Visualização de Dados e Informações - Prática #01

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- Dependências:

In [3]:

```
import pandas as pd
import numpy as np
import seaborn as sb
import plotly as ply
from matplotlib import pyplot as plt
```

- Leitura dos dados

In [6]:

```
df_vendas = pd.read_csv("VIS_Pr_01_Vendas.csv", sep=",", decimal=".", encoding="latin-1")
```

In [9]:

```
df_vendas.head(2)
```

Out[9]:

	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	...	Postal Code
0	1	CA-2016-152156	11/8/2016	11/11/2016	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	...	42420
1	2	CA-2016-152156	11/8/2016	11/11/2016	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	...	42420

2 rows × 21 columns

In [34]:

```
df_vendas.shape
```

Out[34]:

```
(9994, 24)
```

In [10]:

```
df_vendas.head(3).T
```

Out[10]:

	0	1	2
Row ID	1	2	3
Order ID	CA-2016-152156	CA-2016-152156	CA-2016-138688
Order Date	11/8/2016	11/8/2016	6/12/2016
Ship Date	11/11/2016	11/11/2016	6/16/2016
Ship Mode	Second Class	Second Class	Second Class
Customer ID	CG-12520	CG-12520	DV-13045
Customer Name	Claire Gute	Claire Gute	Darrin Van Huff
Segment	Consumer	Consumer	Corporate
Country	United States	United States	United States
City	Henderson	Henderson	Los Angeles
State	Kentucky	Kentucky	California
Postal Code	42420	42420	90036
Region	South	South	West
Product ID	FUR-BO-10001798	FUR-CH-10000454	OFF-LA-10000240
Category	Furniture	Furniture	Office Supplies
Sub-Category	Bookcases	Chairs	Labels
Product Name	Bush Somerset Collection Bookcase	Hon Deluxe Fabric Upholstered Stacking Chairs,...	Self-Adhesive Address Labels for Typewriters b...
Sales	261.96	731.94	14.62
Quantity	2	3	2
Discount	0.0	0.0	0.0
Profit	41.9136	219.582	6.8714

In [13]:

```
df_vendas.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Row ID         9994 non-null   int64
 1   Order ID       9994 non-null   object
 2   Order Date     9994 non-null   object
 3   Ship Date      9994 non-null   object
 4   Ship Mode      9994 non-null   object
 5   Customer ID    9994 non-null   object
 6   Customer Name  9994 non-null   object
 7   Segment        9994 non-null   object
 8   Country        9994 non-null   object
 9   City           9994 non-null   object
 10  State          9994 non-null   object
 11  Postal Code    9994 non-null   int64
 12  Region         9994 non-null   object
 13  Product ID     9994 non-null   object
 14  Category       9994 non-null   object
 15  Sub-Category   9994 non-null   object
 16  Product Name   9994 non-null   object
 17  Sales          9994 non-null   float64
 18  Quantity       9994 non-null   int64
 19  Discount       9994 non-null   float64
 20  Profit         9994 non-null   float64
dtypes: float64(3), int64(3), object(15)
memory usage: 1.6+ MB
```

Q1

Q1. (2,0) Segundo seu chefe, o pessoal de Vendas adora Excel. Assim, eles gostariam de receber um CSV para contrastar Sales X Profit segmentado por Region, destacando qual a media de Discount aplicado.

- Quais são as regiões possíveis e suas volumetrias?

In [16]:

```
df_vendas.Region.value_counts(dropna=False, normalize=False)
```

Out[16]:

```
West       3203
East       2848
Central    2323
South      1620
Name: Region, dtype: int64
```

- Criando a função que fará a agregação:

In [45]:

```
def agg_func(g):

    dictResult = {}

    dictResult['sales_total'] = g["Sales"].sum()
    dictResult['quantity_total'] = g["Quantity"].sum()
    dictResult['discount_mean'] = g["Discount"].mean()
    dictResult['discount_median'] = g["Discount"].median()
    dictResult['discount_std'] = g["Discount"].std()
    dictResult['discount_max'] = g["Discount"].max()
    dictResult['discount_min'] = g["Discount"].min()

    return pd.Series(dictResult)
```

In [46]:

```
%%time
df_agg = df_vendas.groupby(by=["Region"], as_index=False, axis=0, dropna=False, observed=False, sort=Tru
```

```
Wall time: 8 ms
```

- **Resposta:**

In [47]:

```
df_agg
```

Out[47]:

	Region	sales_total	quantity_total	discount_mean	discount_median	discount_std	discount_max	discount_
0	Central	501239.8908	8780.0	0.240353	0.2	0.265433	0.8	
1	East	678781.2400	10618.0	0.145365	0.0	0.193155	0.7	
2	South	391721.9050	6209.0	0.147253	0.2	0.197420	0.7	
3	West	725457.8245	12266.0	0.109335	0.0	0.146861	0.7	

In [88]:

```
# O resultado com os dados ficará disponível com o nome "dados_vendas.csv"
df_agg.to_csv("dados_vendas.csv", sep=";", decimal=".")
```

Q2

Q2. (4,0) Ja para o pessoal de marketing de produto, seu chefe indicou que eles gostariam de uma visão de Profit acumulado por ano (Order Date) para cada um das sub-categorias de produto (Sub-Category). Marketing adora um gráfico de barras! Voce pode usar a bilioteca matplotlib ou seaborn.

```
Profit, Order Date, Sub-Category
```

- Quantos anos distintos temos?

In [48]:

```
# Vamos converter para data para ficar mais fácil de trabalhar
df_vendas['Order Date'] = pd.to_datetime(df_vendas['Order Date'], format="%m/%d/%Y", errors="coerce")
```

In [49]:

```
# Criando as variáveis de dia, mês e ano
df_vendas['day'] = df_vendas['Order Date'].apply(lambda e: e.day)
df_vendas['month'] = df_vendas['Order Date'].apply(lambda e: e.month)
df_vendas['year'] = df_vendas['Order Date'].apply(lambda e: e.year)
```

In [50]:

```
df_vendas['year'].value_counts()
```

Out[50]:

```
2017    3312
2016    2587
2015    2102
2014    1993
Name: year, dtype: int64
```

- Os dados de profit fazem sentido:

In [80]:

```
df_vendas.Profit.describe()
```

Out[80]:

```
count    9994.000000
mean       28.656896
std       234.260108
min     -6599.978000
25%         1.728750
50%         8.666500
75%        29.364000
max      8399.976000
Name: Profit, dtype: float64
```

- Quantas subcategorias temos?
  - Temos mais categorias do que anos distintos, isso influencia no nosso plot;

In [51]:

```
df_vendas['Sub-Category'].value_counts(dropna=False, normalize=False)
```

Out[51]:

```
Binders        1523
Paper          1370
Furnishings     957
Phones          889
Storage         846
Art             796
Accessories     775
Chairs          617
Appliances      466
Labels          364
Tables          319
Envelopes       254
Bookcases       228
Fasteners       217
Supplies        190
Machines        115
Copiers          68
Name: Sub-Category, dtype: int64
```

- Gerando função de agregação:

In [64]:

```
def agg_func_2(g):

    dictResult = {}

    g = g.sort_values(by=['year'], ascending=True)
    dictResult['year'] = int(g["year"].iat[0])

    dictResult['profit_sum'] = g["Profit"].sum()

    return pd.Series(dictResult)
```

In [65]:

```
%%time
df_agg2 = df_vendas.groupby(by=["Sub-Category", "year"], as_index=False, axis=0,
                            dropna=False, observed=False, sort=True, group_keys=False).apply(agg_func_2)

df_agg2.year = df_agg2.year.astype(int)

df_agg2.head()
```

```
Wall time: 53 ms
```

Out[65]:

	Sub-Category	year	profit_sum
0	Accessories	2014	6402.7150
1	Accessories	2015	10197.2752
2	Accessories	2016	9664.2885
3	Accessories	2017	15672.3570
4	Appliances	2014	2459.4999

In [72]:

```
def agg_func_3(g):

    dictResult = {}

    dictResult['sub_category'] = g["Sub-Category"]
    dictResult['year'] = g["year"]
    dictResult['profit_sum'] = g["profit_sum"]
    dictResult['profit_cumsum'] = g["profit_sum"].cumsum()

    return pd.DataFrame(dictResult)

df_agg3 = df_agg2.groupby(by=["Sub-Category"], as_index=False, axis=0,
                          dropna=False, observed=False, sort=True).apply(agg_func_3)
```

In [74]:

```
df_agg3.head(5)
```

Out[74]:

	sub_category	year	profit_sum	profit_cumsum
0	Accessories	2014	6402.7150	6402.7150
1	Accessories	2015	10197.2752	16599.9902
2	Accessories	2016	9664.2885	26264.2787
3	Accessories	2017	15672.3570	41936.6357
4	Appliances	2014	2459.4999	2459.4999

- Plot resposta:

In [87]:

```
sb.catplot(data=df_agg3,
           col="sub_category",
           x="year",
           y="profit_cumsum",
           height=5,
           kind="bar",
           orient="v",
           legend=True,
           sharey=False,
           sharex=False,
           margin_titles=True,
           col_wrap=3)
```

```
C:\Users\vierb\anaconda3\lib\site-packages\seaborn\categorical.py:3793: UserWarning: Sett
ing `sharex=False` with `color=None` may cause different levels of the `x` variable to sh
are colors. This will change in a future version.
  warnings.warn(msg.format("sharex", "x"), UserWarning)
```

Out[87]:

```
<seaborn.axisgrid.FacetGrid at 0x2acd50ec760>
```

In [89]:

```
# O resultado com os dados ficará disponível com o nome "dados_vendas.csv"
df_agg3.to_csv("dados_marketing.csv", sep=";", decimal=".")
```

Q3

Q3. (4,0) Por fim, o pessoal do financeiro gostariam de receber um CSV com a quantidade de consumidores por classe de performance das vendas e Segment do consumidor.

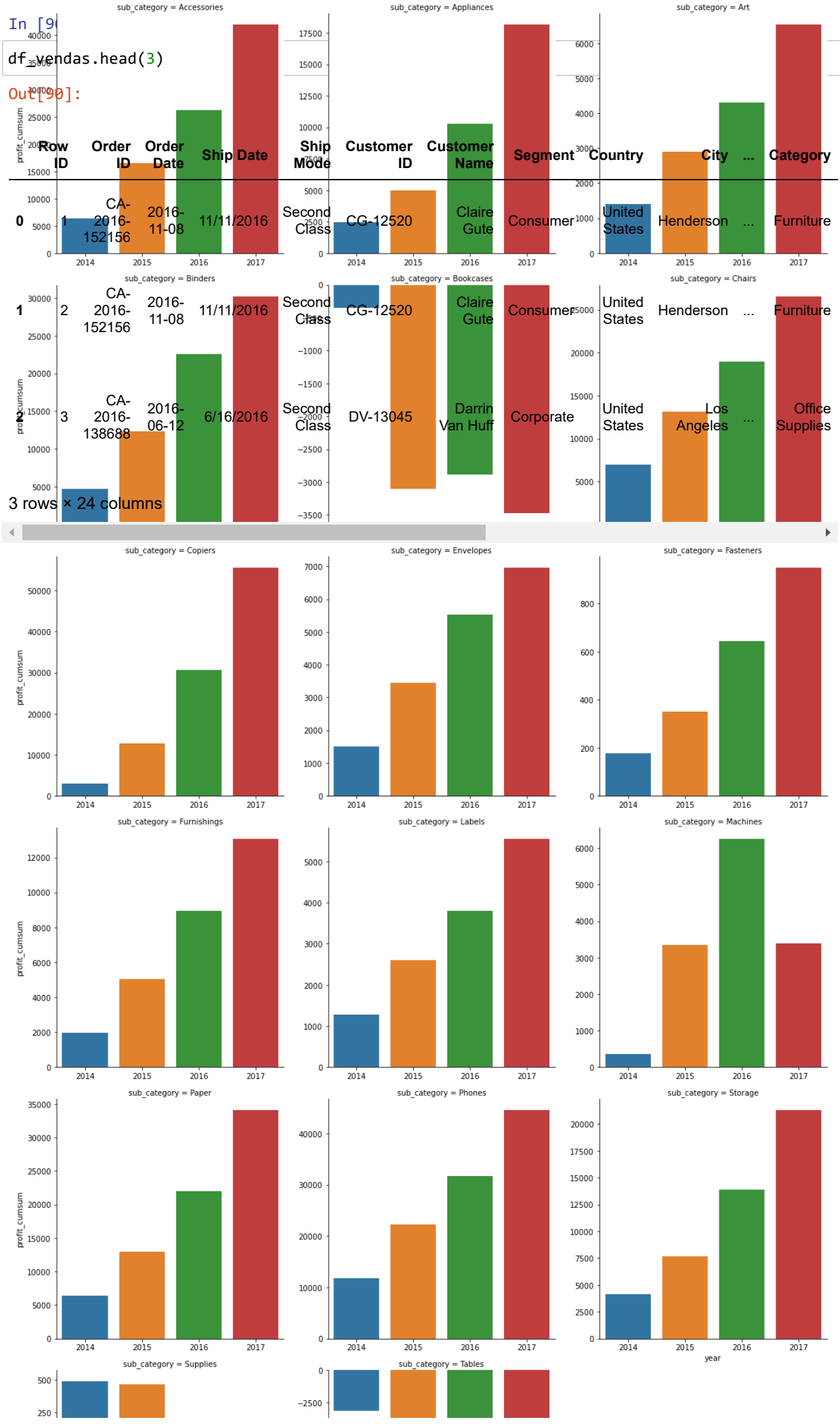
In [9

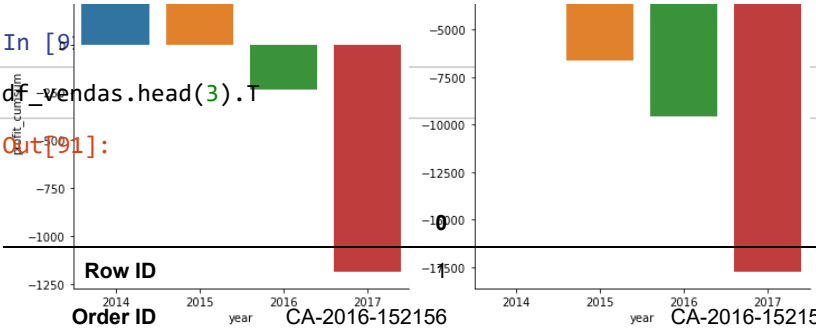
```
df_vendas.head(3)
```

Out[90]:

	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	...	Category
0	1	CA-2016-152156	2016-11-08	11/11/2016	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	...	Furniture
1	2	CA-2016-152156	2016-11-08	11/11/2016	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	...	Furniture
2	3	CA-2016-138688	2016-06-12	6/16/2016	Second Class	DV-13045	Darrin Van Huff	Corporate	United States	Los Angeles	...	Office Supplies

3 rows × 24 columns





In [91]:

```
df_vendas.head(3).T
```

Out[91]:

	0	1	2
Row ID	1	2	3
Order ID	CA-2016-152156	CA-2016-152156	CA-2016-138688
Order Date	2016-11-08 00:00:00	2016-11-08 00:00:00	2016-06-12 00:00:00
Ship Date	11/11/2016	11/11/2016	6/16/2016
Ship Mode	Second Class	Second Class	Second Class
Customer ID	CG-12520	CG-12520	DV-13045
Customer Name	Claire Gute	Claire Gute	Darrin Van Huff
Segment	Consumer	Consumer	Corporate
Country	United States	United States	United States
City	Henderson	Henderson	Los Angeles
State	Kentucky	Kentucky	California
Postal Code	42420	42420	90036
Region	South	South	West
Product ID	FUR-BO-10001798	FUR-CH-10000454	OFF-LA-10000240
Category	Furniture	Furniture	Office Supplies
Sub-Category	Bookcases	Chairs	Labels
Product Name	Bush Somerset Collection Bookcase	Hon Deluxe Fabric Upholstered Stacking Chairs,...	Self-Adhesive Address Labels for Typewriters b...
Sales	261.96	731.94	14.62
Quantity	2	3	2
Discount	0.0	0.0	0.0
Profit	41.9136	219.582	6.8714
day	8	8	12
month	11	11	6
year	2016	2016	2016

- Temos muitos consumidores que fizeram mais de um consumo:

In [92]:

```
df_vendas["Customer ID"].value_counts()
```

Out[92]:

```
WB-21850    37
JL-15835    34
MA-17560    34
PP-18955    34
CK-12205    32
            ..
LD-16855     1
AO-10810     1
CJ-11875     1
RE-19405     1
JR-15700     1
Name: Customer ID, Length: 793, dtype: int64
```

- Tipos de segmento e suas volumetrias:

In [102]:

```
df_vendas["Segment"].value_counts()
```

Out[102]:

```
Consumer       5191
Corporate      3020
Home Office    1783
Name: Segment, dtype: int64
```

- Classe de Performance:

In [93]:

```
def class_perf(row):
    r = row["Profit"]/(row["Sales"]-row["Discount"])
    return r
```

In [96]:

```
df_vendas["class_perf"] = df_vendas.apply(class_perf, axis=1)
```

In [97]:

```
df_vendas["class_perf"].describe()
```

Out[97]:

```
count    9994.000000
mean        0.096314
std         0.715747
min       -37.155556
25%         0.075018
50%         0.270000
75%         0.366666
max         3.873770
Name: class_perf, dtype: float64
```

In [98]:

```
df_vendas[["Profit","Sales","Discount","class_perf"]].head()
```

Out[98]:

	Profit	Sales	Discount	class_perf
0	41.9136	261.9600	0.00	0.160000
1	219.5820	731.9400	0.00	0.300000
2	6.8714	14.6200	0.00	0.470000
3	-383.0310	957.5775	0.45	-0.400188
4	2.5164	22.3680	0.20	0.113515

In [101]:

```
def class_perf_label(v):

    if v <= 0.1:
        return "E"
    elif v <= 0.15:
        return "D"
    elif v <= 0.2:
        return "C"
    elif v <= 0.25:
        return "B"
    elif v > 0.25:
        return "A"
    else:
        return "F"

df_vendas["class_perf_label"] = df_vendas.class_perf.apply(class_perf_label)
```

- Pivotando com agregação:

In [104]:

```
df_result = df_vendas.pivot_table(values="Customer ID",index=["class_perf_label"], columns=["Segment"],
```

In [112]:

```
df_result
```

Out[112]:

Segment	Consumer	Corporate	Home Office
class_perf_label			
A	2821	1675	1020
B	212	124	95
C	186	114	66
D	393	213	114
E	1579	894	488

In [115]:

```
df_result.sum()
```

Out[115]:

```
Segment
Consumer       5191
Corporate      3020
Home Office    1783
dtype: int64
```

In [114]:

```
df_result.sum().sum()
```

Out[114]:

```
9994
```

In [117]:

```
df_vendas.shape
```

Out[117]:

```
(9994, 26)
```

- Resultado:

In [119]:

```
# O resultado com os dados ficará disponível com o nome "dados_vendas.csv"
df_result.to_csv("dados_financeiro.csv", sep=";", decimal=".")
```