In [1]:

```
import pandas as pd
import numpy as np
import cufflinks as cf
from plotly.offline import plot, iplot
cf.go_offline()
```

In [2]:

```
data = "D:/Projetos_Data_Science/Projeto_Olist/data/olist_orders_dataset.csv"
df_orders = pd.read_csv(data, sep=",")
```

In [3]:

```
df_orders.head()
```

Out[3]:

	order_id	customer_id	order_status	order_purchase_timestamp	order_approved_at	order_delivere
0	e481f51cbdc54678b7cc49136f2d6af7	9ef432eb6251297304e76186b10a928d	delivered	2017-10-02 10:56:33	2017-10-02 11:07:15	2017
1	53cdb2fc8bc7dce0b6741e2150273451	b0830fb4747a6c6d20dea0b8c802d7ef	delivered	2018-07-24 20:41:37	2018-07-26 03:24:27	2018
2	47770eb9100c2d0c44946d9cf07ec65d	41ce2a54c0b03bf3443c3d931a367089	delivered	2018-08-08 08:38:49	2018-08-08 08:55:23	2018
3	949d5b44dbf5de918fe9c16f97b45f8a	f88197465ea7920adcdbec7375364d82	delivered	2017-11-18 19:28:06	2017-11-18 19:45:59	2017
4	ad21c59c0840e6cb83a9ceb5573f8159	8ab97904e6daea8866dbdbc4fb7aad2c	delivered	2018-02-13 21:18:39	2018-02-13 22:20:29	2018

In [4]:

```
df_orders.columns
```

Out[4]:

```
Index(['order_id', 'customer_id', 'order_status', 'order_purchase_timestamp',
       'order_approved_at', 'order_delivered_carrier_date',
       'order_delivered_customer_date', 'order_estimated_delivery_date'],
      dtype='object')
```

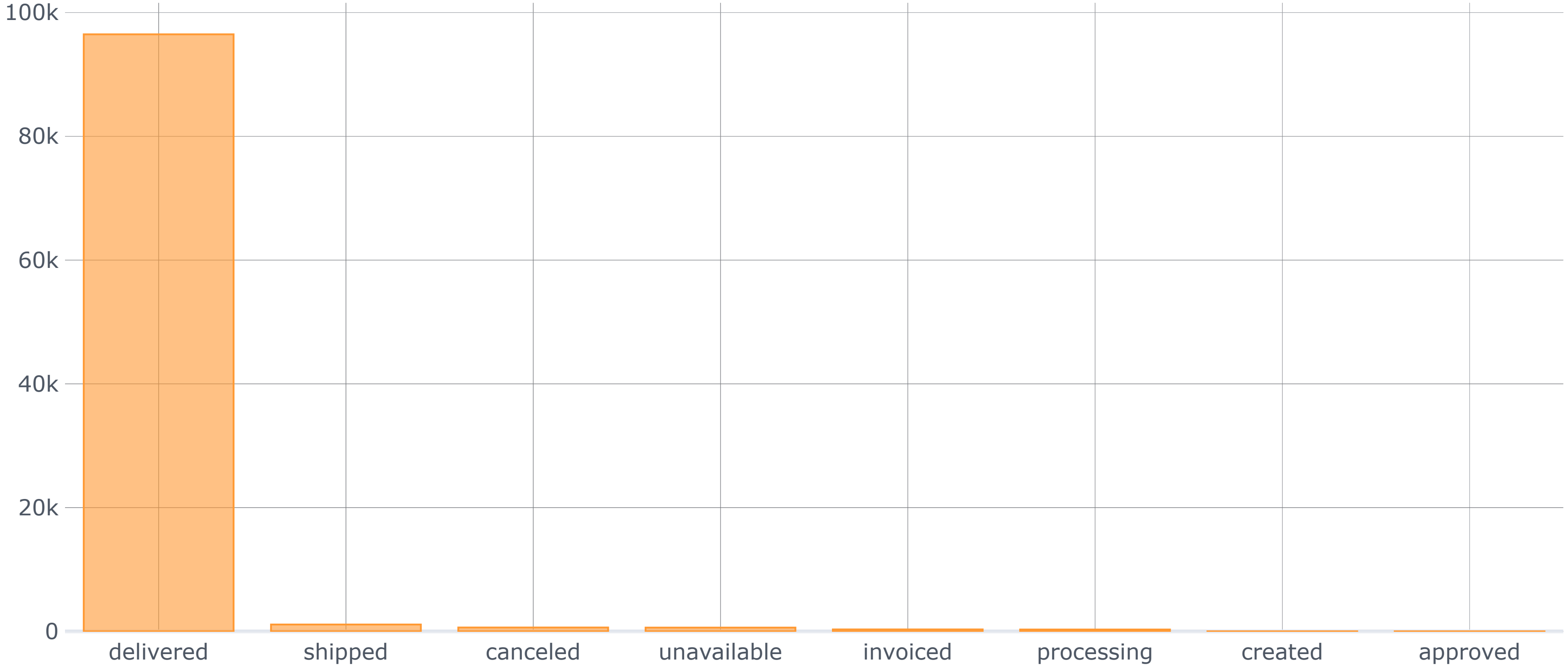
In [5]:
```
df_orders.shape
```

Out[5]:
```
(99441, 8)
```

In [6]:
```
df_orders["order_status"].value_counts()
```

Out[6]:
```
delivered      96478
shipped         1107
canceled         625
unavailable      609
invoiced         314
processing       301
created            5
approved           2
Name: order_status, dtype: int64
```

In [7]:
```
df_orders["order_status"].value_counts().iplot(kind = 'bar')
```



In [8]:

```
df_orders.isnull().sum()
```

Out[8]:

```
order_id                            0
customer_id                         0
order_status                        0
order_purchase_timestamp            0
order_approved_at                 160
order_delivered_carrier_date     1783
order_delivered_customer_date    2965
order_estimated_delivery_date       0
dtype: int64
```

In [9]:
```
df_orders[df_orders['order_delivered_customer_date'].isnull()]
```

Out[9]:

	order_id	customer_id	order_status	order_purchase_timestamp	order_approved_at	orde
6	136cce7faa42fdb2cefd53fdc79a6098	ed0271e0b7da060a393796590e7b737a	invoiced	2017-04-11 12:22:08	2017-04-13 13:25:17	
44	ee64d42b8cf066f35eac1cf57de1aa85	caded193e8e47b8362864762a83db3c5	shipped	2018-06-04 16:44:48	2018-06-05 04:31:18	
103	0760a852e4e9d89eb77bf631eaaf1c84	d2a79636084590b7465af8ab374a8cf5	invoiced	2018-08-03 17:44:42	2018-08-07 06:15:14	
128	15bed8e2fec7fdbadb186b57c46c92f2	f3f0e613e0bdb9c7cee75504f0f90679	processing	2017-09-03 14:22:03	2017-09-03 14:30:09	
154	6942b8da583c2f9957e990d028607019	52006a9383bf149a4fb24226b173106f	shipped	2018-01-10 11:33:07	2018-01-11 02:32:30	
...	...	...	...	...	...	
99283	3a3cddda5a7c27851bd96c3313412840	0b0d6095c5555fe083844281f6b093bb	canceled	2018-08-31 16:13:44	NaN	
99313	e9e64a17afa9653aacf2616d94c005b8	b4cd0522e632e481f8eaf766a2646e86	processing	2018-01-05 23:07:24	2018-01-09 07:18:05	
99347	a89abace0dcc01eeb267a9660b5ac126	2f0524a7b1b3845a1a57fcf3910c4333	canceled	2018-09-06 18:45:47	NaN	
99348	a69ba794cc7deb415c3e15a0a3877e69	726f0894b5becdf952ea537d5266e543	unavailable	2017-08-23 16:28:04	2017-08-28 15:44:47	
99415	5fabc81b6322c8443648e1b21a6fef21	32c9df889d41b0ee8309a5efb6855dcb	unavailable	2017-10-10 10:50:03	2017-10-14 18:35:57	

2965 rows × 8 columns

Identificando pedidos entregues sem data de entrega

In [10]:
```
# Criando um novo dataframe para identificar se existe algum pedido entregue sem data de entrega (erro sistemico?)
df_null = df_orders[df_orders['order_delivered_customer_date'].isnull()]
```

```
In [11]: df_null.order_status.value_counts()
```

```
Out[11]: shipped        1107
         canceled        619
         unavailable     609
         invoiced        314
         processing      301
         delivered         8
         created           5
         approved          2
         Name: order_status, dtype: int64
```

Neste caso identificamos 8 pedidos dos quais foram entregues e não possuimos a data de entrega. A empresa deve investigar se foi falha sistemica ou algum erro operacional

In [12]:

```
# Iremos demonstrar quais linhas são estes 8 pedidos
df_null.loc[df_null["order_status"]=='delivered']
```

Out[12]:

	order_id	customer_id	order_status	order_purchase_timestamp	order_approved_at	order_de
3002	2d1e2d5bf4dc7227b3bfebb81328c15f	ec05a6d8558c6455f0cbbd8a420ad34f	delivered	2017-11-28 17:44:07	2017-11-28 17:56:40	
20618	f5dd62b788049ad9fc0526e3ad11a097	5e89028e024b381dc84a13a3570decb4	delivered	2018-06-20 06:58:43	2018-06-20 07:19:05	
43834	2ebdfc4f15f23b91474edf87475f108e	29f0540231702fda0cfdee0a310f11aa	delivered	2018-07-01 17:05:11	2018-07-01 17:15:12	
79263	e69f75a717d64fc5ecdfae42b2e8e086	cfda40ca8dd0a5d486a9635b611b398a	delivered	2018-07-01 22:05:55	2018-07-01 22:15:14	
82868	0d3268bad9b086af767785e3f0fc0133	4f1d63d35fb7c8999853b2699f5c7649	delivered	2018-07-01 21:14:02	2018-07-01 21:29:54	
92643	2d858f451373b04fb5c984a1cc2defaf	e08caf668d499a6d643dafd7c5cc498a	delivered	2017-05-25 23:22:43	2017-05-25 23:30:16	
97647	ab7c89dc1bf4a1ead9d6ec1ec8968a84	dd1b84a7286eb4524d52af4256c0ba24	delivered	2018-06-08 12:09:39	2018-06-08 12:36:39	
98038	20edc82cf5400ce95e1afacc25798b31	28c37425f1127d887d7337f284080a0f	delivered	2018-06-27 16:09:12	2018-06-27 16:29:30	

Criando um novo DF eliminando colunas da qual possuem todos os dados nulos

In [13]:

```
df_orders_new = df_orders.dropna(how='all', axis=1).copy()
```

In [14]:

```
df_orders_new.shape
```

Out[14]:

```
(99441, 8)
```

Como não existiu alteração no números de colunas, irei continuar usando o DF anterior (df_orders)

Trabalhando com as datas

Verificar o tipo de dados das series com datas

In [15]:

```
df_orders.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 99441 entries, 0 to 99440
Data columns (total 8 columns):
 #   Column                         Non-Null Count  Dtype 
---  ------                         --------------  ----- 
 0   order_id                       99441 non-null  object
 1   customer_id                    99441 non-null  object
 2   order_status                   99441 non-null  object
 3   order_purchase_timestamp       99441 non-null  object
 4   order_approved_at              99281 non-null  object
 5   order_delivered_carrier_date   97658 non-null  object
 6   order_delivered_customer_date  96476 non-null  object
 7   order_estimated_delivery_date  99441 non-null  object
dtypes: object(8)
memory usage: 6.1+ MB
```

Transformando o tipo de algumas colunas

In [16]:

```
df_orders.order_status = df_orders['order_status'].astype("category")
df_orders.order_purchase_timestamp = pd.to_datetime(df_orders['order_purchase_timestamp'])
df_orders.order_approved_at = pd.to_datetime(df_orders['order_approved_at'])
df_orders.order_delivered_customer_date = pd.to_datetime(df_orders['order_delivered_customer_date'])
df_orders.order_estimated_delivery_date = pd.to_datetime(df_orders['order_estimated_delivery_date'])
```

In [17]:
```
df_orders.dtypes
```

Out[17]:
```
order_id                                 object
customer_id                              object
order_status                           category
order_purchase_timestamp         datetime64[ns]
order_approved_at                datetime64[ns]
order_delivered_carrier_date             object
order_delivered_customer_date    datetime64[ns]
order_estimated_delivery_date    datetime64[ns]
dtype: object
```

In [18]:
```
# Criando 3 novas colunas e alterando o formato
df_orders['data_entrega']=pd.to_datetime(df_orders['order_delivered_customer_date'],
                                            format='%Y-%m-%d').dt.date
df_orders['data_estimada']=pd.to_datetime(df_orders['order_estimated_delivery_date'],
                                           format='%Y-%m-%d').dt.date
```

In [19]:
```
df_orders['mes_compra'] = df_orders['order_purchase_timestamp'].dt.to_period('M').astype(str)
```

In [20]:
```
df_orders['dif_dias']= df_orders['data_entrega']-df_orders['data_estimada']
```

In [21]:

```
df_orders.head()
```

Out[21]:

	order_id	customer_id	order_status	order_purchase_timestamp	order_approved_at	order_delivere
0	e481f51cbdc54678b7cc49136f2d6af7	9ef432eb6251297304e76186b10a928d	delivered	2017-10-02 10:56:33	2017-10-02 11:07:15	2017
1	53cdb2fc8bc7dce0b6741e2150273451	b0830fb4747a6c6d20dea0b8c802d7ef	delivered	2018-07-24 20:41:37	2018-07-26 03:24:27	2018
2	47770eb9100c2d0c44946d9cf07ec65d	41ce2a54c0b03bf3443c3d931a367089	delivered	2018-08-08 08:38:49	2018-08-08 08:55:23	2018
3	949d5b44dbf5de918fe9c16f97b45f8a	f88197465ea7920adcdbec7375364d82	delivered	2017-11-18 19:28:06	2017-11-18 19:45:59	2017
4	ad21c59c0840e6cb83a9ceb5573f8159	8ab97904e6daea8866dbdbc4fb7aad2c	delivered	2018-02-13 21:18:39	2018-02-13 22:20:29	2018

Quais meses houveram mais vendas?

In [22]:

```
vendas_mes = df_orders.groupby(by='mes_compra').order_id.count()
```

In [23]:

```
vendas_mes_max = vendas_mes.values.max()
```

In [24]:

```
vendas_mes_max
```

Out[24]:

```
7544
```

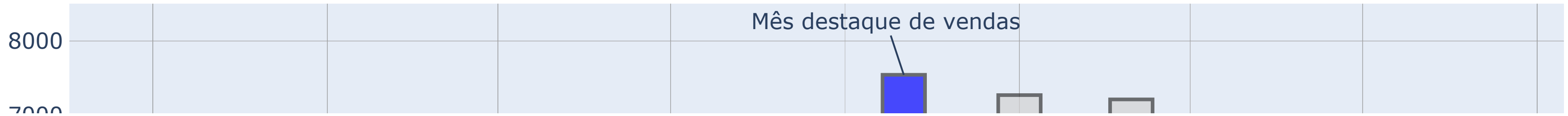
In [25]:

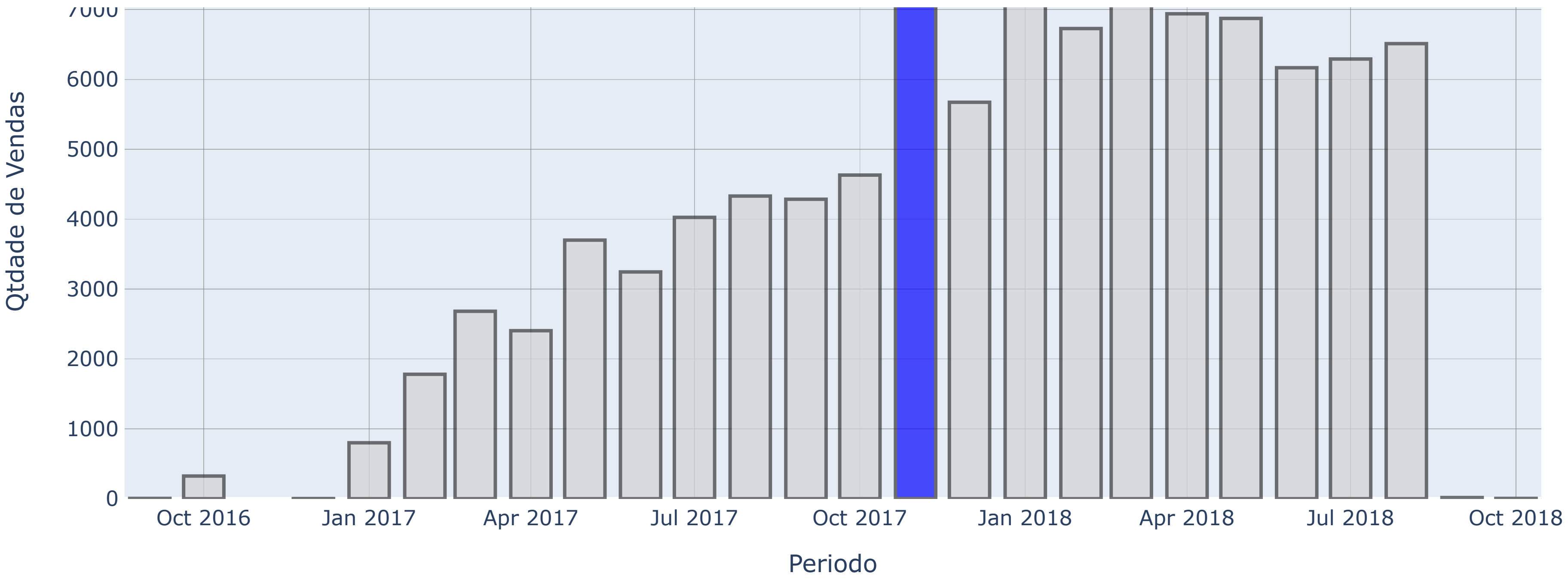
```
cores = []
for x,y in zip(vendas_mes.values, vendas_mes.index):
    if x == vendas_mes_max:
        mes_maximo_de_vendas = y
        cores.append('blue')
    else:
        cores.append('lightgray')
```

In [26]:

```
import plotly.offline as py
import plotly.graph_objs as go

data = [go.Bar(x=vendas_mes.index,
               y=vendas_mes.values,
               marker = {'color': cores,
                         'line': {'color': '#333',
                                 'width': 2}
                        },
               opacity= 0.7
              )
       ]

# Criando Layout
configuracoes_layout = go.Layout(title='Qtdade de vendas no Periodo',
                                 yaxis={'title':'Qtdade de Vendas'},
                                 xaxis={'title': 'Periodo'},
                                 # texto na barra de destaque
                                 annotations = [{'text':'Mês destaque de vendas',
                                                'x':mes_maximo_de_vendas,
                                                'y':vendas_mes_max}
                                               ]

                                )

# Objeto figura

fig = go.Figure(data=data, layout=configuracoes_layout)

# plotando o grafico
py.iplot(fig, filename='Mes destaque de vendas')
```

Qtdade de vendas no Periodo





Realizar Merge entre as bases de dados

In [27]:

```
data = "D:/Projetos_Data_Science/Projeto_Olist/data/olist_order_items_dataset.csv"
ordem_itens = pd.read_csv(data, sep=",")
```

In [28]:

```
df_total_ordem = pd.merge(df_orders,ordem_itens)
```

In [29]:

```
data = "D:/Projetos_Data_Science/Projeto_Olist/data/olist_products_dataset.csv"
produtos = pd.read_csv(data, sep=",")
```

In [30]:

```
df_ordem_produto = pd.merge(df_total_ordem, produtos, on = 'product_id' )
```

In [31]:
```
df_ordem_produto.columns
```

Out[31]:
```
Index(['order_id', 'customer_id', 'order_status', 'order_purchase_timestamp',
       'order_approved_at', 'order_delivered_carrier_date',
       'order_delivered_customer_date', 'order_estimated_delivery_date',
       'data_entrega', 'data_estimada', 'mes_compra', 'dif_dias',
       'order_item_id', 'product_id', 'seller_id', 'shipping_limit_date',
       'price', 'freight_value', 'product_category_name',
       'product_name_lenght', 'product_description_lenght',
       'product_photos_qty', 'product_weight_g', 'product_length_cm',
       'product_height_cm', 'product_width_cm'],
      dtype='object')
```

In [32]:
```
df_ordem_produto['prod_id_red'] = df_ordem_produto['product_id'].str[-5:]
```

In [33]:

```
df_ordem_produto.dtypes
```

Out[33]:

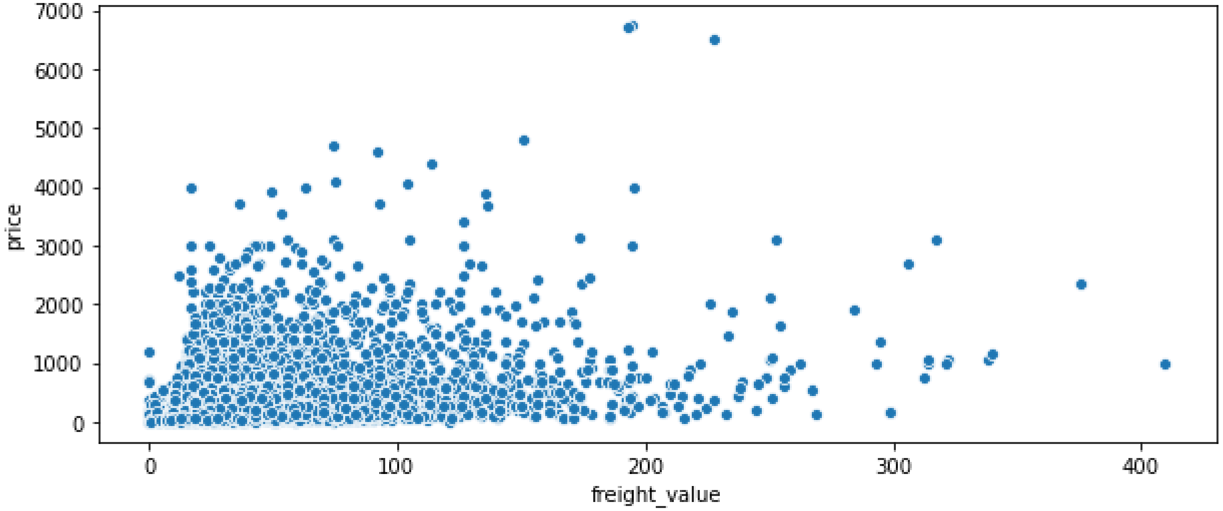
```
order_id                                  object
customer_id                               object
order_status                            category
order_purchase_timestamp          datetime64[ns]
order_approved_at                 datetime64[ns]
order_delivered_carrier_date              object
order_delivered_customer_date     datetime64[ns]
order_estimated_delivery_date     datetime64[ns]
data_entrega                              object
data_estimada                             object
mes_compra                                object
dif_dias                         timedelta64[ns]
order_item_id                              int64
product_id                                object
seller_id                                 object
shipping_limit_date                       object
price                                    float64
freight_value                            float64
product_category_name                     object
product_name_lenght                      float64
product_description_lenght               float64
product_photos_qty                       float64
product_weight_g                         float64
product_length_cm                        float64
product_height_cm                        float64
product_width_cm                         float64
prod_id_red                               object
dtype: object
```

Existe alguma tendencia entre valor do produto x valor do frete?

In [34]:

```
import seaborn as sns
import matplotlib.pyplot as plt
```

```
In [35]: f, ax = plt.subplots(figsize=(10, 4))

         sns.scatterplot(x="freight_value", y="price", data=df_ordem_produto);
```



Não existe uma correlação forte entre aumento do valor do produto x aumento do valor do frete

Categorias dos produtos

In [36]:
```
df_ordem_produto['product_category_name'].value_counts()
```

Out[36]:
```
cama_mesa_banho                   11115
beleza_saude                       9670
esporte_lazer                      8641
moveis_decoracao                   8334
informatica_acessorios             7827
                                  ...
la_cuisine                           14
cds_dvds_musicais                    14
pc_gamer                              9
fashion_roupa_infanto_juvenil         8
seguros_e_servicos                    2
Name: product_category_name, Length: 73, dtype: int64
```

In [37]:
```
categ_mais_vendidas = df_ordem_produto['product_category_name'].value_counts().head(10)
```

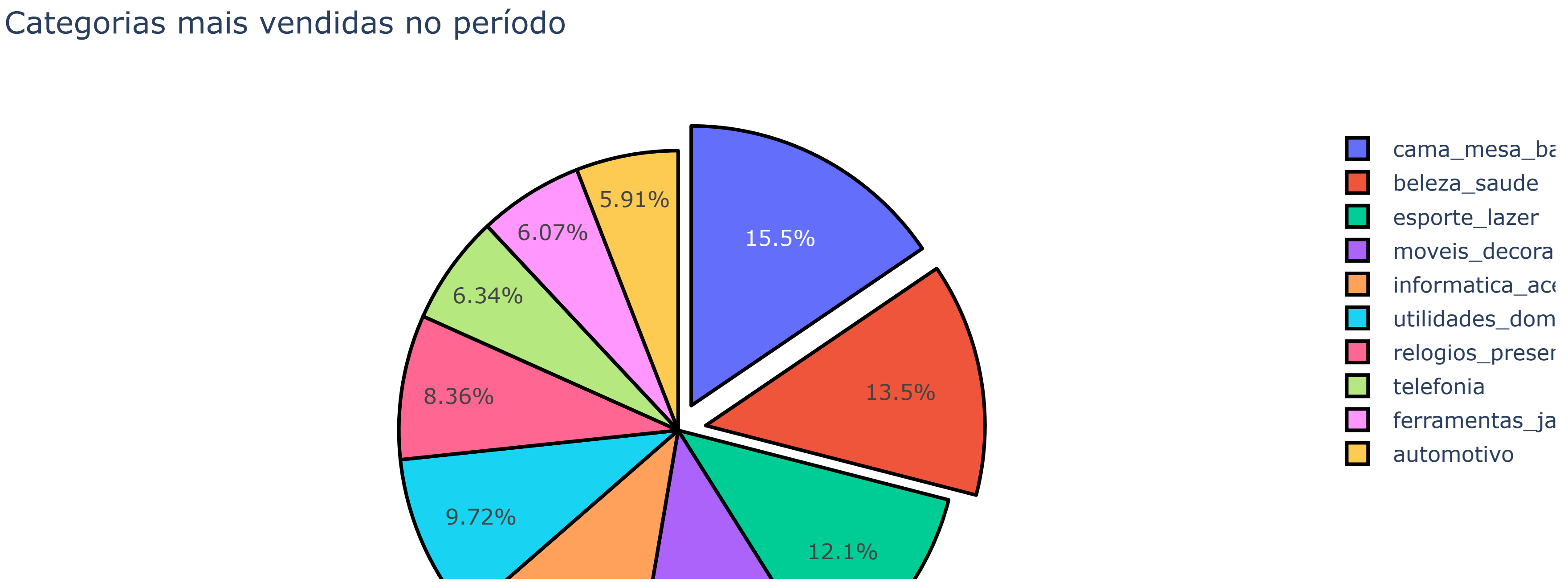
In [38]:
```
categ_mais_vendidas
```

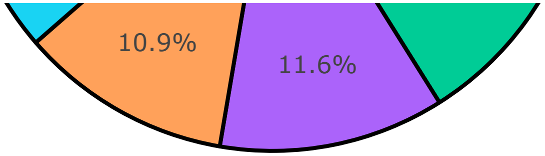
Out[38]:
```
cama_mesa_banho           11115
beleza_saude               9670
esporte_lazer              8641
moveis_decoracao           8334
informatica_acessorios     7827
utilidades_domesticas      6964
relogios_presentes         5991
telefonia                  4545
ferramentas_jardim         4347
automotivo                 4235
Name: product_category_name, dtype: int64
```

Montando o gráfico com as categorias mais vendidas

In [39]:

```
trace = go.Pie(labels = categ_mais_vendidas.index,
               values = categ_mais_vendidas.values,
               pull=[0.1,0.1,0,0,0,0,0,0,0,0],
               direction='clockwise',
               marker = {'line' : {'color':'#000000','width':2}}
              )

# Armazenando gráfico em uma lista

data = [trace]

# Criando Layout

layout = go.Layout(title='Categorias mais vendidas no período')

# Criando figura que será exibida
fig = go.Figure(data=data, layout=layout)

py.iplot(fig)
```




10.9%
11.6%