20250418 爬虫

1.urllib_基本使用.py

```
# 使用urllib来获取百度的源码
import urllib.request

# (1) 定义一个url
url = 'http://www.baidu.com'

# (2)模拟浏览器向服务器发送请求,
response = urllib.request.urlopen(url)

# （3）获取响应中的页面源码,
# content = response.read().decode('utf-8')
#
# print(content)

# read() 字节形式读取二进制 扩展：rede(5)返回前几个字节

# readline() 读取一行
# content = response.readline()
# print(content)  # b'<!DOCTYPE html>\n'


# readlines() 一行一行读取 直至结束
# content = response.readlines()
# print(content)  # 读取所有的数据

# getcode() 获取状态码
# content = response.getcode()
# print(content)  # 200

# geturl() 获取url
# content = response.geturl()
# print(content)  # http://www.baidu.com

# getheaders() 获取header
print(response.getheaders())
```

2.urllib_下载.py

```
import urllib.request

# 1.下载网页
# url_page = "http://www.baidu.com"
# 在python中，url代表的是下载地址，filename文件的名字
# urllib.request.urlretrieve(url_page, './temp/1.baidu.html')

# 2.下载图片
# url_img = 'https://ww4.sinaimg.cn/mw690/008BY4DGly1i0gg1ukut7j31p62m7b29.jpg'
# urllib.request.urlretrieve(url_img, "./temp/2chen.jpg")
# 3.下载视频
url_video = 'http://t.cn/A6rFJejQ'
urllib.request.urlretrieve(url_video, './temp/3chen.mp4')
```

3.urllib_请求对象定制.py

```
import urllib.request

url = "http://www.baidu.com/s?wd=%E9%99%88%E4%B8%BD%E5%90%9B"

headers = {
    'user-agent':'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
}


request = urllib.request.Request(url=url, headers=headers)

response = urllib.request.urlopen(request)

content = response.read().decode('utf-8')

print(content)
```

扩充1：get和post,delete,put ----restful

扩充2：json格式

4.urllib_百度翻译.py

```
import urllib.request
import urllib.parse
import json

url = 'https://fanyi.baidu.com/sug'
headers = {
    'user-agent':'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
}
data = {
    'kw': 'spider'
}
# post 请求的参数，必须要进行编码
data = urllib.parse.urlencode(data).encode('utf-8')
request = urllib.request.Request(url=url,data=data,headers=headers)
response = urllib.request.urlopen(request)
content = response.read().decode('utf-8')
obj = json.loads(content)
print(type(obj))
```

5.urllib_豆瓣电影第一页.py

```
# https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&start=0&limit=20

import urllib.request
import urllib.parse
import json

url = 'https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&start=0&limit=20'

headers = {
    'user-agent':'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
}

# (1)请求对象定制
request = urllib.request.Request(url=url, headers=headers)

# （2）获取相应的数据
response = urllib.request.urlopen(request)
content = response.read().decode('utf-8')

# (3)数据保存到本地
fp = open('./temp/douban1.json', 'w', encoding='utf-8')
fp.write(content)
```

6.urllib_豆瓣电影十页.py

```
# 观察路由
"""
    第一页：https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&start=0&limit=20
    第二页：https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&start=20&limit=20
    第三页：https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&start=40&limit=20
    第四页：https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&start=60&limit=20
    (page-1)*20
"""

"""
    需求：下载豆瓣电影前十页的数据
    （1）请求对象定制
    （2）获取相应数据
    （3）下载数据
"""

import urllib.request
import urllib.parse
import json

def create_request(page):
    base_url = 'https://movie.douban.com/j/chart/top_list?
type=5&interval_id=100%3A90&action=&'
    data = {
        'start':(page - 1) * 20,
        'limit':20
    }
    data = urllib.parse.urlencode(data)
    url = base_url + data

    headers = {
        'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
    }
    return urllib.request.Request(url=url, headers=headers)

def get_content(request):
    response = urllib.request.urlopen(request)
    return response.read().decode('utf-8')

def down_load(page, content):
    with open('./temp/douban_' + str(page) + '.json', 'w', encoding='utf-8') as
fp:
        fp.write(content)


if __name__ == '__main__':
    start_page = int(input("请输入起始页: "))
    end_page = int(input("请输入结束页:"))

    for page in range(start_page, end_page + 1):
        # 每一页都有自己的请求对象
        request = create_request(page)

        # 获取相应数据
        content = get_content(request)

        # 下载
        down_load(page, content)
```

7.urllib_kfc下载.py

```
import urllib.request
import urllib.parse

def create_request(page):
    base_url = 'https://www.kfc.com.cn/kfccda/ashx/GetStoreList.ashx?op=cname'

    data = {
        'cname': '成都',
        'pid': '',
        'pageIndex': page,
        'pageSize': '10'
    }

    data = urllib.parse.urlencode(data).encode('utf-8')

    headers = {
        'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
    }
    return urllib.request.Request(url=base_url, data=data, headers=headers)


def get_content(request):
    reponse = urllib.request.urlopen(request)
    return reponse.read().decode('utf-8')

def down_load(page, content):
    with open('./temp/kfc_' + str(page) + '.json', 'w', encoding='utf-8') as fp:
        fp.write(content)

if __name__ == '__main__':
    start_page = int(input("请输入起始页："))
    end_page = int(input("请输入结束页："))
    for page in range(start_page, end_page + 1):
        # 请求对象定制
        request = create_request(page)
        # 获取网页源码
        content = get_content(request)
        # 下载数据
        down_load(page, content)
```

8.urllib_异常.py

```
import urllib.request
import urllib.parse
import urllib.error

# url = 'https://blog.csdn.net/qq_41684621/article/details/113851644111'
url = 'http://www.zhangsandewangzhi.com'

headers = {
    'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
}

try:
    request = urllib.request.Request(url=url, headers=headers)
    response = urllib.request.urlopen(request)
    content = response.read().decode('utf-8')
    print(content)
except urllib.error.HTTPError:
    print('系统在升级.....')
except urllib.error.URLError:
    print('在升级啊.....')
```

9.urllib_微博.py

```
# 适用场景：数据采集，需要绕过登录，然后进入到某个页面
# 个人信息界面是utf-8,字符集gb2312

import urllib.request
import urllib.parse
```

```
# url = 'https://weibo.com/ajax/profile/info?uid=2164895442'
url = 'https://weibo.com/u/2164895442'

# headers = {
#     'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
# }

headers = {
    # ':authority': 'weibo.cn',
    # ':method': 'GET',
    # ':path': '/6451491586/info',
    # ':scheme': 'https',
    'accept':
'text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,ima
ge/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9',
    # 'accept-encoding': 'gzip, deflate, br',
    'accept-language': 'zh-CN,zh;q=0.9',
    'cache-control': 'max-age=0',
    #     cookie中携带着你的登陆信息    如果有登陆之后的cookie  那么我们就可以携带着cookie
进入到任何页面
    'cookie': '_T_WM=24c44910ba98d188fced94ba0da5960e;
SUBP=0033WrSXqPxfM725Ws9jqgMF55529P9D9WFxxfgNNUmXi4YiaYZKr_J_5NHD95QcSh-
pSh.pSKncWs4DqcjiqgSXIgvVPcpD; SUB=_2A25MKKG_DeRhGeBK7lMV-
S_JwzqIHXVv0s_3rDV6PUJbktCOLXL2kW1NR6e0UHkCGcyvxTYyKB2OV9aloJJ7mUNz;
SSOLoginState=1630327279',
    # referer  判断当前路径是不是由上一个路径进来的    一般情况下  是做图片防盗链
    'referer': 'https://weibo.cn/',
    'sec-ch-ua': '"Chromium";v="92", " Not A;Brand";v="99", "Google
Chrome";v="92"',
    'sec-ch-ua-mobile': '?0',
    'sec-fetch-dest': 'document',
    'sec-fetch-mode': 'navigate',
    'sec-fetch-site': 'same-origin',
    'sec-fetch-user': '?1',
    'upgrade-insecure-requests': '1',
    'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/92.0.4515.159 Safari/537.36',
}

request = urllib.request.Request(url=url,headers=headers)
response = urllib.request.urlopen(request)
content = response.read().decode('gb2312')

# 将数据保存到本地
with open('./temp/weibo.html', 'w', encoding='gb2312') as fp:
    fp.write(content)
```

20250419 解析

10.解析_xpath基本用法.py

```
from lxml import etree

# xpath 解析
# （1）本地文件      etree.parse
# （2）服务器响应的数据，response.read().decode('utf-8')  重点   etree.HTML

# xpath解析本地文件
tree = etree.parse("10.解析_xpath的基本使用.html")

# 查找ul下面的li
# li_list = tree.xpath("//body/ul/li")  # 4

# 查找所有有id的属性的li标签
# li_list = tree.xpath('//ul/li[@id]')  # 4

# text()获取标签的内容
# li_list = tree.xpath("//ul/li[@id]/text()")  # ['北京', '上海', '深圳', '武汉']

# 找到id=l1的li标签,注意，引号问题
# li_list = tree.xpath("//ul/li[@id='l1']/text()")  # ['北京']

# 查询id中包含l的标签
# li_list = tree.xpath('//ul/li[contains(@id,"l")]/text()')  # ['北京', '上海']

# 查询id的值以l开头
# li_list = tree.xpath('//ul/li[starts-with(@id,"l")]/text()')  # ['北京', '上海']

# 查找id=l1同时class=c1
# li_list = tree.xpath("//ul/li[@id='l1' and @class='c1']/text()")  # ['北京']

# 查询id=l1和id=l2
li_list = tree.xpath("//ul/li[@id='l1']/text() | //ul/li[@id='l2']/text()")  #
['北京', '上海']

print(li_list)
print(len(li_list))
```

11.解析_获取百度一下.py

```
# 1.获取网页内容
# 2.解析，解析服务器响应的文件，etree.HTML
# 3.打印

import urllib.request
from lxml import etree

url = 'http://www.baidu.com'

headers = {
    'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
}

request = urllib.request.Request(url=url, headers=headers)
response = urllib.request.urlopen(request)
content = response.read().decode('utf-8')

# print(content)
tree = etree.HTML(content)
```

```
# 获取想要的数据
result = tree.xpath("//input[@id='su']/@value")[0]

print(result)  # 百度一下
```

12.解析_站长素材.py

```
"""
    第一页：https://sc.chinaz.com/tupian/qinglvtupian.html
    第二页：https://sc.chinaz.com/tupian/qinglvtupian_2.html
    第三页：https://sc.chinaz.com/tupian/qinglvtupian_3.html
    第四页：https://sc.chinaz.com/tupian/qinglvtupian_4.html
"""

import urllib.request
from lxml import etree

def create_request(page):
    if page == 1:
        url = 'https://sc.chinaz.com/tupian/qinglvtupian.html'
    else:
        url = 'https://sc.chinaz.com/tupian/qinglvtupian_' + str(page) + '.html'

    headers = {
        'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) 
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
    }

    return urllib.request.Request(url=url, headers=headers)


def get_content(request):
    response = urllib.request.urlopen(request)
    return response.read().decode('utf-8')

def down_load(content):
    # 下载图片，urllib.request.urlretrieve(图片地址，图片名字)
    tree = etree.HTML(content)
    # 获取文字信息
    name_list = tree.xpath("//div[@class='container']/div/div/img/@alt")
    # 获取图片
    src_list = tree.xpath("//div[@class='container']/div/div/img/@data-
original")

    # 下载图片并保存
    for i in range(len(name_list)):
        name = name_list[i]
        src = src_list[i]
        url = "https:" + src

        # 保存数据
        urllib.request.urlretrieve(url=url, filename="./temp/" + name + ".jpg")


if __name__ == '__main__':
    start_page = int(input("请输入起始页："))
    end_page = int(input("请输入结束页："))
    for page in range(start_page, end_page + 1):
        # 1.请求对象定制
        request = create_request(page)
        # 2.获取网页源码
        content = get_content(request)
        # 3.下载
        down_load(content)
```

13.解析_jsonpath基本用法.py

```
import json
import jsonpath

obj = json.load(open('./tool/store.json', 'r', encoding='utf-8'))

# 书店的所有作者
# print(jsonpath.jsonpath(obj,"$.store.book[*].author"))  # ['六道', '天蚕土豆',
'唐家三少', '南派三叔']

# 所有作者
# print(jsonpath.jsonpath(obj,'$..author'))  # ['六道', '天蚕土豆', '唐家三少', '南派
三叔']

# store下面的所有元素
# print(jsonpath.jsonpath(obj,'$.store.*'))  # 所有内容

# store里面所有东西的价格
# print(jsonpath.jsonpath(obj,'$.store..price'))  # [8.95, 12.99, 8.99, 22.99,
19.95]

# 第三本书
# print(jsonpath.jsonpath(obj,'$..book[2]'))  # [{'category': '修真', 'author':
'唐家三少', 'title': '斗罗大陆', 'isbn': '0-553-21311-3', 'price': 8.99}]

# 最后一本书
# print(jsonpath.jsonpath(obj,'$..book[(@.length - 1)]'))

# 前面两本书
# print(jsonpath.jsonpath(obj, '$..book[:2]'))

# 条件过滤需要在（）的前面添加一个
# 过滤出所有包含isbn的书
# print(jsonpath.jsonpath(obj,'$..book[?(@.isbn)]'))

# 那本书超过十块钱
# print(jsonpath.jsonpath(obj,'$..book[?(@.price>10)]'))
```

14.解析_jsonpath淘票票.py

```
import urllib.request
import json
import jsonpath
```

```python
url = 'https://dianying.taobao.com/cityAction.json?
activityId&_ksTS=1745045424373_108&jsoncallback=jsonp109&action=cityAction&n_s=n
ew&event_submit_doGetAllRegion=true'

headers = {
    # ':authority': 'dianying.taobao.com',
    # ':method': 'GET',
    # ':path': '/cityAction.json?
activityId&_ksTS=1629789477003_137&jsoncallback=jsonp138&action=cityAction&n_s=n
ew&event_submit_doGetAllRegion=true',
    # ':scheme': 'https',
    'accept': 'text/javascript, application/javascript, application/ecmascript,
application/x-ecmascript, */*; q=0.01',
    # 'accept-encoding': 'gzip, deflate, br',
    'accept-language': 'zh-CN,zh;q=0.9',
    'cookie': 'cna=UkO6F8VULRwCAXTqq7dbS5A8; miid=949542021157939863;
sgcookie=E100F01JK9XMmyoZRigjfmZKExNdRHQqPf4v9NIWIC1nnpnxyNgROLshAf0gz7lGnkKvwCn
u1umyfirMSAWtubqc4g%3D%3D; tracknick=action_li; _cc_=UIHiLt3xSw%3D%3D;
enc=dA18hg7jG1xapfVGPHoQCAkPQ4as1%2FEUqsG4M6AcAjHFFUM54HWpBv4AAmOMbQgqO%2BiZ5qkU
eLIxljrHkOW%2BtQ%3D%3D; hng=CN%7Czh-CN%7CCNY%7C156; thw=cn;
_m_h5_tk=3ca69de1b9ad7dce614840fcd015dcdb_1629776735568;
_m_h5_tk_enc=ab56df54999d1d2cac2f82753ae29f82;
t=874e6ce33295bf6b95cfcfaff0af0db6; xlly_s=1;
cookie2=13acd8f4dafac4f7bd2177d6710d60fe; v=0; _tb_token_=e65ebbe536158;
tfstk=cGhRB7mNpnxkDmUx7YpDAMNM2gTGZbWLxUZN9U4ulewe025didli6j5AFPI8MEC..;
l=eBrgmF1cOsMXqSxaBO5aFurza77tzIRb8sPzaNbMiInca6OdtFt_rNCK2Ns9SdtjgtfFBetPVKlOcR
CEF3apbgiMW_N-1NKDSxJ6-;
isg=BBoas2yXLzHdGp3pCh7XVmpja8A8S54lyLj1RySTHq14l7vRDNufNAjpZ2MLRxa9',
    'referer': 'https://dianying.taobao.com/',
    'sec-ch-ua': '"Chromium";v="92", " Not A;Brand";v="99", "Google
Chrome";v="92"',
    'sec-ch-ua-mobile': '?0',
    'sec-fetch-dest': 'empty',
    'sec-fetch-mode': 'cors',
    'sec-fetch-site': 'same-origin',
    'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/92.0.4515.159 Safari/537.36',
    'x-requested-with': 'XMLHttpRequest',
}

request = urllib.request.Request(url=url, headers=headers)
response = urllib.request.urlopen(request)
content = response.read().decode('utf-8')

# 由于不是标准的json,所以切割
content = content.split('(')[1].split(')')[0]
# print(content)

# 保存数据
with open('14.解析_jsonpath淘票票.json', 'w', encoding='utf-8') as fp:
    fp.write(content)

# 读取
obj = json.load(open('14.解析_jsonpath淘票票.json', 'r', encoding='utf-8'))

city_list = jsonpath.jsonpath(obj, '$..regionName')
print(city_list)
```

15.解析_bs基本用法.py

```
from bs4 import BeautifulSoup

# 通过解析本地文件，来将bs4的基本语法进行讲解

soup = BeautifulSoup(open('15.解析_bs4的基本使用.html', encoding='utf-8'), 'lxml')

# 根据标签名字找结点,找到符合条件的第一个元素
# print(soup.a)
# 获取标签的属性和属性值
# print(soup.a.attrs)

# bs4的一些函数
#（1）find()
# 返回的是第一个符合条件的数据
# print(soup.find('a'))

# 根据title的值来找到对应的标签对象
# print(soup.find('a', title='a2'))

# 根据class的值找到对应的标签对象，注意的是class要添加下划线，因为class是一个关键字
# print(soup.find('a', class_='a1'))

# （2）find_all
# 查找所有满足条件
# print(soup.find_all('a'))

# 如果要获取a和span
# print(soup.find_all(['a', 'span']))

# limit的作用是查找前几个数据
# print(soup.find_all('li', limit=2))

# (3)select【推荐】全部东西都可以使用选择器来获取
# print(soup.select('a'))  # 标签选择器

# print(soup.select('.a1'))  #类选择器

# print(soup.select('#l1'))  # id选择器

# print(soup.select('li[id]'))  # 属性选择器

# print(soup.select('li[id="l2"]'))  # 属性选择器

# print(soup.select('div li'))  # 后代选择器

# print(soup.select('div>ul>li'))  # 子代选择器

# print(soup.select('a,li'))  # 并集选择器

# 节点获取
# obj = soup.select('#d1')[0]
# print(obj.get_text())  # 获取节点的值

obj = soup.select('#p1')[0]
print(obj.name)  # p
print(obj.attrs)  # {'id': 'p1', 'class': ['p1']}
# 以下结果都是一样，都是获得元素的class属性，p1
print(obj.attrs.get('class'))
print(obj.get('class'))
print(obj['class'])
```

16.requests_基本使用.py

```
import requests

url = 'http://www.baidu.com'

response = requests.get(url=url)

print(response.text)
```

17.案例_古诗文网.py

```
# 通过登录，直接进入主页
# 通过找登录接口我们发现，参数比较多

import requests

url = 'https://www.gushiwen.cn/user/login.aspx?
from=http://www.gushiwen.cn/user/collect.aspx'

headers = {
    'user-agent': 'Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/135.0.0.0 Safari/537.36'
}

# 获取页面的源码
response = requests.get(url=url,headers=headers)
content = response.text

# 解析页面源码，获取__VIEWSTATE和__VIEWSTATEGENERATOR
from bs4 import BeautifulSoup
soup = BeautifulSoup(content, 'lxml')

# 获取不知道的两个隐藏的文字内容
viewstate = soup.select("#__VIEWSTATE")[0].attrs.get('value')
viewstategenerator = soup.select("#__VIEWSTATEGENERATOR")[0].attrs.get('value')

# 获取验证码图片
code = soup.select("#imgCode")[0].attrs.get('src')
code_url = 'https://www.gushiwen.cn/' + code

# 下面有错，但是按照思路正常写
# import urllib.request
# urllib.request.urlretrieve(url=code_url, filename='./temp/code.jpg')
# requests里面有一个方法session(),通过session的返回值，就能使用请求变成一个对象
session = requests.session()
# 验证码的url内容
response_code = session.get(code_url)
```

```
# 注意此时要使用二进制数据，因为我们要使用图片下载
content_code = response_code.content

# 将二进制写入文件
with open('./temp/code.jpg','wb') as fp:
    fp.write(content_code)



code_name = input("请输入你的验证码：")

# 点击登录
url_post = 'https://www.gushiwen.cn/user/login.aspx?
from=http%3a%2f%2fwww.gushiwen.cn%2fuser%2fcollect.aspx'

data_post = {
    "__VIEWSTATE": viewstate,
    "__VIEWSTATEGENERATOR": viewstategenerator,
    "from": 'http://www.gushiwen.cn/user/collect.aspx',
    "email": '18280111255',
    "pwd": 'luo510626',
    "code": code_name,
    "denglu": '登录'
}

response_post = session.post(url=url,headers=headers,data=data_post)
content = response_post.text
with open('./temp/gushiwen.html', 'w', encoding='utf-8') as fp:
    fp.write(content)
```

20250419 matplotlib

一、综述

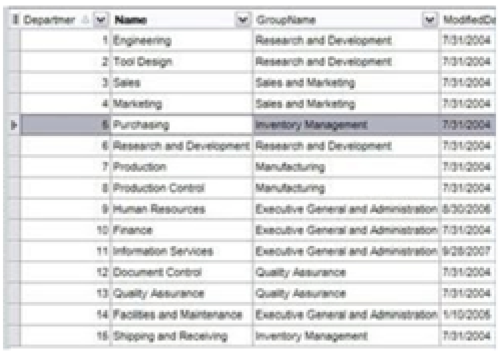
\1. 为什么要学习数据分析

\2. 什么是数据分析

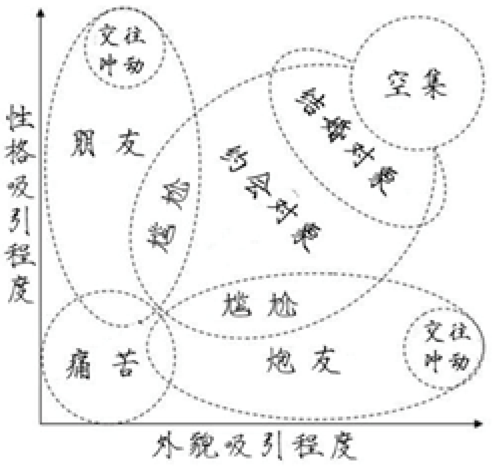
\3. 环境安装

\4. 认识jupyter notebook

1.1 为什么要学习数据分析



Departmer	Name	GroupName	ModifiedDa
1	Engineering	Research and Development	7/31/2004
2	Tool Design	Research and Development	7/31/2004
3	Sales	Sales and Marketing	7/31/2004
4	Marketing	Sales and Marketing	7/31/2004
5	Purchasing	Inventory Management	7/31/2004
6	Research and Development	Research and Development	7/31/2004
7	Production	Manufacturing	7/31/2004
8	Production Control	Manufacturing	7/31/2004
9	Human Resources	Executive General and Administration	8/30/2006
10	Finance	Executive General and Administration	7/31/2004
11	Information Services	Executive General and Administration	9/28/2007
12	Document Control	Quality Assurance	7/31/2004
13	Quality Assurance	Quality Assurance	7/31/2004
14	Facilities and Maintenance	Executive General and Administration	1/10/2006
15	Shipping and Receiving	Inventory Management	7/31/2004



\1. 有岗位需求

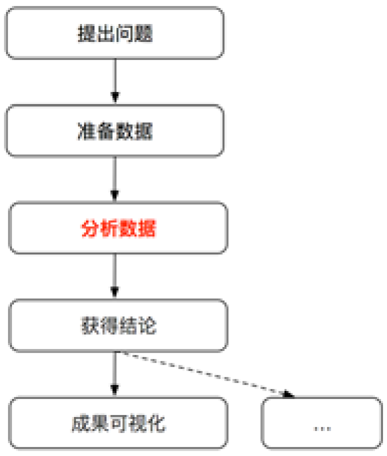
\2. 是python数据科学得基础

\3. 是机器学习课程的基础

1.2 什么是数据分析

数据分析是用适当的方法对收集来的大量数据进行分析，帮助人们作出判断，以便采取适当行动。

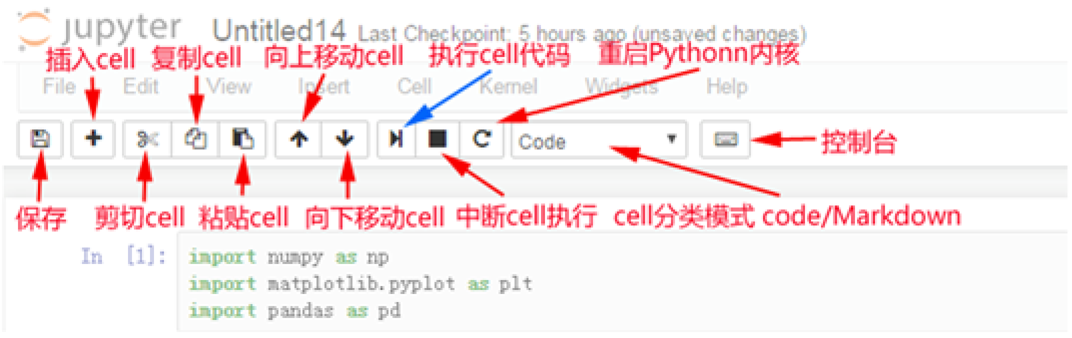
1.2.1 数据分析的流程



1.3 认识jupyter notebook

jupyter notebook:一款编程/文档/笔记/展示软件

启动命令：jupyter notebook



```
In [1]: import numpy as np
        import matplotlib.pyplot as plt
        import pandas as pd
```

二、matplotlib折线图

\1. 什么是matplotlib

\2. matplotlib基本要点

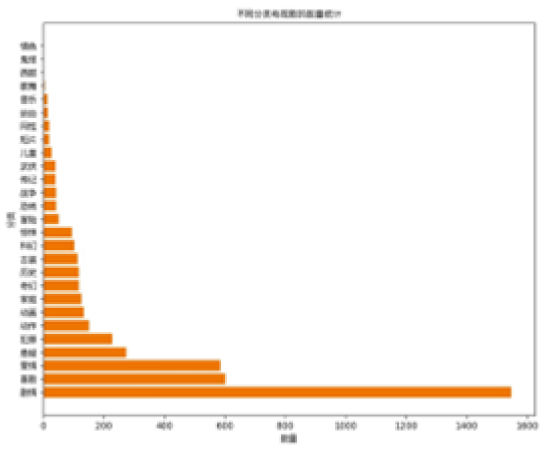
\3. matplotlib的散点图、直方图、柱状图

\4. 更多的画图工具

2.1 为什么要学习matplotlib

\1. 能将数据进行可视化，更直观的呈现

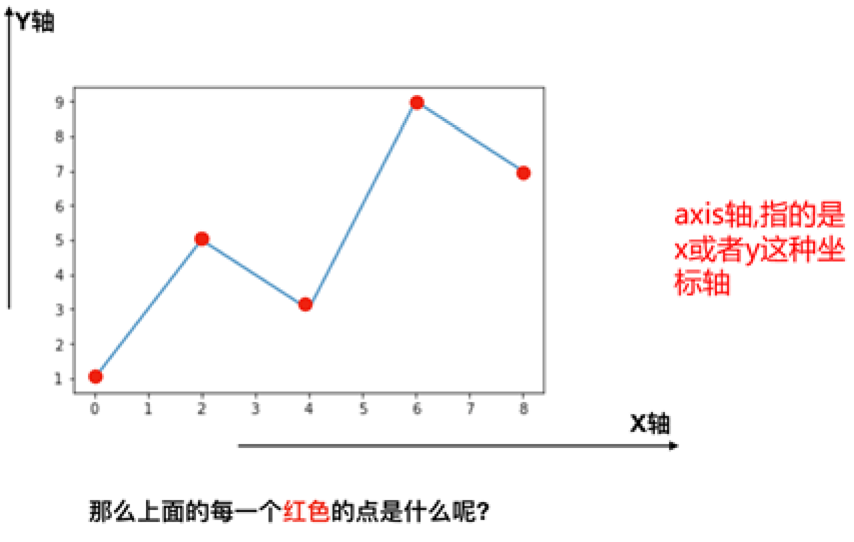
\2. 使数据更加客观、更具说服力



2.2 什么是matplotlib

matplotlib:最流行的Python底层绘图库,主要做数据可视化表格,名字取材于MATLAB,模仿MATLAB构建

2.3 matplotlib基本要点



每个红色的点是坐标，把5个点的坐标连接成一条线，组成了一个折线图。

那么到底如何把它通过代码画出来呢?

通过下面的小例子我们来看一下matplotlib该如何简单的使用

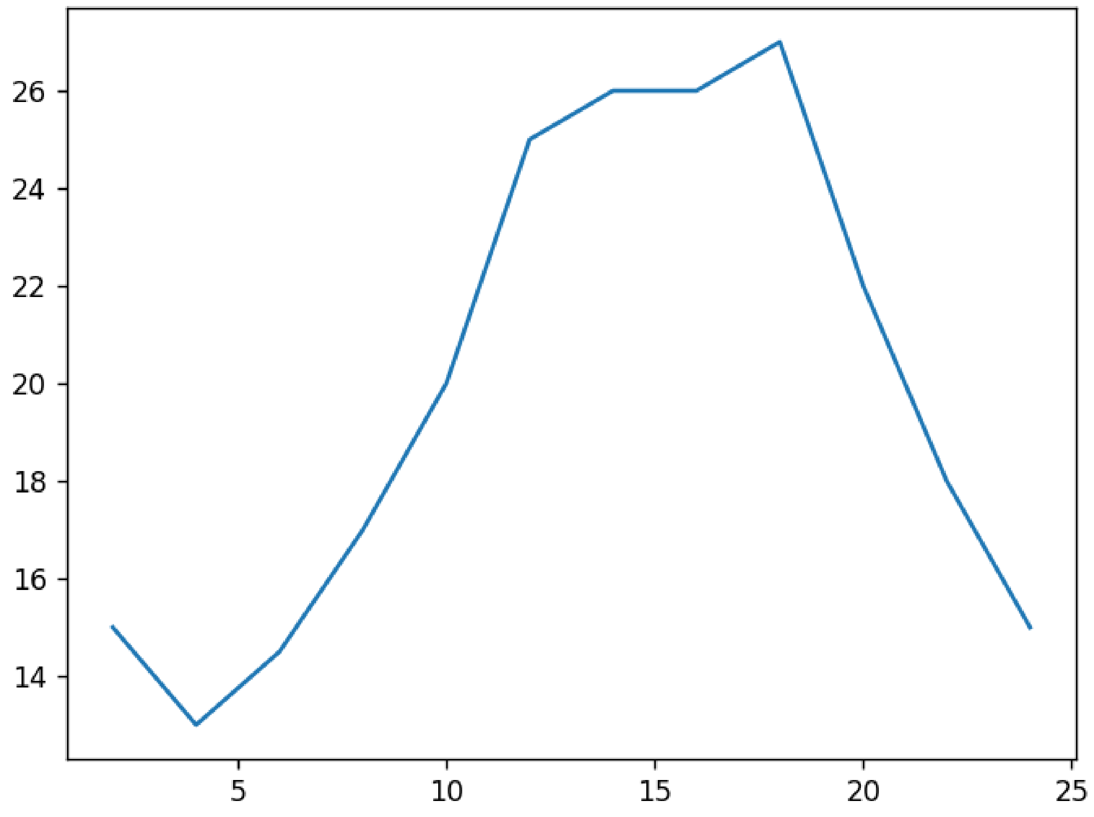
假设一天中每隔两个小时(range(2,26,2))的气温（℃）分别是

[15,13,14.5,17,20,25,26,26,27,22,18,15]

代码：（18.mat_气温变化.py）

```
from matplotlib import pyplot as plt

x = range(2, 26, 2)
y = [15,13,14.5,17,20,25,26,26,27,22,18,15]

# 绘制
plt.plot(x, y)
plt.show()
```

效果图：



但是目前存在以下几个问题：

\1. 设置图片大小（想要一个高清无码大图）

\2. 保存到本地

\3. 描述信息，比如x轴和y轴标识什么，这个图表示什么

\4. 调整x或y的刻度的间距

\5. 线条的样式（比如颜色，透明度等）

\6. 标记出特殊的点（比如告诉别人最高点和最低点在那里）

\7. 给图片添加一个水印（防伪，防止盗用）

2.4 设置图片大小

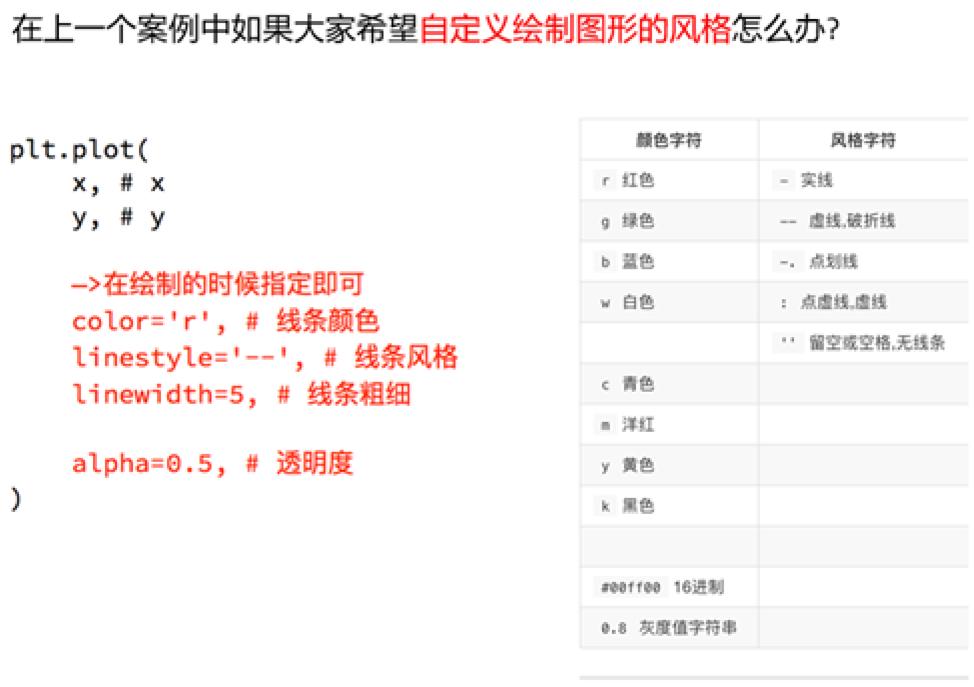
```
from matplotlib import pyplot as plt

x = range(2, 26, 2)
y = [15,13,14.5,17,20,25,26,26,27,22,18,15]

# 设置图片大小
plt.figure(figsize=(20, 8), dpi=80)
'''
    figure图形图标的意思，在这里指的就是我们画的图
    通过实例化一个figure并且传递参数
'''

# 绘制
plt.plot(x, y)

# x轴的刻度
# plt.xticks(range(2, 26))
# 设置一个小数
# _xtick_labels = [i/2 for i in range(4, 49)]  # 每隔0.5
# plt.xticks(_xtick_labels[::3])  # 切片
plt.xticks(range(25, 50))

plt.yticks(range(min(y), max(y) + 1))  # y轴




# 保存图片
plt.savefig("./temp/temp1.png")



plt.show()
```

案例：10点-12点的每一分钟的气温变化，温度采用20-35的随机数

```
from matplotlib import pyplot as plt
import random
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname='./tool/simhei.ttf')

x = range(0, 120)
y = [random.randint(20, 35) for i in range(120)]

plt.figure(figsize=(20, 8), dpi=80)
plt.plot(x, y)

# 设置x轴的刻度
_x = list(x)
_xtick_labels = ["10点{}分".format(i) for i in range(60)]
_xtick_labels += ["11点{}分".format(i) for i in range(60, 120)]

plt.xticks(_x[::3], _xtick_labels[::3], rotation=45, fontproperties=my_font)

# 展示描述信息
```

```
plt.xlabel("时间", fontproperties=my_font)
plt.ylabel('温度', fontproperties=my_font)
plt.title("10-12点每分钟的温度变化", fontproperties=my_font)

plt.show()
```

案例：20.动手折线图.py



在上一个案例中如果大家希望自定义绘制图形的风格怎么办?

```
plt.plot(
    x, # x
    y, # y

    ->在绘制的时候指定即可
    color='r', # 线条颜色
    linestyle='--', # 线条风格
    linewidth=5, # 线条粗细

    alpha=0.5, # 透明度
)
```

颜色字符	风格字符
r 红色	- 实线
g 绿色	-- 虚线,破折线
b 蓝色	-. 点划线
w 白色	: 点虚线,虚线
	'' 留空或空格,无线条
c 青色	
m 洋红	
y 黄色	
k 黑色	
#00ff00 16进制	
0.8 灰度值字符串	

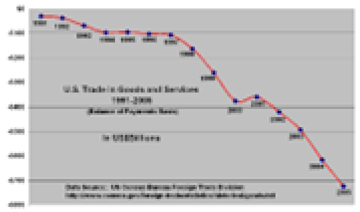
```
from matplotlib import pyplot as plt
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname="./tool/simhei.ttf")

a = [1, 0, 1, 1, 2, 4, 3, 2, 3, 4, 4, 5, 6, 5, 4, 3, 3, 1, 1, 1]
b = [1, 0, 3, 1, 2, 2, 3, 3, 2, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1]

x = range(11, 31)

plt.figure(figsize=(20, 8), dpi=80)

plt.plot(x, a, label="自己", color="red", linestyle='-.')
plt.plot(x, b, label="同桌", color="green", linestyle='--')

# 设置x轴刻度
_xtick_labels = ["{}岁".format(i) for i in x]
plt.xticks(x, _xtick_labels,fontproperties=my_font)
plt.yticks(range(0, 9))

# 添加网格
plt.grid(alpha=0.4)

# 添加图例
plt.legend(prop=my_font, loc="upper left")

plt.show()
```

2.5 matplotlib只能发折线图吗?

matplotlib能够绘制折线图,散点图,柱状图,直方图,箱线图,饼图等

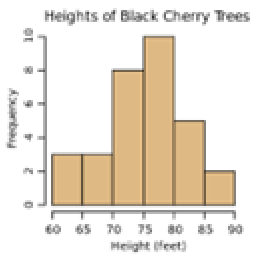
但是,我们需要知道不同的**统计图**到底能够表示出什么,以此来决定选择哪种**统计图**来更直观的呈现我们的数据

2.6 对比常用统计图



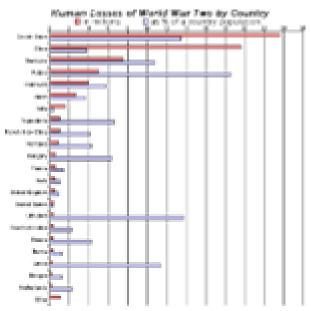
折线图:以折线的上升或下降来表示统计数量的增减变化的统计图

特点:能够显示数据的变化趋势，反映事物的变化情况。(变化)



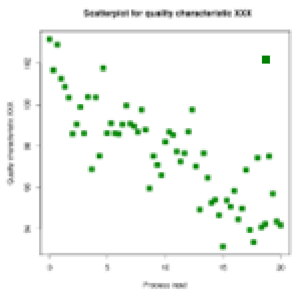
直方图:由一系列高度不等的纵向条纹或线段表示数据分布的情况。 一般用横轴表示数据范围，纵轴表示分布情况。

特点:绘制连**续性**的数据,展示一组或者多组数据的分布状况(统计)



条形图:排列在工作表的列或行中的数据可以绘制到条形图中。

特点:绘制连**离散**的数据,能够一眼看出各个数据的大小,比较数据之间的差别。(统计)



散点图:用两组数据构成多个坐标点，考察坐标点的分布,判断两变量之间是否存在某种关联或总结坐标点的分布模式。

特点:判断变量之间是否存在数量关联趋势,展示离群点(分布规律)

三、matplotlib常用统计图

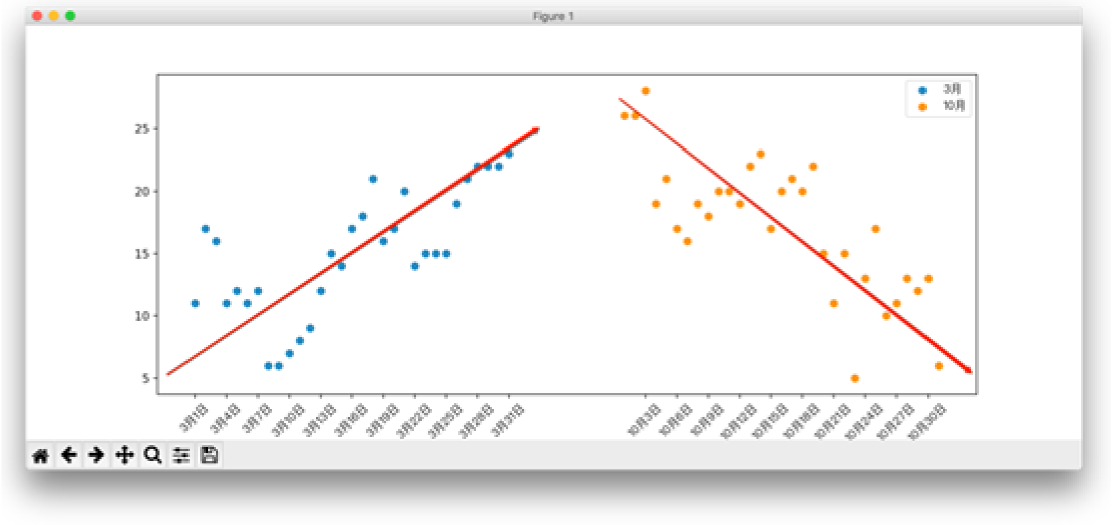
3.1 绘制散点图

假设通过爬虫你获得了北京2016年3，10月份每天白天的最高气温（分别位于列表a,b）,那么此时如何寻找出气温和随时间（天）变化的某种规律?

a = [11,17,16,11,12,11,12,6,6,7,8,9,12,15,14,17,18,21,16,17,20,14,15,15,15,19,21,22,22,22,23]

b = [26,26,28,19,21,17,16,19,18,20,20,19,22,23,17,20,21,20,22,15,11,15,5,13,17,10,11,13,12,13,6]

数据来源：http://lishi.tianqi.com/beijing/index.html



技术要点:plt.scatter(x,y)

```
from matplotlib import pyplot as plt
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname="./tool/simhei.ttf")

y_3 = [11, 17, 16, 11, 12, 11, 12, 6, 6, 7, 8, 9, 12, 15, 14, 17, 18, 21, 16, 17,
20, 14, 15, 15, 15, 19, 21, 22, 22,
       22, 23]

y_10 = [26, 26, 28, 19, 21, 17, 16, 19, 18, 20, 20, 19, 22, 23, 17, 20, 21, 20,
22, 15, 11, 15, 5, 13, 17, 10, 11, 13,
        12, 13, 6]

# x轴
x_3 = range(1, 32)
x_10 = range(51, 82)

# 设置图像大小
plt.figure(figsize=(20, 8), dpi=80)

# 使用scatter方法绘制散点图
plt.scatter(x_3, y_3, label="3月")
plt.scatter(x_10, y_10, label="10月")

# 设置x轴
_x = list(x_3) + list(x_10)
_xtick_labels = ['3月{}日'.format(i) for i in x_3]
_xtick_labels += ['10月{}日'.format(i-50) for i in x_10]
plt.xticks(_x[::3], _xtick_labels[::3],fontproperties=my_font,rotation=45)

# 绘制网格
plt.grid(alpha=0.4)

# 添加图例
plt.legend(prop=my_font)

# 展示
plt.show()
```

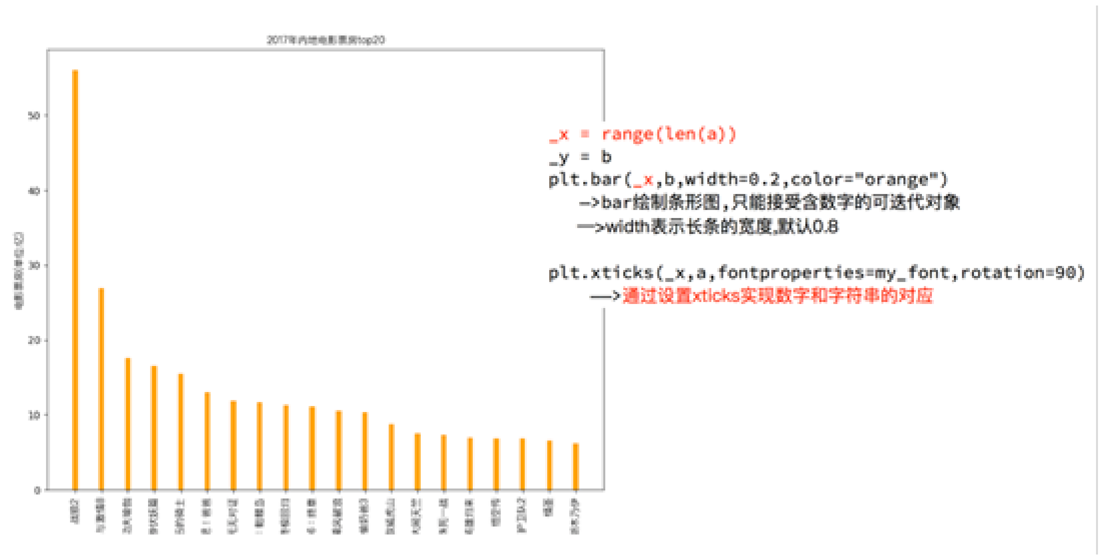
3.2 绘制条形图

假设你获取到了2017年内地电影票房前20的电影（列表a）和电影票房数据（列表b）,那么如何更加直观的展示该数据?

a = ["战狼2","速度与激情8","功夫瑜伽","西游伏妖篇","变形金刚5：最后的骑士","摔跤吧！爸爸","加勒比海盗5：死无对证","金刚：骷髅岛","极限特工：终极回归","生化危机6：终章","乘风破浪","神偷奶爸3","智取威虎山","大闹天竺","金刚狼3：殊死一战","蜘蛛侠：英雄归来","悟空传","银河护卫队2","情圣","新木乃伊",]

b=[56.01,26.94,17.53,16.49,15.45,12.96,11.8,11.61,11.28,11.12,10.49,10.3,8.75,7.55,7.32,6.99,6.88,6.86,6.58,6.23] 单位:亿

数据来源: http://58921.com/alltime/2017



```
_x = range(len(a))
_y = b
plt.bar(_x,b,width=0.2,color="orange")
    —>bar绘制条形图,只能接受含数字的可迭代对象
    —>width表示长条的宽度,默认0.8

plt.xticks(_x,a,fontproperties=my_font,rotation=90)
     —>通过设置xticks实现数字和字符串的对应
```

```
from matplotlib import pyplot as plt
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname="./tool/simhei.ttf")

a = ["战狼2","速度与激情8","功夫瑜伽","西游伏妖篇","变形金刚5：最后的骑士","摔跤吧！爸爸","加勒比海盗5：死无对证","金刚：骷髅岛","极限特工：终极回归","生化危机6：终章","乘风破浪","神偷奶爸3","智取威虎山","大闹天竺","金刚狼3：殊死一战","蜘蛛侠：英雄归来","悟空传","银河护卫队2","情圣","新木乃伊",]

b=
[56.01,26.94,17.53,16.49,15.45,12.96,11.8,11.61,11.28,11.12,10.49,10.3,8.75,7.55,7.32,6.99,6.88,6.86,6.58,6.23]
```

```
plt.figure(figsize=(20, 8), dpi=80)

# plt.bar(range(len(a)), b, width=0.3)

# 横着的
plt.barh(range(len(a)), b, height=0.3, color="green")

# 设置x轴
# plt.xticks(range(len(a)), a, fontproperties=my_font, rotation=90)
# 设置y轴
plt.yticks(range(len(a)), a, fontproperties=my_font)

plt.show()
```

案例:

假设你知道了列表a中电影分别在2017-09-14(b_14), 2017-09-15(b_15), 2017-09-16(b_16)三天的票房,为了展示列表中电影本身的票房以及同其他电影的数据对比情况,应该如何更加直观的呈现该数据?

a = ["猩球崛起3：终极之战","敦刻尔克","蜘蛛侠：英雄归来","战狼2"]

b_16 = [15746,312,4497,319]

b_15 = [12357,156,2045,168]

b_14 = [2358,399,2358,362]

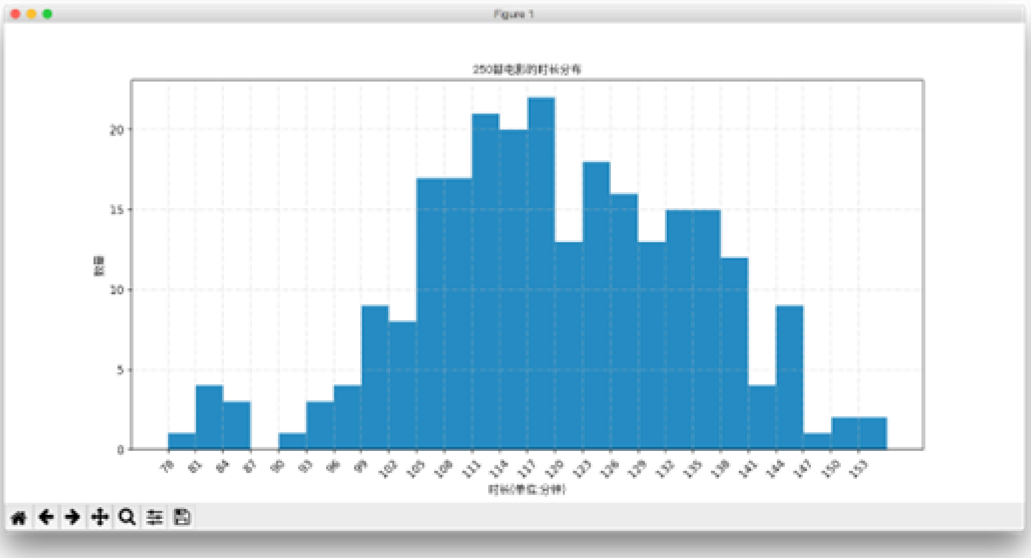
数据来源: http://www.cbooo.cn/movieday

```
from matplotlib import pyplot as plt
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname="./tool/simhei.ttf")

a = ["猩球崛起3：终极之战", "敦刻尔克", "蜘蛛侠：英雄归来", "战狼2"]
b_16 = [15746, 312, 4497, 319]
b_15 = [12357, 156, 2045, 168]
b_14 = [2358, 399, 2358, 362]

bar_width = 0.2

x_14 = list(range(len(a)))
x_15 = [i + bar_width for i in x_14]
x_16 = [i + 2*bar_width for i in x_14]

plt.figure(figsize=(20, 8), dpi=80)

plt.bar(range(len(a)), b_14, width=bar_width, label="14号")
plt.bar(x_15, b_15, width=bar_width, label="15号")
plt.bar(x_16, b_16, width=bar_width, label="16号")

plt.xticks(x_15, a, fontproperties=my_font)
plt.grid()

plt.legend(prop=my_font)

plt.show()
```

3.3 绘制直方图

假设你获取了250部电影的时长（列表a中），系统统计出这些电影时长的分布状态（比如时长为100分钟到120分钟电影的数量，出现的频率）等信息，你应该如何呈现这些数据?

a=[131, 98, 125, 131, 124, 139, 131, 117, 128, 108, 135, 138, 131, 102, 107, 114, 119, 128, 121, 142, 127, 130, 124, 101, 110, 116, 117, 110, 128, 128, 115, 99, 136, 126, 134, 95, 138, 117, 111,78, 132, 124, 113, 150, 110, 117, 86, 95, 144, 105, 126, 130,126, 130, 126, 116, 123, 106, 112, 138, 123, 86, 101, 99, 136,123, 117, 119, 105, 137, 123, 128, 125, 104, 109, 134, 125, 127,105, 120, 107, 129, 116, 108, 132, 103, 136, 118, 102, 120, 114,105, 115, 132, 145, 119, 121, 112, 139, 125, 138, 109, 132, 134,156, 106, 117, 127, 144, 139, 139, 119, 140, 83, 110, 102,123,107, 143, 115, 136, 118, 139, 123, 112, 118, 125, 109, 119, 133,112, 114, 122, 109, 106, 123, 116, 131, 127, 115, 118, 112, 135,115, 146, 137, 116, 103, 144, 83, 123, 111, 110, 111, 100, 154,136, 100, 118, 119, 133, 134, 106, 129, 126, 110, 111, 109, 141,120, 117, 106, 149, 122, 122, 110, 118, 127, 121, 114, 125, 126,114, 140, 103, 130, 141, 117, 106, 114, 121, 114, 133, 137, 92,121, 112, 146, 97, 137, 105, 98, 117, 112, 81, 97, 139, 113,134, 106, 144, 110, 137, 137, 111, 104, 117, 100, 111, 101, 110,105, 129, 137, 112, 120, 113, 133, 112, 83, 94, 146, 133, 101,131, 116, 111, 84, 137, 115, 122, 106, 144, 109, 123, 116, 111,111, 133, 150]



把数据分为多少组进行统计？？？ 组数要适当，太少会有较大的统计误差，大多规律不明显。

组数：将数据分组，当数据在100个以内时，
按数据多少常分5-12组。

组距：指每个小组的两个端点的距离，

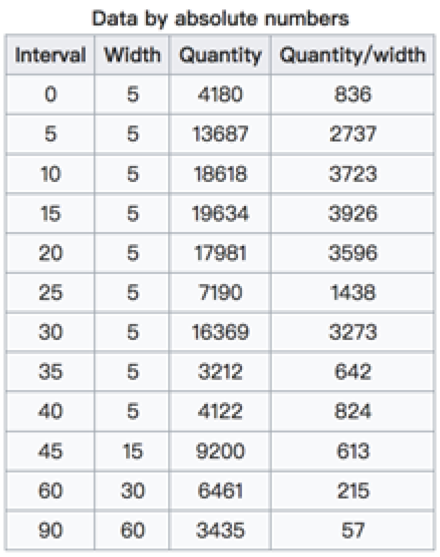
$$组数=\frac{极差}{组距}=\frac{max(a)-min(a)}{4}$$

```
bin_width = 3 #设置组距为3
num_bins = int((max(a)-min(a))/bin_width) #分为多少组
plt.hist(a, num_bins)
          —>传入需要统计的数据,以及组数即可
#plt.hist(a, [min(a)+i*bin_width for i in range(num_bins)])
          —>可以传入一个列表,长度为组数,值为分组依据,当组距不均匀的时候使用
# plt.hist(a, num_bins, normed=1)
          —>normed:bool 是否绘制频率分布直方图,默认为频数直方图
plt.xticks(list(range(min(a),max(a)))[::bin_width],rotation=45)
plt.grid(True, linestyle = "-.",alpha=0.5)  #显示网格,alpha为透明度
```

```
from matplotlib import pyplot as plt
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname="./tool/simhei.ttf")

a = [131, 98, 125, 131, 124, 139, 131, 117, 128, 108, 135, 138, 131, 102, 107,
114, 119, 128, 121, 142, 127, 130, 124,
     101, 110, 116, 117, 110, 128, 128, 115, 99, 136, 126, 134, 95, 138, 117,
111, 78, 132, 124, 113, 150, 110, 117, 86,
     95, 144, 105, 126, 130, 126, 130, 126, 116, 123, 106, 112, 138, 123, 86,
101, 99, 136, 123, 117, 119, 105, 137,
     123, 128, 125, 104, 109, 134, 125, 127, 105, 120, 107, 129, 116, 108, 132,
103, 136, 118, 102, 120, 114, 105, 115,
     132, 145, 119, 121, 112, 139, 125, 138, 109, 132, 134, 156, 106, 117, 127,
144, 139, 139, 119, 140, 83, 110, 102,
     123, 107, 143, 115, 136, 118, 139, 123, 112, 118, 125, 109, 119, 133, 112,
114, 122, 109, 106, 123, 116, 131, 127,
     115, 118, 112, 135, 115, 146, 137, 116, 103, 144, 83, 123, 111, 110, 111,
100, 154, 136, 100, 118, 119, 133, 134,
     106, 129, 126, 110, 111, 109, 141, 120, 117, 106, 149, 122, 122, 110, 118,
127, 121, 114, 125, 126, 114, 140, 103,
     130, 141, 117, 106, 114, 121, 114, 133, 137, 92, 121, 112, 146, 97, 137,
105, 98, 117, 112, 81, 97, 139, 113, 134,
     106, 144, 110, 137, 137, 111, 104, 117, 100, 111, 101, 110, 105, 129, 137,
112, 120, 113, 133, 112, 83, 94, 146,
     133, 101, 131, 116, 111, 84, 137, 115, 122, 106, 144, 109, 123, 116, 111,
111, 133, 150]

d = 3  # 组距
num_bins = (max(a) - min(a)) // d

plt.figure(figsize=(20, 8), dpi=80)

plt.hist(a, num_bins)

plt.xticks(range(min(a), max(a) + d, d))
plt.grid()

plt.show()
```

那么问题来了

在美国2004年人口普查发现有124million的人在离家相对较远的地方工作。根据他们从家到上班地点所需要的时间，通过抽样统计（最后一列）出了下表的数据，这些数据能够绘制成直方图么？


Data by absolute numbers

Interval	Width	Quantity	Quantity/width
0	5	4180	836
5	5	13687	2737
10	5	18618	3723
15	5	19634	3926
20	5	17981	3596
25	5	7190	1438
30	5	16369	3273
35	5	3212	642
40	5	4122	824
45	15	9200	613
60	30	6461	215
90	60	3435	57

interval = [0,5,10,15,20,25,30,35,40,45,60,90]

width = [5,5,5,5,5,5,5,5,5,15,30,60]

quantity = [836,2737,3723,3926,3596,1438,3273,642,824,613,215,47]

前面的问题问的是什么呢？？问的是：哪些数据能够绘制直方图。前面的问题中给出的数据都是统计之后的数据，所以为了达到直方图的效果，需要绘制条形图

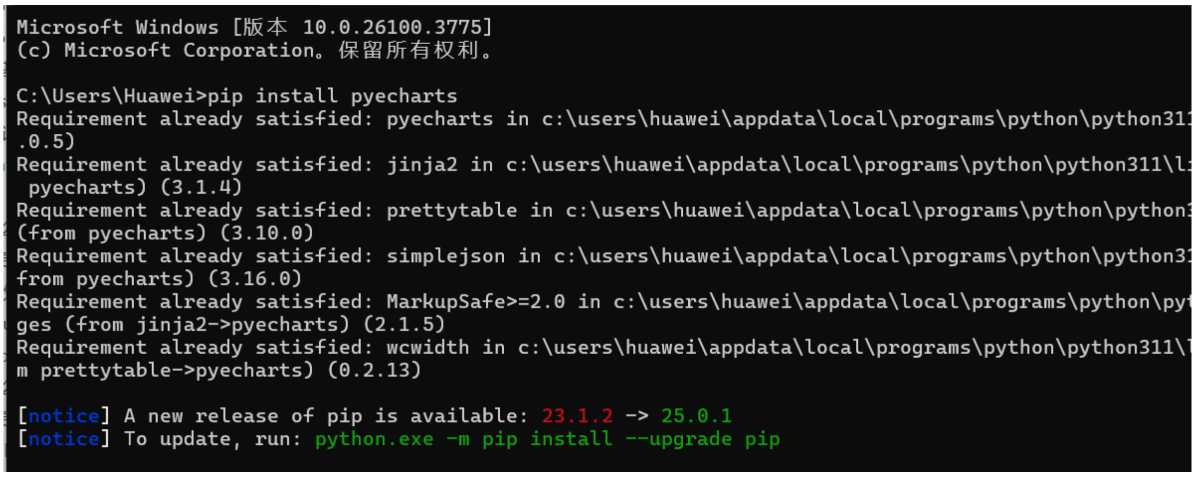
所以：一般来说能够使用plt.hist方法的是哪些没有统计国的数据。

```
from matplotlib import pyplot as plt
from matplotlib import font_manager

my_font = font_manager.FontProperties(fname="./tool/simhei.ttf")

interval = [0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 60, 90]
width = [5, 5, 5, 5, 5, 5, 5, 5, 5, 15, 30, 60]
quantity = [836, 2737, 3723, 3926, 3596, 1438, 3273, 642, 824, 613, 215, 47]

plt.figure(figsize=(20, 8), dpi=80)

plt.bar(range(12), quantity, width=1)

# x轴
_x = [i - 0.5 for i in range(13)]
_xtick_labels = interval + [150]
plt.xticks(_x, _xtick_labels)

plt.grid()
plt.show()
```

20250420 pyecharts

一、安装

pip install pyecharts



```
Microsoft Windows [版本 10.0.26100.3775]
(c) Microsoft Corporation。保留所有权利。

C:\Users\Huawei>pip install pyecharts
Requirement already satisfied: pyecharts in c:\users\huawei\appdata\local\programs\python\python31
.0.5)
Requirement already satisfied: jinja2 in c:\users\huawei\appdata\local\programs\python\python311\l
 pyecharts) (3.1.4)
Requirement already satisfied: prettytable in c:\users\huawei\appdata\local\programs\python\python
(from pyecharts) (3.10.0)
Requirement already satisfied: simplejson in c:\users\huawei\appdata\local\programs\python\python3
from pyecharts) (3.16.0)
Requirement already satisfied: MarkupSafe>=2.0 in c:\users\huawei\appdata\local\programs\python\py
ges (from jinja2->pyecharts) (2.1.5)
Requirement already satisfied: wcwidth in c:\users\huawei\appdata\local\programs\python\python311\
m prettytable->pyecharts) (0.2.13)

[notice] A new release of pip is available: 23.1.2 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip
```

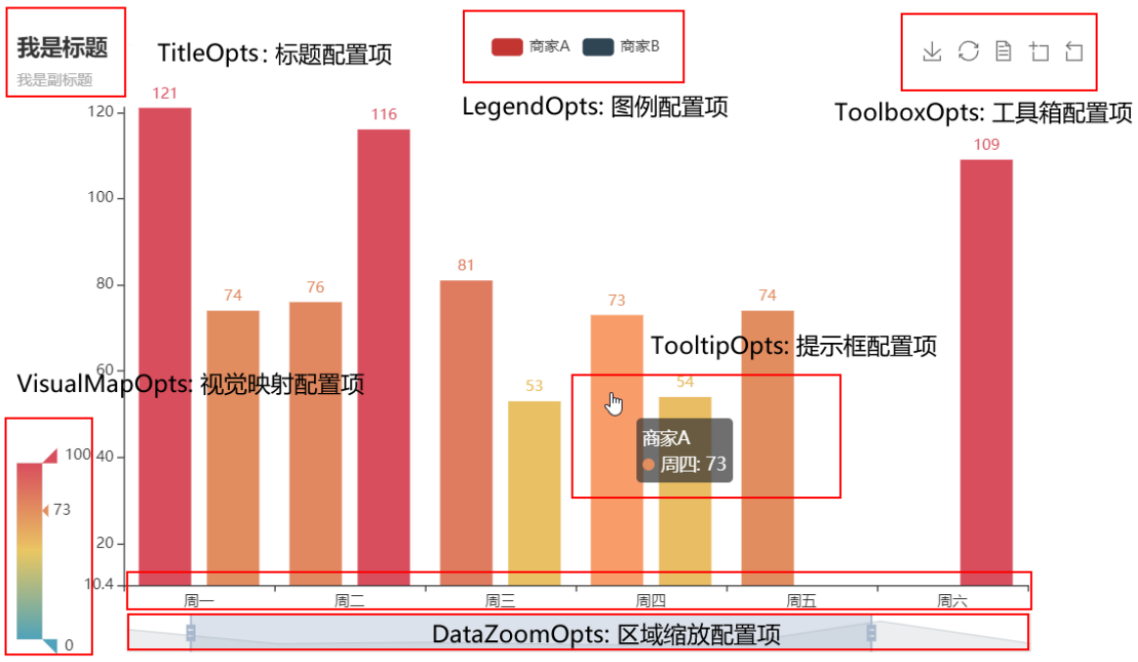
二、pyecharts快速入门

1. 构建一个基础的折线图
2. 使用全局配置项设置属性

2.1 基础折线图

```
# 导包
from pyecharts.charts import Line

# 创建折线对象
line = Line()

# 添加x轴数据
line.add_xaxis(["中国", "美国", "日本"])

# 添加y轴
line.add_yaxis("GDP", [30,20,10])

# 生成图标
line.render("26.pyecharts入门(基础折线图).html")
```

2.2 pyecharts配置项



```
# 导包
from pyecharts.charts import Line
from pyecharts.options import TitleOpts, LegendOpts, ToolboxOpts, VisualMapOpts

# 创建折线对象
line = Line()

# 添加x轴数据
line.add_xaxis(["中国", "美国", "日本"])

# 添加y轴
line.add_yaxis("GDP", [30,20,10])

# 设置全局配置，需要在生成之前
line.set_global_opts(
    title_opts=TitleOpts(title="GDP展示", pos_left="center", pos_bottom="1%"),# 标题配置项
    legend_opts=LegendOpts(is_show=True),  # 图例展示
    toolbox_opts=ToolboxOpts(is_show=True),  # 工具箱
    visualmap_opts=VisualMapOpts(is_show=True)
)

# 生成图标
line.render("26.pyecharts入门(基础折线图).html")
```

案例：展示美国、日本、印度疫情确诊人数

```
import json
from pyecharts.charts import Line
from pyecharts.options import TitleOpts

# 处理数据，读取数据
f_us = open('./files/美国.txt', 'r', encoding='utf-8')
us_data = f_us.read()  # 美国的全部数据

f_jp = open('./files/日本.txt', 'r', encoding='utf-8')
```

```python
jp_data = f_jp.read()  # 日本的全部数据

f_in = open('./files/印度.txt', 'r', encoding='utf-8')
in_data = f_in.read()  # 印度的全部数据

# 去掉不合法的地方
us_data = us_data.replace("jsonp_1629344292311_69436(", "")  # 去掉前面
us_data = us_data[:-2]  # 去掉后面的

jp_data = jp_data.replace("jsonp_1629350871167_29498(", "")  # 去掉前面
jp_data = jp_data[:-2]  # 去掉后面的

in_data = in_data.replace("jsonp_1629350745930_63180(", "")  # 去掉前面
in_data = in_data[:-2]  # 去掉后面的

# 把json数据转化为python数据
us_dict = json.loads(us_data)
jp_dict = json.loads(jp_data)
in_dict = json.loads(in_data)

# 获取trend key
us_trend_data = us_dict['data'][0]['trend']
jp_trend_data = jp_dict['data'][0]['trend']
in_trend_data = in_dict['data'][0]['trend']

# 获取日期数据，用于x轴
us_x_data = us_trend_data['updateDate'][:314]
jp_x_data = jp_trend_data['updateDate'][:314]
in_x_data = in_trend_data['updateDate'][:314]

# 获取确诊人数
us_y_data = us_trend_data['list'][0]["data"][:314]
jp_y_data = jp_trend_data['list'][0]["data"][:314]
in_y_data = in_trend_data['list'][0]["data"][:314]

# 生成图像
line = Line()
line.add_xaxis(us_x_data)
line.add_yaxis("美国确诊人数", us_y_data)  # 美国确诊人数
line.add_yaxis("日本确诊人数", jp_y_data)
line.add_yaxis("印度确诊人数", in_y_data)

line.set_global_opts(
    title_opts=TitleOpts(title="美国日本印度疫情确诊人数", pos_left="center",
pos_bottom="1%")
)

line.render('27.三个国家的折线图.html')
f_us.close()
f_jp.close()
f_in.close()
```

2.3 基础地图使用

```
from pyecharts.charts import Map
from pyecharts.options import VisualMapOpts

map = Map()

data = [
    ("北京", 99),
    ("上海", 199),
    ("湖南", 299),
    ("台湾", 199),
    ("安徽", 299),
    ("广州", 399),
    ("湖北", 599)
]

map.add('28.地图的基本用法', data, "china")
map.render('28.地图的基本用法.html')
```

2.4 中国疫情数据

```
import json
from pyecharts.charts import Map
from pyecharts.options import  *

# 读取文件
f = open('./files/疫情.txt', 'r', encoding='utf-8')
data = f.read()
# 关闭文件
f.close()

# 把json转化为python数据
data_dict = json.loads(data)

# 从字典中读取省份的数据
province_data_list = data_dict['areaTree'][0]["children"]

# 组装成每个省份和确认人数的元组，并数据封装到列表中
data_list = []
for province_data in province_data_list:
    province_name = province_data["name"] + '省'
    if province_data["name"] == '重庆':
        province_name = '重庆市'
    if province_data["name"] == '新疆':
        province_name = '新疆维吾尔自治区'

    province_confirm = province_data['total']["confirm"]  # 确诊人数
    data_list.append((province_name, province_confirm))

# 绘制地图
map1 = Map()
map1.add('各省确诊人数', data_list, 'china')
# 全部配置
map1.set_global_opts(
    title_opts=TitleOpts(title="全国疫情地图"),
    visualmap_opts=VisualMapOpts(
        is_show=True,
        is_piecewise=True,
        pieces=[
            {"min": 1, "max": 99, "label":"1~99人", "color": "#CCFFFF"},
            {"min": 100, "max": 999, "label": "100~990人", "color": "#FFFF99"},
            {"min": 1000, "max": 4999, "label": "1000~4999人", "color":
"#FF9966"},
            {"min": 5000, "max": 9999, "label": "5000~9999人", "color":
"#FF6666"},
            {"min": 10000, "max": 99999, "label": "10000~99999人", "color":
"#CC3333"},
            {"min": 100000, "label": "100000+", "color": "#990033"},
        ]
    )
)

map1.render('29.中国疫情数据.html')
```

2.6 河南地图数据

```
import json
from pyecharts.charts import Map
from pyecharts.options import  *

# 读取文件
f = open('./files/疫情.txt', 'r', encoding='utf-8')
data = f.read()
# 关闭文件
f.close()

# 把json转化为python数据
data_dict = json.loads(data)

# 数据
province_data_list = data_dict['areaTree'][0]["children"][3]["children"]

data_list = []
for province_data in province_data_list:
    province_name = province_data["name"] + '市'
    province_confirm = province_data['total']["confirm"]  # 确诊人数
    data_list.append((province_name, province_confirm))

# 绘制地图
map1 = Map()
map1.add('河南确诊人数', data_list, '河南')
# 全部配置
map1.set_global_opts(
    title_opts=TitleOpts(title="全国疫情地图"),
    visualmap_opts=VisualMapOpts(
        is_show=True,
        is_piecewise=True,
        pieces=[
            {"min": 1, "max": 99, "label":"1~99人", "color": "#CCFFFF"},
            {"min": 100, "max": 999, "label": "100~990人", "color": "#FFFF99"},
            {"min": 1000, "max": 4999, "label": "1000~4999人", "color":
"#FF9966"},
            {"min": 5000, "max": 9999, "label": "5000~9999人", "color":
"#FF6666"},
            {"min": 10000, "max": 99999, "label": "10000~99999人", "color":
"#CC3333"},
            {"min": 100000, "label": "100000+", "color": "#990033"},
        ]
    )
)

map1.render("30.河南数据分析.html")
```

2.7基础柱状图

```
from pyecharts.charts import Bar
from pyecharts.options import *

bar = Bar()

bar.add_xaxis(["中国", "美国", "英国"])

bar.add_yaxis("GDP", [30, 20, 10], label_opts=LabelOpts(position="right"))

# 翻转xy
bar.reversal_axis()

bar.render("31.柱状图基本用法.html")
```

2.8 基础时间线柱状图

```
from pyecharts.charts import Bar,Timeline
from pyecharts.options import *
from pyecharts.globals import ThemeType

# 第一张图
bar1 = Bar()
bar1.add_xaxis(["中国", "美国", "英国"])
bar1.add_yaxis("GDP", [30, 20, 10], label_opts=LabelOpts(position="right"))
bar1.reversal_axis()

# 第二张图
bar2 = Bar()
bar2.add_xaxis(["中国", "美国", "英国"])
bar2.add_yaxis("GDP", [50, 30, 20], label_opts=LabelOpts(position="right"))
bar2.reversal_axis()

# 第三图
bar3 = Bar()
bar3.add_xaxis(["中国", "美国", "英国"])
bar3.add_yaxis("GDP", [70, 60, 100], label_opts=LabelOpts(position="right"))
bar3.reversal_axis()

# 创建时间线对象
timeline = Timeline({
    "theme":ThemeType.DARK
})
```

```
# timeline对象添加bar
timeline.add(bar1, "2021年GDP")
timeline.add(bar2, "2022年GDP")
timeline.add(bar3, "2023年GDP")

# 自动播放设置
timeline.add_schema(
    play_interval=1000,
    is_timeline_show=True,  # 是否在自动播放的时候，显示时间线
    is_auto_play=True,
    is_loop_play=True
)

timeline.render('32.时间线基础.html')
```

案例：1960-2019年GDP的变化

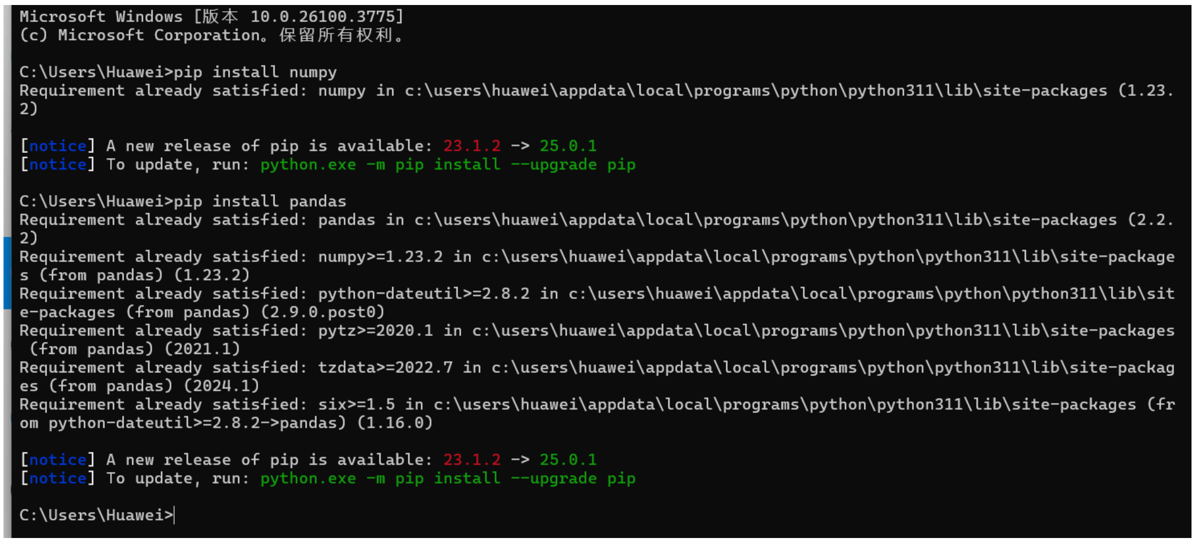
```
from pyecharts.charts import Bar,Timeline
from pyecharts.options import *
from pyecharts.globals import ThemeType

# 读取数据
f = open("./files/1960-2019全球GDP数据.csv", 'r', encoding="gb2312")
data_lines = f.readlines()
f.close()

# 删除第一行表头
data_lines.pop(0)

'''
    将数据转化为字典存储，格式为：
    {年份：[[国家,gdp],[国家,gdp],[国家,gdp],[]...]}
    {1960:[[美国,123],[中国,345].....]}
'''
# print(data_lines)  # '1960,美国,5.433E+11\n', '1960,英国,73233967692\n',
data_dict = {}
for line in data_lines:
    year = int(line.split(',')[0])
    country = line.split(',')[1]
    gdp = float(line.split(',')[2])
    # 如何判断字段里面有没有指定的key
    try:
        data_dict[year].append([country, gdp])
    except:
        data_dict[year] = []
        data_dict[year].append([country, gdp])

# print(data_dict)
# 创建时间线对象
timeline = Timeline({
    "theme": ThemeType.LIGHT
})

# 排序年份
sorted_year_list = sorted(data_dict.keys())

for year in sorted_year_list:
    data_dict[year].sort(key=lambda element:element[1], reverse=True)
    # 取出前8个国家
    year_data = data_dict[year][0:8]
    x_data = []
    y_data = []
    for country_gdp in year_data:
        x_data.append(country_gdp[0])  # x添加国家
        y_data.append(country_gdp[1]/100000000)

    # 构建柱状图
    bar = Bar()
    x_data.reverse()
    y_data.reverse()
    bar.add_xaxis(x_data)
    bar.add_yaxis("GDP(亿)", y_data, label_opts=LabelOpts(position="right"))
    bar.reversal_axis()
    # 图例
    bar.set_global_opts(
        title_opts=TitleOpts(title=f"{year}年全球前八GDP数据")
    )
    timeline.add(bar, str(year))

# 自动播放设置
timeline.add_schema(
    play_interval=1000,
    is_timeline_show=True,  # 是否在自动播放的时候，显示时间线
    is_auto_play=True,
    is_loop_play=True
)

# 绘制
timeline.render("33.GDP的变化.html")
```

2.9 淘宝数据清洗

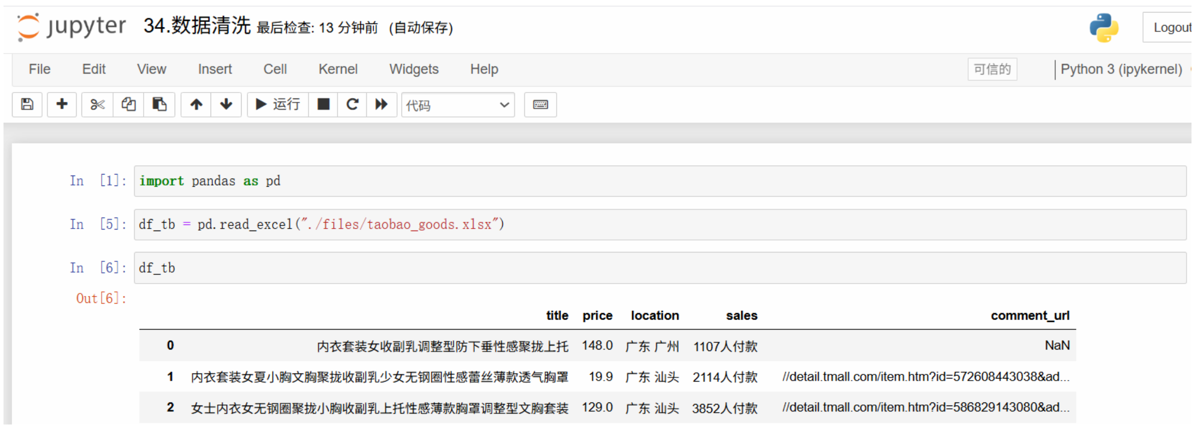
1.安装模块

pip install numpy

pip install pandas

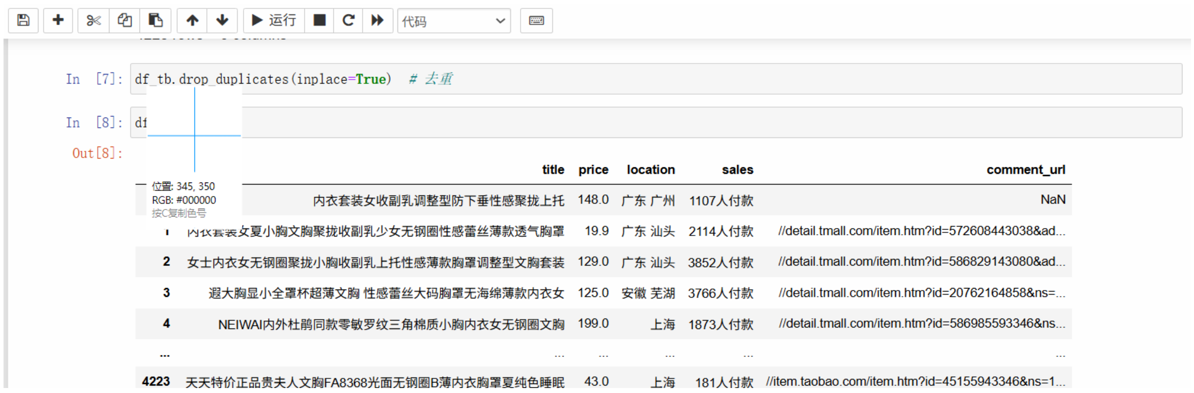


```
Microsoft Windows [版本 10.0.26100.3775]
(c) Microsoft Corporation。保留所有权利。

C:\Users\Huawei>pip install numpy
Requirement already satisfied: numpy in c:\users\huawei\appdata\local\programs\python\python311\lib\site-packages (1.23.
2)

[notice] A new release of pip is available: 23.1.2 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\Huawei>pip install pandas
Requirement already satisfied: pandas in c:\users\huawei\appdata\local\programs\python\python311\lib\site-packages (2.2.
2)
Requirement already satisfied: numpy>=1.23.2 in c:\users\huawei\appdata\local\programs\python\python311\lib\site-package
s (from pandas) (1.23.2)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\huawei\appdata\local\programs\python\python311\lib\sit
e-packages (from pandas) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in c:\users\huawei\appdata\local\programs\python\python311\lib\site-packages
 (from pandas) (2021.1)
Requirement already satisfied: tzdata>=2022.7 in c:\users\huawei\appdata\local\programs\python\python311\lib\site-packag
es (from pandas) (2024.1)
Requirement already satisfied: six>=1.5 in c:\users\huawei\appdata\local\programs\python\python311\lib\site-packages (fr
om python-dateutil>=2.8.2->pandas) (1.16.0)

[notice] A new release of pip is available: 23.1.2 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\Huawei>
```


jupyter 34.数据清洗 最后检查: 13 分钟前 (自动保存)
Logout
File Edit View Insert Cell Kernel Widgets Help
可信的
Python 3 (ipykernel)
运行
代码

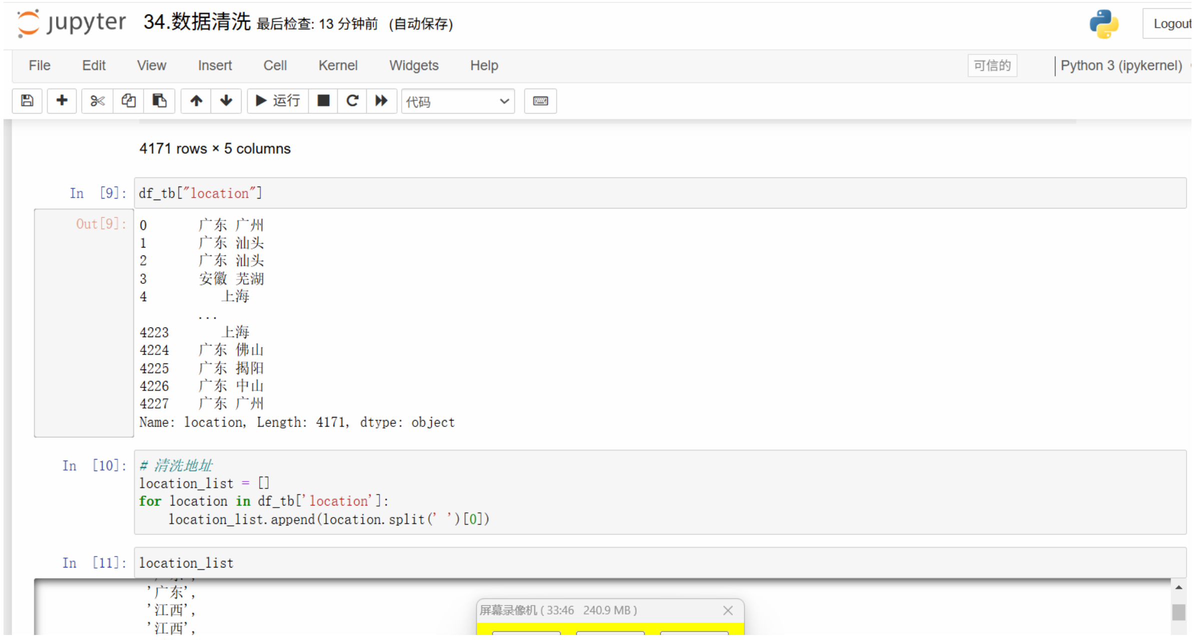
```
In [1]: import pandas as pd

In [5]: df_tb = pd.read_excel("./files/taobao_goods.xlsx")

In [6]: df_tb
Out[6]:
```

	title	price	location	sales	comment_url
0	内衣套装女收副乳调整型防下垂性感聚拢上托	148.0	广东 广州	1107人付款	NaN
1	内衣套装女夏小胸文胸聚拢收副乳少女无钢圈性感蕾丝薄款透气胸罩	19.9	广东 汕头	2114人付款	//detail.tmall.com/item.htm?id=572608443038&ad...
2	女士内衣女无钢圈聚拢小胸收副乳上托性感薄款胸罩调整型文胸套装	129.0	广东 汕头	3852人付款	//detail.tmall.com/item.htm?id=586829143080&ad...

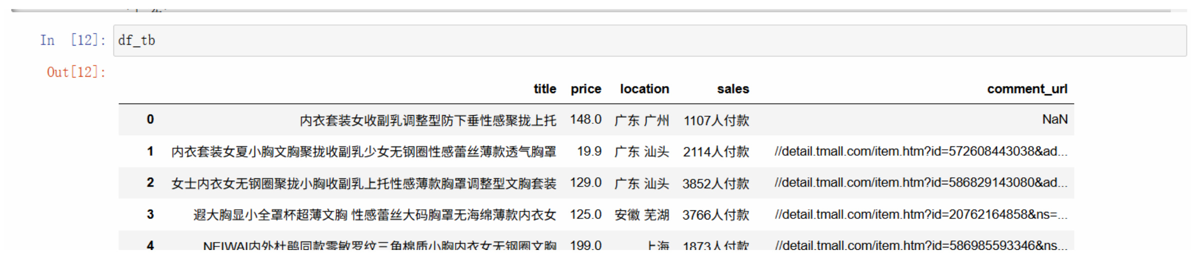


```
In [7]: df_tb.drop_duplicates(inplace=True)  # 去重

In [8]: df
Out[8]:
```

	title	price	location	sales	comment_url
0	内衣套装女收副乳调整型防下垂性感聚拢上托	148.0	广东 广州	1107人付款	NaN
1	内衣套装女夏小胸文胸聚拢收副乳少女无钢圈性感蕾丝薄款透气胸罩	19.9	广东 汕头	2114人付款	//detail.tmall.com/item.htm?id=572608443038&ad...
2	女士内衣女无钢圈聚拢小胸收副乳上托性感薄款胸罩调整型文胸套装	129.0	广东 汕头	3852人付款	//detail.tmall.com/item.htm?id=586829143080&ad...
3	遐大胸显小全罩杯超薄文胸 性感蕾丝大码胸罩无海绵薄款内衣女	125.0	安徽 芜湖	3766人付款	//detail.tmall.com/item.htm?id=20762164858&ns=...
4	NEIWAI内外杜鹃同款零敏罗纹三角棉质小胸内衣女无钢圈文胸	199.0	上海	1873人付款	//detail.tmall.com/item.htm?id=586985593346&ns...
...	...	...	...	...	...
4223	天天特价正品贵夫人文胸FA8368光面无钢圈B薄内衣胸罩夏纯色睡眠	43.0	上海	181人付款	//item.taobao.com/item.htm?id=45155943346&ns=1...

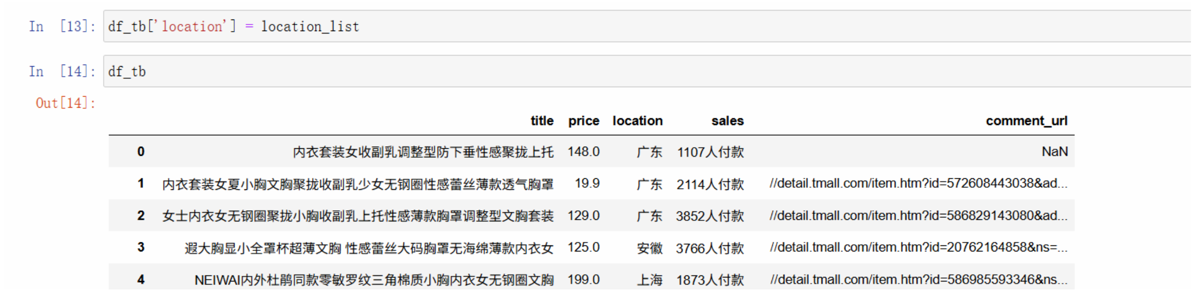

jupyter 34.数据清洗 最后检查: 13 分钟前 (自动保存)
Logout
File Edit View Insert Cell Kernel Widgets Help
可信的
Python 3 (ipykernel)
运行
代码
屏幕录像机 (33:46 240.9 MB)

```
4171 rows × 5 columns

In [9]: df_tb["location"]
Out[9]: 0       广东 广州
        1       广东 汕头
        2       广东 汕头
        3       安徽 芜湖
        4          上海
                 ...
        4223       上海
        4224    广东 佛山
        4225    广东 揭阳
        4226    广东 中山
        4227    广东 广州
        Name: location, Length: 4171, dtype: object

In [10]: # 清洗地址
         location_list = []
         for location in df_tb['location']:
             location_list.append(location.split(' ')[0])

In [11]: location_list
          '广东',
          '江西',
          '江西',
```



```
In [12]: df_tb
Out[12]:
```

	title	price	location	sales	comment_url
0	内衣套装女收副乳调整型防下垂性感聚拢上托	148.0	广东 广州	1107人付款	NaN
1	内衣套装女夏小胸文胸聚拢收副乳少女无钢圈性感蕾丝薄款透气胸罩	19.9	广东 汕头	2114人付款	//detail.tmall.com/item.htm?id=572608443038&ad...
2	女士内衣女无钢圈聚拢小胸收副乳上托性感薄款胸罩调整型文胸套装	129.0	广东 汕头	3852人付款	//detail.tmall.com/item.htm?id=586829143080&ad...
3	遐大胸显小全罩杯超薄文胸 性感蕾丝大码胸罩无海绵薄款内衣女	125.0	安徽 芜湖	3766人付款	//detail.tmall.com/item.htm?id=20762164858&ns=...
4	NEIWAI内外杜鹃同款零敏罗纹三角棉质小胸内衣女无钢圈文胸	199.0	上海	1873人付款	//detail.tmall.com/item.htm?id=586985593346&ns...



```
In [13]: df_tb['location'] = location_list

In [14]: df_tb
Out[14]:
```

	title	price	location	sales	comment_url
0	内衣套装女收副乳调整型防下垂性感聚拢上托	148.0	广东	1107人付款	NaN
1	内衣套装女夏小胸文胸聚拢收副乳少女无钢圈性感蕾丝薄款透气胸罩	19.9	广东	2114人付款	//detail.tmall.com/item.htm?id=572608443038&ad...
2	女士内衣女无钢圈聚拢小胸收副乳上托性感薄款胸罩调整型文胸套装	129.0	广东	3852人付款	//detail.tmall.com/item.htm?id=586829143080&ad...
3	遐大胸显小全罩杯超薄文胸 性感蕾丝大码胸罩无海绵薄款内衣女	125.0	安徽	3766人付款	//detail.tmall.com/item.htm?id=20762164858&ns=...
4	NEIWAI内外杜鹃同款零敏罗纹三角棉质小胸内衣女无钢圈文胸	199.0	上海	1873人付款	//detail.tmall.com/item.htm?id=586985593346&ns...

```
In [15]: # 清洗金额
         sales_list = []
         for sale in df_tb['sales']:
             sale = sale[:-3].replace('+','')
             if '万' in sale:
                 sale = int(float(sale[:-1])*10000)
             sales_list.append(sale)
```

```
In [16]: df_tb['sales'] = sales_list
```

```
In [17]: df_tb
```

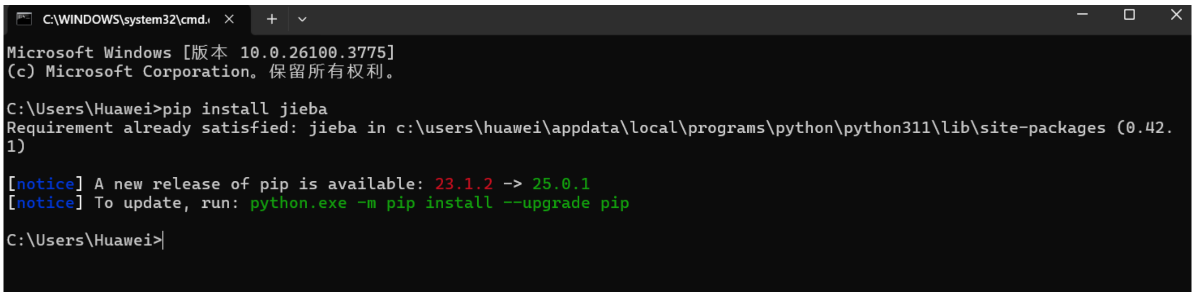
Out[17]:

	title	price	location	sales	comment_url
0	内衣套装女收副乳调整型防下垂性感聚拢上托	148.0	广东	1107	NaN
1	内衣套装女夏小胸文胸聚拢收副乳少女无钢圈性感蕾丝薄款透气胸罩	19.9	广东	2114	//detail.tmall.com/item.htm?id=572608443038&ad...
2	女士内衣女无钢圈聚拢小胸收副乳上托性感薄款胸罩调整型文胸套装	129.0	广东	3852	//detail.tmall.com/item.htm?id=586829143080&ad...

```
In [19]: # 保存到新表
         df_tb.to_excel("./files/standard_taobao_goods.xlsx",index=None)
```

2.10 词云

安装：pip install jieba



```
Microsoft Windows [版本 10.0.26100.3775]
(c) Microsoft Corporation。保留所有权利。

C:\Users\Huawei>pip install jieba
Requirement already satisfied: jieba in c:\users\huawei\appdata\local\programs\python\python311\lib\site-packages (0.42.
1)

[notice] A new release of pip is available: 23.1.2 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\Huawei>
```

```
In [45]: # 词云
         df_bra = pd.read_excel(r'D:\工作\知了堂\川农实训\代码\files\standard_goods_comments.xlsx')
```

```
In [46]: df_bra
```

Out[46]:

	bra_size	color	date	comment
0	B	酒红色	2019-12-03 00:24:39	每年固定双十一买五套，正好每套两个月，今年这几个颜色更差了，但质量比去年优秀，真的是裸感。
1	B	裸粉色	2019-12-03 17:16:35	不厚无钢圈，第一回买这个牌子，款式好看，买了两件，感觉舒适度一般，懒得退了。。粉色的应该是别...
2	C	黑色	2019-11-28 15:00:30	上身效果：很合适 很贴身 厚薄度：适中 尺码推荐：很准确 材质特性：描述一致 罩杯推荐：很准

```
In [47]: df_bra['comment']  # 评论
Out[47]: 0           每年固定双十一买五套，正好每套两个月，今年这几个颜色更差了，但质量比去年优秀，真的是裸感。
         1       不厚无钢圈，第一回买这个牌子，款式好看，买了两件，感觉舒适度一般，懒得退了。。粉色的应该是别...
         2       上身效果：很合适 很贴身 厚薄度：适中 尺码推荐：很准确 材质特性：描述一致 罩杯推荐：很准...
         3       没有买过VS，自己根据尺码表算的尺寸没想到挺合适。很喜欢这件内衣很薄很透气，没有钢圈午睡也很...
         4         终于等到双十一买了4件，维密家的内衣面料是穿过的内衣里面质感最好的，舒服度也很高，无限回购！！
                                         ...
         3669                    鞋很好，物美价廉物流速度快，这个价位质量还这么好，非常赞?
         3670              昨天下单，今天就到了，京东物流???！质量很好！需要的朋友赶紧下单哦
         3671                         非常好，质量不错，大小很合适，卖家态度很好
         3672                        穿着很舒服！不错的选择！质量很好！真心喜欢！
         3673                    穿着很舒服，质量也很好，活动购 价值66元算便宜了吧！
         Name: comment, Length: 3674, dtype: object
```

```
In [48]: import jieba
         import numpy as np
         import matplotlib.pyplot as plt
         from PIL import Image
         from wordcloud import WordCloud
```

```
In [49]: text = ' '.join(jieba.cut(str([comment for comment in df_bra['comment']])))

         Building prefix dict from the default dictionary ...
         Dumping model to file cache C:\Users\Huawei\AppData\Local\Temp\jieba.cache
         Loading model cost 2.103 seconds.
         Prefix dict has been built successfully.
```

```
In [50]: mask = np.array(Image.open('./files/bra.jpg'))
```

```
In [51]: wc = WordCloud(mask=mask,font_path='./tool/simhei.ttf',mode="RGBA").generate(text)
```

```
In [52]: # 保存图片
         wc.to_file('./test_bra.png')
Out[52]: <wordcloud.wordcloud.WordCloud at 0x1f778393450>
```

20250420 numpy

20250420 pandas