Week5：优衣库销售产品分析

一、问题界定

整体销售情况随着时间的变化是怎样的？
不同产品的销售情况是怎样的？顾客偏爱哪一种购买方式？
销售额和产品成本之间的关系怎么样？

二、数据查看、简单清洗与整理

1
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

2
```
plt.rcParams['font.sans-serif'] = ['simhei']
```

3
```
data=pd.read_csv('C:\\Users\mac\Desktop\数据分析班\week5\\unique.csv')
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 22293 entries, 0 to 22292
Data columns (total 13 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   store_id      22293 non-null  int64  
 1   city          22293 non-null  object 
 2   channel       22293 non-null  object 
 3   gender_group  22293 non-null  object 
 4   age_group     22293 non-null  object 
 5   wkd_ind       22293 non-null  object 
 6   product       22293 non-null  object 
 7   customer      22293 non-null  int64  
 8   revenue       22293 non-null  float64
 9   order         22293 non-null  int64  
 10  quant         22293 non-null  int64  
 11  unit_cost     22293 non-null  int64  
 12  unit_price    22293 non-null  int64  
dtypes: float64(1), int64(6), object(6)
memory usage: 2.2+ MB
```

4
```
data.head()
```

4

	store_id	city	channel	gender_group	age_group	wkd_ind	product	customer
0	658	深圳	线下	Female	25-29	Weekday	当季新品	4
1	146	杭州	线下	Female	25-29	Weekday	运动	1

	store_id	city	channel	gender_group	age_group	wkd_ind	product	customer
2	70	深圳	线下	Male	>=60	Weekday	T恤	2
3	658	深圳	线下	Female	25-29	Weekday	T恤	1
4	229	深圳	线下	Male	20-24	Weekend	袜子	2

5
```
data.describe(include='all')
```
5

	store_id	city	channel	gender_group	age_group	wkd_ind	product
count	22293.000000	22293	22293	22293	22293	22293	22293
unique	NaN	10	2	3	11	2	9
top	NaN	深圳	线下	Female	30-34	Weekday	T恤
freq	NaN	4364	18403	14208	4426	12465	10610
mean	335.391558	NaN	NaN	NaN	NaN	NaN	NaN
std	230.236167	NaN	NaN	NaN	NaN	NaN	NaN
min	19.000000	NaN	NaN	NaN	NaN	NaN	NaN
25%	142.000000	NaN	NaN	NaN	NaN	NaN	NaN
50%	315.000000	NaN	NaN	NaN	NaN	NaN	NaN
75%	480.000000	NaN	NaN	NaN	NaN	NaN	NaN
max	831.000000	NaN	NaN	NaN	NaN	NaN	NaN

revenue存在异常值，需要处理

6
```
data[data['revenue']<0]
```
6

	store_id	city	channel	gender_group	age_group	wkd_ind	product	custom
20049	91	武汉	线上	Female	55-59	Weekday	运动	1

7
```
df_clean=data.copy()
```

8
```
df_clean=df_clean.drop(df_clean[data['revenue']<0].index)
```

9
```
df_clean.describe(include='all')
```

9

	store_id	city	channel	gender_group	age_group	wkd_ind	product
count	22292.000000	22292	22292	22292	22292	22292	22292
unique	NaN	10	2	3	11	2	9
top	NaN	深圳	线下	Female	30-34	Weekday	T恤
freq	NaN	4364	18403	14207	4426	12464	10610
mean	335.402521	NaN	NaN	NaN	NaN	NaN	NaN
std	230.235512	NaN	NaN	NaN	NaN	NaN	NaN
min	19.000000	NaN	NaN	NaN	NaN	NaN	NaN
25%	142.000000	NaN	NaN	NaN	NaN	NaN	NaN
50%	315.000000	NaN	NaN	NaN	NaN	NaN	NaN
75%	480.000000	NaN	NaN	NaN	NaN	NaN	NaN
max	831.000000	NaN	NaN	NaN	NaN	NaN	NaN

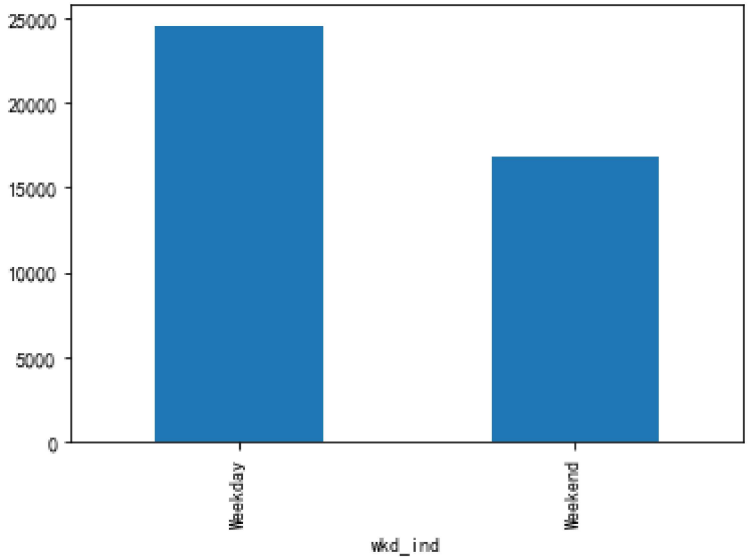
三、数据探索与可视化

1、整体销售情况随着时间的变化是怎样的？

（1）思路：
①变量选择：
销售情况可以用销售数量quant和销售金额revenue体现，时间则用周末/周中wkd_ind表示
②数据关系：
对比销售数据在周中和周末分组下的分布情况
③图表：柱状图

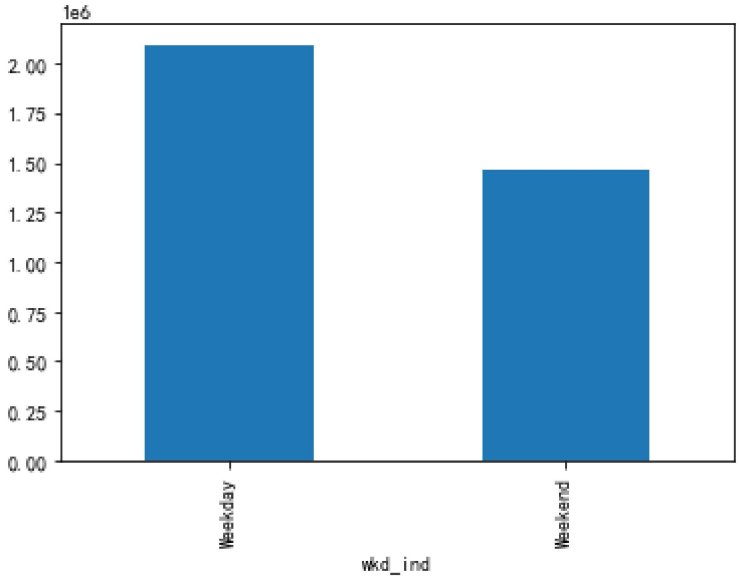
10
```
df_clean.groupby('wkd_ind')['quant'].sum().plot(kind='bar')
```

10
```
<AxesSubplot:xlabel='wkd_ind'>
```



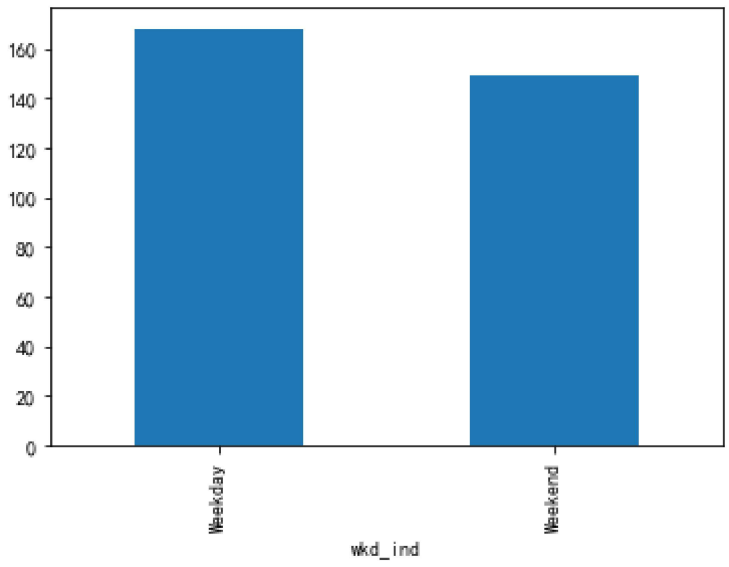

```
11 df_clean.groupby('wkd_ind')['revenue'].sum().plot(kind='bar')
```

```
11 <AxesSubplot:xlabel='wkd_ind'>
```




```
12 df_clean.groupby('wkd_ind')['revenue'].mean().plot(kind='bar')
```

```
12 <AxesSubplot:xlabel='wkd_ind'>
```



总结

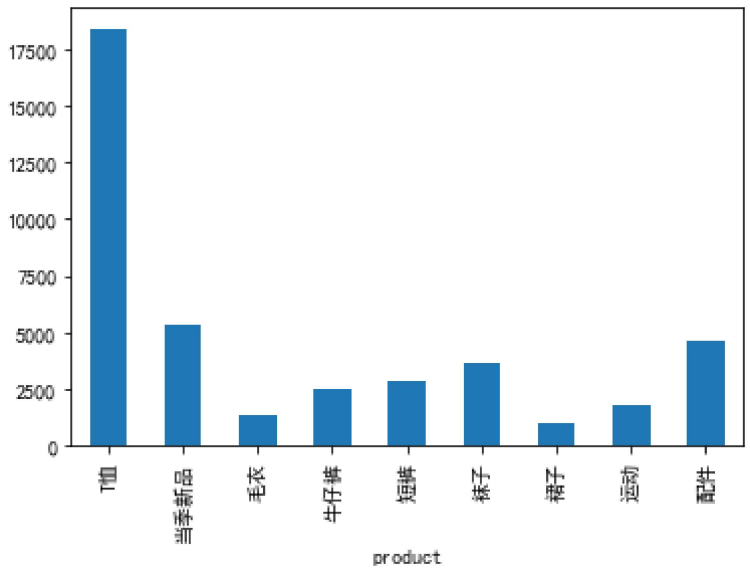
从上图可以看出，整体来看，在周末的销售数量和销售总额要远高于在工作日的，但是周末销售总额的均值

2、不同产品的销售情况是怎样的？

（1）思路：
①变量选择：
不同产品用产品类别product来区分，销售情况用销售数量quant和销售总额revenue，以及利润profit=
②数据关系：
对比不同类别产品在销售数量和销售总额上的区别
③图表：柱状图

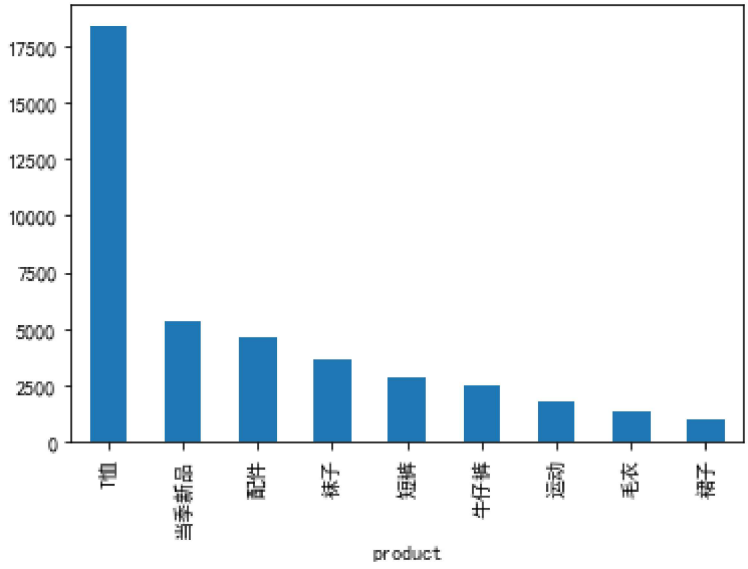
13
```
df_clean.groupby('product')['quant'].sum().plot(kind='bar')
```

13
```
<AxesSubplot:xlabel='product'>
```



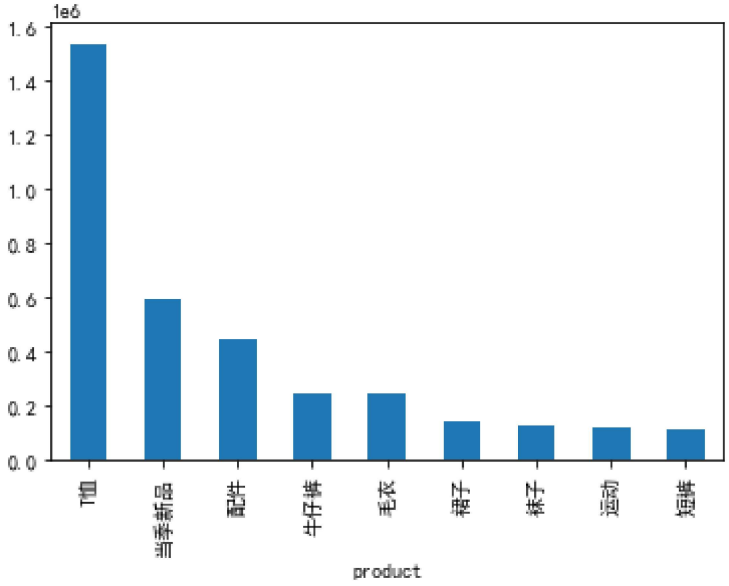
14
```
df_clean.groupby('product')['quant'].sum().sort_values(ascending=False).plot(kind='bar')
```

14
```
<AxesSubplot:xlabel='product'>
```



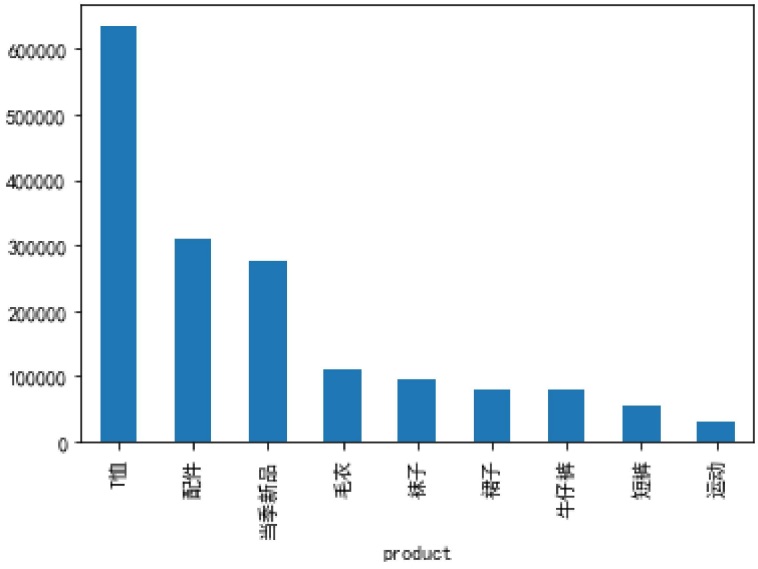
15 df_clean.groupby('product')['revenue'].sum().sort_values(ascending=False).plot(kind='bar')

15 <AxesSubplot:xlabel='product'>



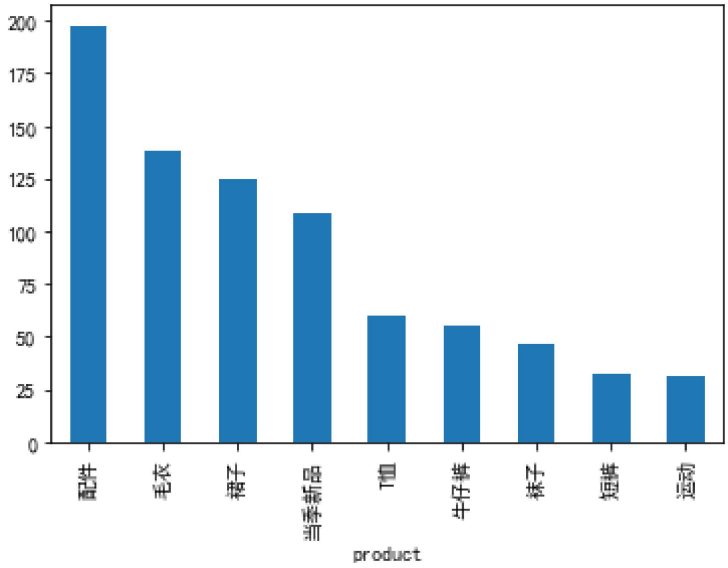
16 df_clean['profit']=df_clean['revenue']-df_clean['quant']*df_clean['unit_cost']
df_clean.groupby('product')['profit'].sum().sort_values(ascending=False).plot(kind='bar')

16 <AxesSubplot:xlabel='product'>




```
17 df_clean.groupby('product')['profit'].mean().sort_values(ascending=False).plot(kind='bar')
```

```
17 <AxesSubplot:xlabel='product'>
```



总结

由上图可知，无论是销售数量、销售金额还是利润综总和，T恤占据绝对领先的位置，是第二名的两倍以上
其次是当季新品和配件，其中虽然当季新品的销售数量和金额高于配件，但配件的利润总和要稍高于当季新
而对于平均利润而言，配件、毛衣和裤子的平均利润最高，都在100元以上

3、顾客偏爱哪一种购买方式？

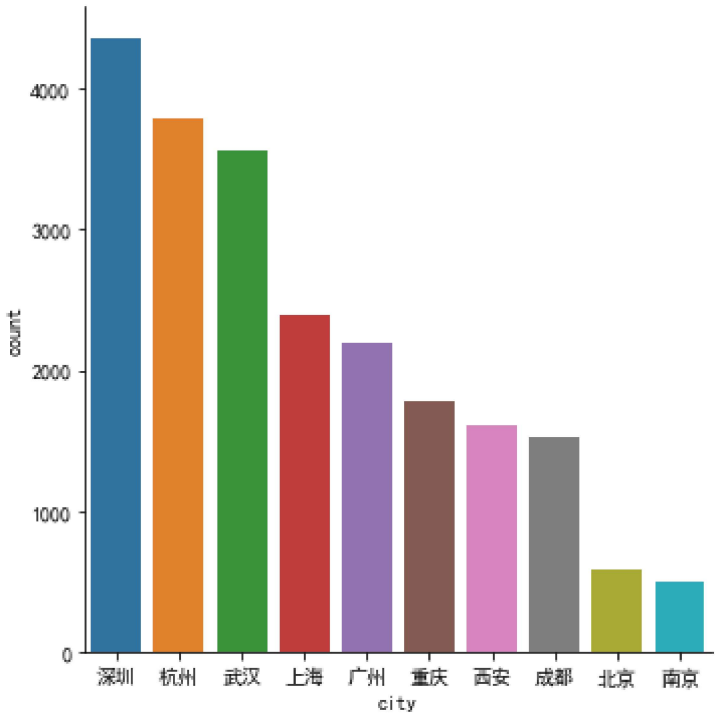
思路：
①变量选择：细分为什么样的顾客偏好什么样的购买方式：
顾客数量用count来表示，顾客可以用所在城市city、性别gender_Group、年龄段age_group来分类，购
②数据关系：
对比不同特征的顾客在不同渠道上的分布
③图表：柱状图

·城市

```
18 df_clean['count'] = 1
```

```
19 tmp0 = df_clean.groupby(['city'])['count'].count().sort_values(ascending=False)
   tmp0 = tmp0.reset_index()
   sns.catplot(x='city',y='count',kind='bar',data=tmp0)
```

```
19 <seaborn.axisgrid.FacetGrid at 0x28ed9048ca0>
```

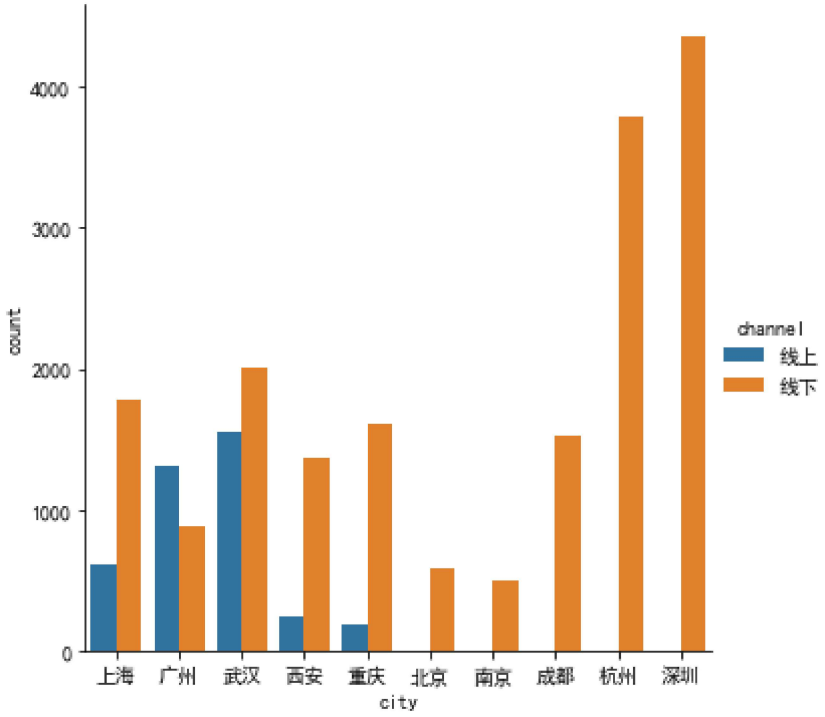


·渠道和城市

```
20 tmp1 = df_clean.groupby(['channel','city'])['count'].count()
   tmp1 = tmp1.reset_index()
```

```
21 sns.catplot(x='city',y='count',hue='channel',kind='bar',data=tmp1)
```

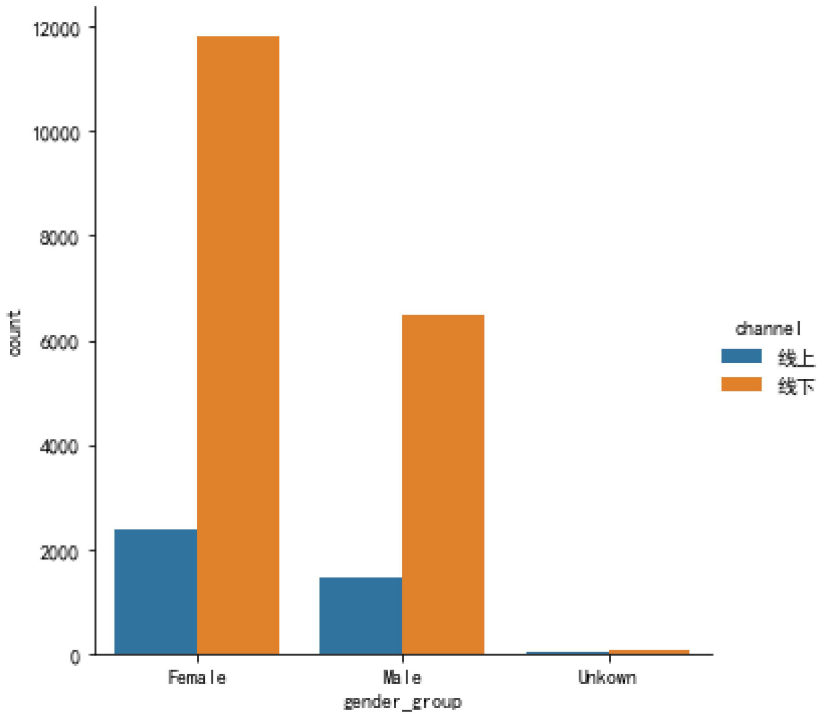
```
21 <seaborn.axisgrid.FacetGrid at 0x28ed8ef56a0>
```



·渠道和性别

```
22  tmp2 = df_clean.groupby(['channel','gender_group'])['count'].count()
    tmp2 = tmp2.reset_index()
    sns.catplot(x='gender_group',y='count',hue='channel',kind='bar',data=tmp2)
```

```
22  <seaborn.axisgrid.FacetGrid at 0x28ed8f42b20>
```

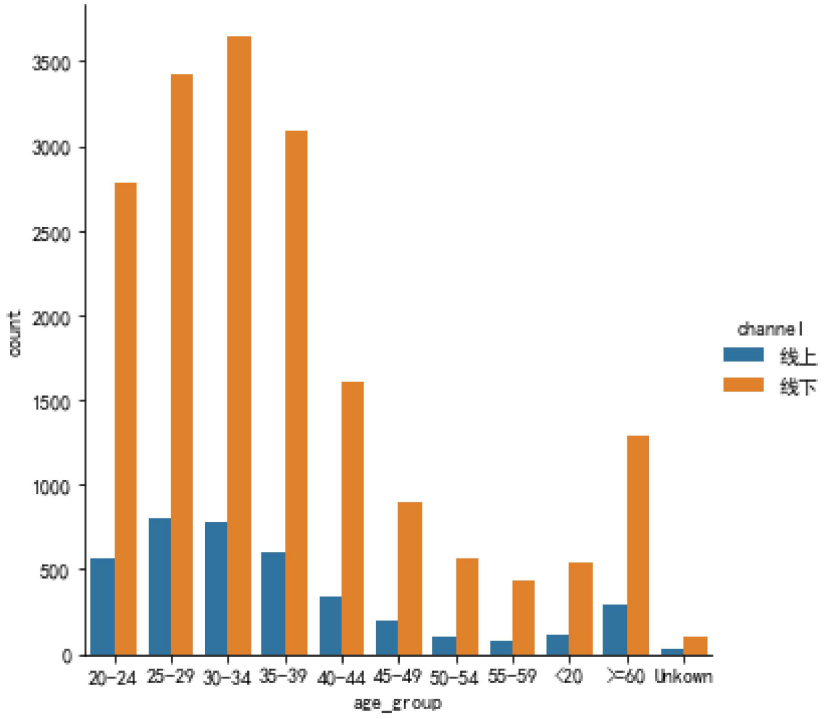


·渠道和年龄

```
23  tmp3 = df_clean.groupby(['channel','age_group'])['count'].count()
```

```
tmp3 = tmp3.reset_index()
sns.catplot(x='age_group',y='count',hue='channel',kind='bar',data=tmp3)
```

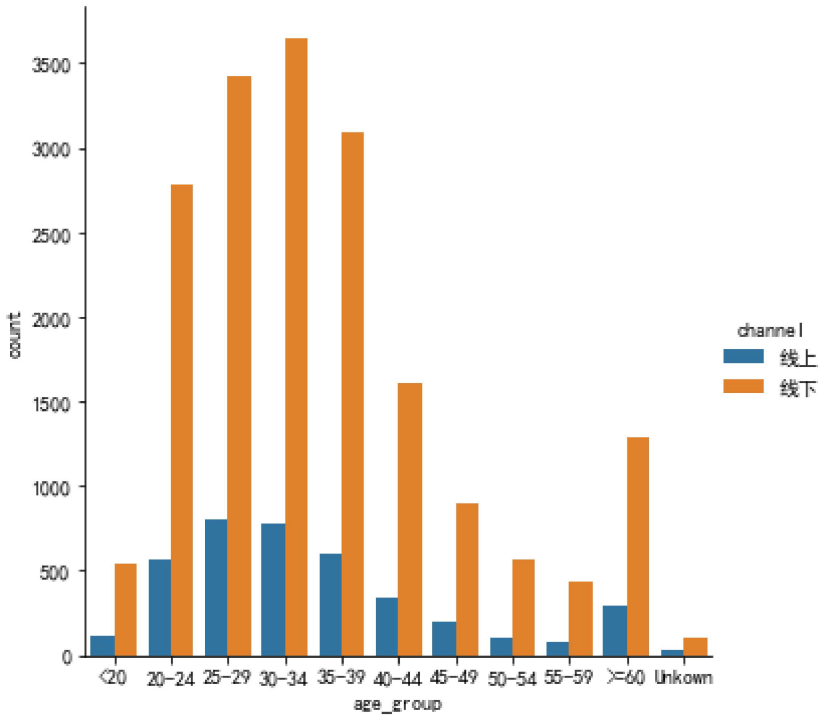
23 <seaborn.axisgrid.FacetGrid at 0x28ed8e69f40>




```
age_orders = ['<20','20-24','25-29',  '30-34','35-39',  '40-44','45-49', '50-54','55-59','>=60', 'U
```

```
sns.catplot(x='age_group',y='count',hue='channel',kind='bar',data=tmp3,order=age_orders)
```

25 <seaborn.axisgrid.FacetGrid at 0x28ed9233910>

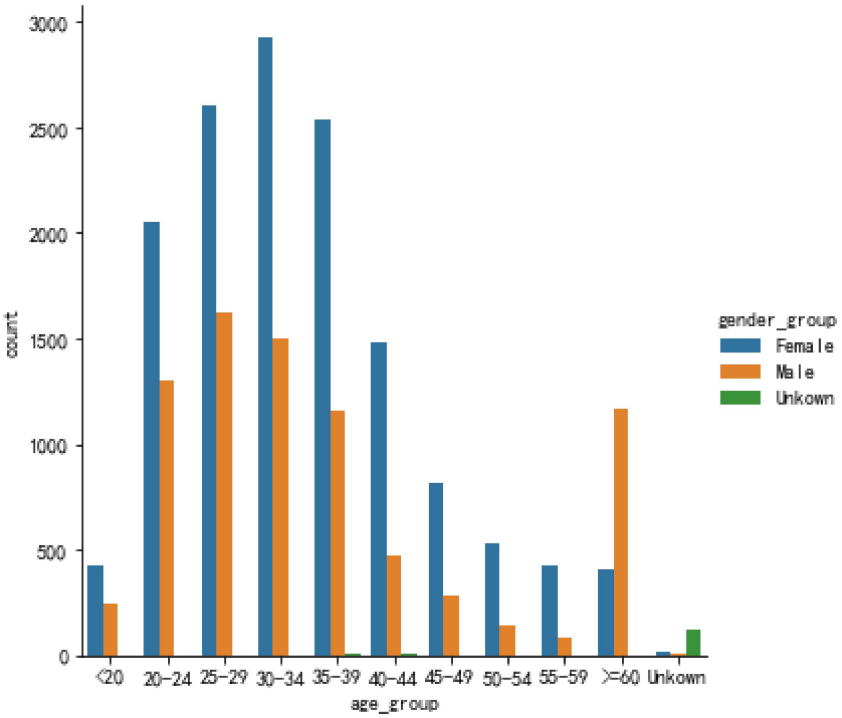


- 性别和年龄

```
68 tmp4= df_clean.groupby(['gender_group','age_group'])['count'].count()
   tmp4= tmp4.reset_index()
```

```
69 sns.catplot(x='age_group',y='count',hue='gender_group',kind='bar',data=tmp4,order=age_orders)
```

```
69 <seaborn.axisgrid.FacetGrid at 0x1eb76755dc0>
```



总结

由上述图形可得：
对于渠道来说：绝大部分的城市偏好线下购买，只有广州是唯一线上超过线下的地方；全年龄段以及无论男
对于城市来说：深圳、杭州和武汉是订单数最多的城市，均在3500以上，同时深圳和杭州几乎全是线下销
性别和年龄段：同时男女客户均集中分布在20~44岁之间，其中女性远多于男性，超过部分主要来自线下购

4、销售额和产品成本之间的关系怎么样？

思路：
①变量选择：
销售额可以用销售金额revenue和销售数量quant来度量，产品成本使用unit_cost表示
②数据关系：
分析销售金额和销售数量与产品成本的相关关系
③图表：
相关系数表+热力图

```
97 df_clean['tol_cost']=df_clean['quant']*df_clean['unit_cost']
   rel=['revenue','tol_cost','profit']
   df_clean[rel].corr()
```

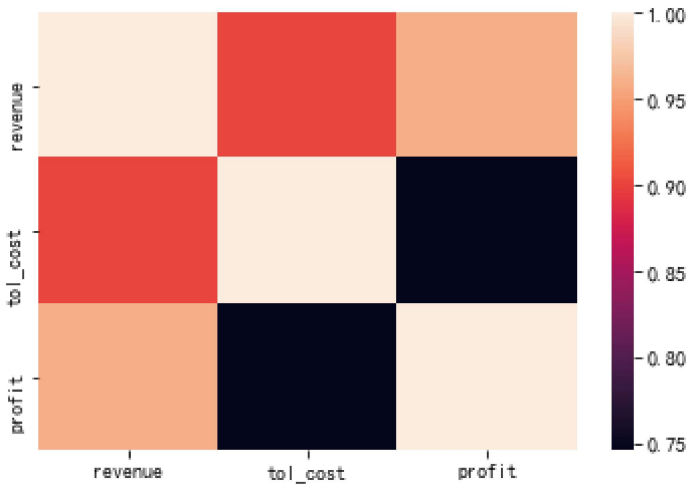
97

	revenue	tol_cost	profit

	revenue	tol_cost	profit
revenue	1.000000	0.901396	0.961068
tol_cost	0.901396	1.000000	0.746662
profit	0.961068	0.746662	1.000000

```
98 sns.heatmap(df_clean[rel].corr())
```

```
98 <AxesSubplot:>
```



总结

由上图和上表可以看出：
销售金额与总成本的相关系数为正，且接近与1，表示二者之间存在强烈的正相关的关系
同时销售金额与总利润的相关系数也为正，且接近与1，表示二者之间存在强烈的正相关的关系

5、总体业务总结

- 数据主要集中在深圳、杭州和武汉等城市，北京和南京数据较少
- 无论性别如何，和年龄如何，选择线下购买的客户都远高于线上购买的
- 优衣库的客户年龄主要分布在20~44岁之间，且女性多于男性
- 周末的客户数量和销售总额显著高于工作日的，但是销售额均值超出值并不多
- T恤、当今新品是最畅销的产品，T恤和配件是利润总额最高的商品，但是配件的单件利润要显著高