...	...	...	...	...
3995	ATQCUS3996	[May, June, July, August, September, October]	6	99589
3996	ATQCUS3997	[May, June, July, August, September, October]	6	56264
3997	ATQCUS3998	[May, June, July, August, September, October]	6	59760
3998	ATQCUS3999	[May, June, July, August, September, October]	6	67142
3999	ATQCUS4000	[May, June, July, August, September, October]	6	53549

4000 rows × 4 columns

In [ ]:
```
a=a.merge(right=a_grp,on='customer_id',how='inner')  # Merging the aggregations into to Dataset A on customer_i
```

In [ ]:
```
a.head()
```

Out[ ]:

	customer_id	age_group	city	occupation	gender	marital status	avg_income	month_x	spend	month_y	spend_avg
0	ATQCUS0001	21-24	Mumbai	Salaried IT Employees	Male	Married	49767	[May, June, July, August, September, October]	170545	6	28424.166667
1	ATQCUS0002	21-24	Mumbai	Salaried IT Employees	Male	Married	47336	[May, June, July, August, September, October]	168514	6	28085.666667
2	ATQCUS0003	21-24	Mumbai	Salaried IT Employees	Male	Married	48851	[May, June, July, August, September, October]	157534	6	26255.666667
3	ATQCUS0004	21-24	Mumbai	Salaried IT Employees	Male	Married	45425	[May, June, July, August, September, October]	162655	6	27109.166667
4	ATQCUS0005	21-24	Mumbai	Salaried IT Employees	Male	Married	46732	[May, June, July, August, September, October]	157296	6	26216.000000

In [ ]:
```
a.drop(columns=['month_x','spend','month_y'],inplace=True)   # Droping the columns not needed
a
```

Out[ ]:

	customer_id	age_group	city	occupation	gender	marital status	avg_income	spend_avg
0	ATQCUS0001	21-24	Mumbai	Salaried IT Employees	Male	Married	49767	28424.166667
1	ATQCUS0002	21-24	Mumbai	Salaried IT Employees	Male	Married	47336	28085.666667
2	ATQCUS0003	21-24	Mumbai	Salaried IT Employees	Male	Married	48851	26255.666667
3	ATQCUS0004	21-24	Mumbai	Salaried IT Employees	Male	Married	45425	27109.166667
4	ATQCUS0005	21-24	Mumbai	Salaried IT Employees	Male	Married	46732	26216.000000
...	...	...	...	...	...	...	...	...
3995	ATQCUS3996	25-34	Chennai	Business Owners	Female	Single	68003	16598.166667
3996	ATQCUS3997	25-34	Chennai	Freelancers	Female	Single	33323	9377.333333
3997	ATQCUS3998	25-34	Chennai	Freelancers	Female	Single	33336	9960.000000
3998	ATQCUS3999	25-34	Chennai	Freelancers	Female	Single	37453	11190.333333
3999	ATQCUS4000	25-34	Chennai	Government Employees	Female	Single	50901	8924.833333

4000 rows × 8 columns

In [ ]:
```
a['Income_util_prctg']=a.spend_avg/a.avg_income
a
```

Out[ ]:

	customer_id	age_group	city	occupation	gender	marital status	avg_income	spend_avg	Income_util_prctg
0	ATQCUS0001	21-24	Mumbai	Salaried IT Employees	Male	Married	49767	28424.166667	0.571145
1	ATQCUS0002	21-24	Mumbai	Salaried IT Employees	Male	Married	47336	28085.666667	0.593326
2	ATQCUS0003	21-24	Mumbai	Salaried IT Employees	Male	Married	48851	26255.666667	0.537464
3	ATQCUS0004	21-24	Mumbai	Salaried IT Employees	Male	Married	45425	27109.166667	0.596790
4	ATQCUS0005	21-24	Mumbai	Salaried IT Employees	Male	Married	46732	26216.000000	0.560986
...	...	...	...	...	...	...	...	...	...
3995	ATQCUS3996	25-34	Chennai	Business Owners	Female	Single	68003	16598.166667	0.244080
3996	ATQCUS3997	25-34	Chennai	Freelancers	Female	Single	33323	9377.333333	0.281407
3997	ATQCUS3998	25-34	Chennai	Freelancers	Female	Single	33336	9960.000000	0.298776
3998	ATQCUS3999	25-34	Chennai	Freelancers	Female	Single	37453	11190.333333	0.298783
3999	ATQCUS4000	25-34	Chennai	Government Employees	Female	Single	50901	8924.833333	0.175337

4000 rows × 9 columns

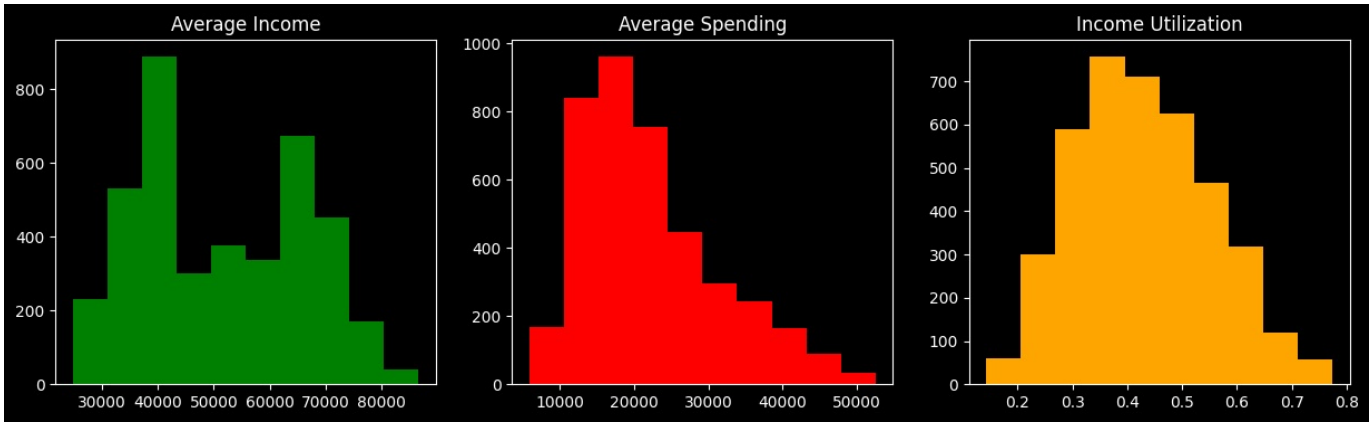
In [ ]:
```
a.to_csv('output.csv',index=False)   # Exporting the Dataset as CSV for Tableau
```

Note : The Spend aggreagation can be simply divided by 6 but if there is a customer less than 6 months it might be problem and to keep it **dynamic** we divide total spend by nunique of months

Histogram Plots

In [ ]:
```
plt.style.use('dark_background')   # Dark Background
```

In [ ]:
```
fig, axs = plt.subplots(1,3,figsize=(15,4))                                    # Sub plots to keep all kind

axs[0].hist(a['avg_income'],color='g', label='Average Income')                 # Histogram of Average Income
axs[0].set_title('Average Income')

axs[1].hist(a['spend_avg'],color='r', label='Average Spending')                # Histogram of Average Spending
axs[1].set_title('Average Spending')

axs[2].hist(a['Income_util_prctg'],color='orange',label='Income Utilization')  # Histogram of Income Utilizati
axs[2].set_title('Income Utilization')

plt.show();
```



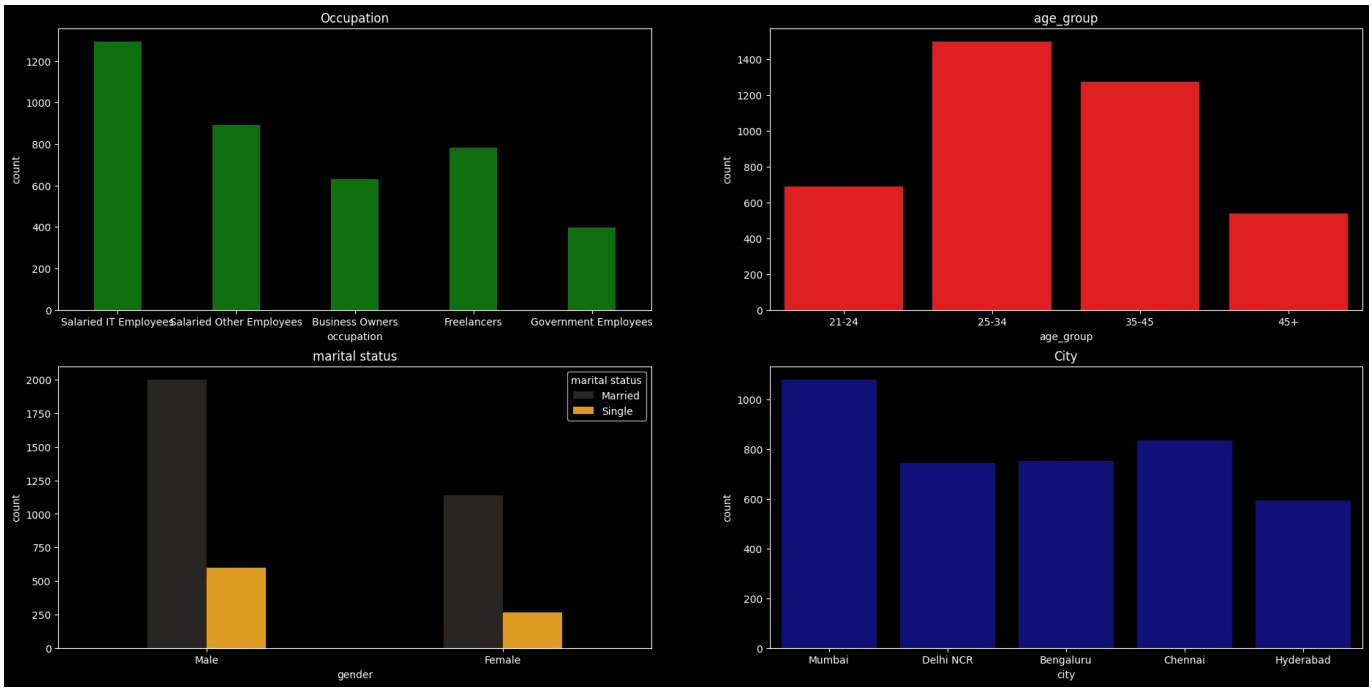
In [ ]:
```
a.head()
```

Out[ ]:

	customer_id	age_group	city	occupation	gender	marital status	avg_income	spend_avg	Income_util_prctg
0	ATQCUS0001	21-24	Mumbai	Salaried IT Employees	Male	Married	49767	28424.166667	0.571145
1	ATQCUS0002	21-24	Mumbai	Salaried IT Employees	Male	Married	47336	28085.666667	0.593326
2	ATQCUS0003	21-24	Mumbai	Salaried IT Employees	Male	Married	48851	26255.666667	0.537464
3	ATQCUS0004	21-24	Mumbai	Salaried IT Employees	Male	Married	45425	27109.166667	0.596790
4	ATQCUS0005	21-24	Mumbai	Salaried IT Employees	Male	Married	46732	26216.000000	0.560986

Count plots

In [ ]:
```
fig, axs = plt.subplots(2,2,figsize=(23,11))                                    # Sub plots

sns.countplot(x=a['occupation'],width=0.4,color='g',ax=axs[0,0]);                # Count plo
axs[0,0].set_title('Occupation')

sns.countplot(x=a['age_group'],order=['21-24', '25-34', '35-45', '45+'],color='r',ax=axs[0,1]);     # Count Plo
axs[0,1].set_title('age_group')

sns.countplot(x=a.gender,hue=a['marital status'],width=0.4,palette='dark:orange',ax=axs[1,0]);      #
axs[1,0].set_title('marital status')

sns.countplot(x=a.city,color='darkblue',ax=axs[1,1]);                            # Count Plo
axs[1,1].set_title('City')

plt.show();
```



Data is Exported to Tableau Public and Further insigts are taken from it

Thank You !