hw1

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2024/3/8

0.

```
library(reticulate)
```

1.

```
# 1. GET request

import requests

###################################################################################################
#
def get_bus_route_info(company_id, route):
    url = f"https://rt.data.gov.hk/v2/transport/citybus/route/{company_id}/{route}"
    response = requests.get(url)
    data = response.json()
    return data

# 调用函数获取A28公交线路信息
company_id = "CTB"
route = "A28"
route_info = get_bus_route_info(company_id, route)

# 打印结果
print(route_info)

###################################################################################################
#
```

```
## {'type': 'Route', 'version': '2.0', 'generated_timestamp': '2024-03-08T19:05:37+08:00', 'dat
a': {'co': 'CTB', 'route': 'A28', 'orig_tc': '日出康城', 'orig_en': 'LOHAS Park', 'dest_tc':
'機場 (經港珠澳大橋香港口岸)', 'dest_en': 'Airport (via HZMB Hong Kong Port)', 'orig_sc': '日出
康城', 'dest_sc': '机场 (经港珠澳大桥香港口岸)', 'data_timestamp': '2024-03-08T05:00:01+08:0
0'}}
```

```
def get_bus_route_stop_info(company_id, route, direction):
    url = f"https://rt.data.gov.hk/v2/transport/citybus/route-stop/{company_id}/{route}/{direction}"
    response = requests.get(url)
    data = response.json()
    return data

# 调用函数获取A28公交线路进站方向站点信息
company_id = "CTB"
route = "A28"
direction = "inbound"
route_stop_info = get_bus_route_stop_info(company_id, route, direction)

# 打印结果
print(route_stop_info)

# 提取站点信息并保存在列表中
```

```
## {'type': 'RouteStop', 'version': '2.0', 'generated_timestamp': '2024-03-08T19:10:02+08:00', 'data': [{'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 1, 'stop': '001837', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 2, 'stop': '002672', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 3, 'stop': '003304', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 4, 'stop': '003482', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 5, 'stop': '003540', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 6, 'stop': '001854', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 7, 'stop': '001766', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 8, 'stop': '001523', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 9, 'stop': '001688', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 10, 'stop': '001696', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 11, 'stop': '001697', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 12, 'stop': '001653', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 13, 'stop': '001652', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 14, 'stop': '001780', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 15, 'stop': '001788', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 16, 'stop': '003498', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 17, 'stop': '003499', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 18, 'stop': '003500', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 19, 'stop': '002701', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 20, 'stop': '003068', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 21, 'stop': '002705', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 22, 'stop': '001677', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 23, 'stop': '001678', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 24, 'stop': '003234', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 25, 'stop': '001823', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 26, 'stop': '001763', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 27, 'stop': '001764', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 28, 'stop': '001824', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 29, 'stop': '001825', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 30, 'stop': '001826', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 31, 'stop': '003160', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 32, 'stop': '003225', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 33, 'stop': '002919', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 34, 'stop': '002928', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 35, 'stop': '002929', 'data_timestamp': '2024-03-08T05:00:03+08:00'}, {'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 36, 'stop': '003329', 'data_timestamp': '2024-03-08T05:00:03+08:00'}]}
```

```
stops = [entry['stop'] for entry in route_stop_info['data']]

# 打印站点信息列表
print(stops)

###########################################################################################
#
```

```
## ['001837', '002672', '003304', '003482', '003540', '001854', '001766', '001523', '001688',
'001696', '001697', '001653', '001652', '001780', '001788', '003498', '003499', '003500', '0027
01', '003068', '002705', '001677', '001678', '003234', '001823', '001763', '001764', '001824',
'001825', '001826', '003160', '003225', '002919', '002928', '002929', '003329']
```

```
import pandas as pd

def get_stop_name(stop_id):
    url = f"https://rt.data.gov.hk/v2/transport/citybus/stop/{stop_id}"
    response = requests.get(url)
    data = response.json()
    return data

# 站点ID列表
stop_ids = ['001837', '002672', '003304', '003482', '003540', '001854', '001766', '001523', '00
1688', '001696', '001697', '001653', '001652', '001780', '001788', '003498', '003499', '00350
0', '002701', '003068', '002705', '001677', '001678', '003234', '001823', '001763', '001764',
'001824', '001825', '001826', '003160', '003225', '002919', '002928', '002929', '003329']

# 创建一个空的列表
data = []

# 遍历每个站点ID，获取对应的name_tc，并添加到列表中
for stop_id in stop_ids:
    stop_info = get_stop_name(stop_id)
    name_tc = stop_info['data']['name_tc']
    data.append({'stop_id': stop_id, 'name_tc': name_tc})

# 创建DataFrame
df = pd.DataFrame(data)

# 打印数据集
print(df)

###########################################################################################
#
```

```
##    stop_id          name_tc
## 0   001837       機場 (地面運輸中心)
## 1   002672         機場博覽館, 航展道
## 2   003304  香港天際萬豪酒店, 航天城東路
## 3   003482    航天城交匯處, 航天城東路
## 4   003540          港珠澳大橋香港口岸
## 5   001854          青嶼幹線巴士轉乘站
## 6   001766         畢架山花園, 龍翔道
## 7   001523          黃大仙站, 龍翔道
## 8   001688          沙田坳道, 龍翔道
## 9   001696          鑽石山站, 大磡道
## 10  001697          牛池灣村, 龍翔道
## 11  001653        牛池灣街市, 清水灣道
## 12  001652    彩雲邨白虹樓, 新清水灣道
## 13  001780        基順學校, 新清水灣道
## 14  001788         順利消防局, 利安道
## 15  003498           安泰邨, 安秀道
## 16  003499        安達邨愛達樓, 安秀道
## 17  003500           安達邨, 安秀道
## 18  002701           寶達邨, 寶琳路
## 19  003068                寶達邨
## 20  002705          馬游塘村, 寶琳路
## 21  001677         康盛花園, 寶琳北路
## 22  001678          翠林邨, 寶琳北路
## 23  003234          富麗花園, 寶康路
## 24  001823         唐明街公園, 唐明街
## 25  001763        彩明苑彩富閣, 景嶺路
## 26  001764          調景嶺站, 景嶺路
## 27  001824         將軍澳中心, 寶邑路
## 28  001825          將軍澳站, 寶邑路
## 29  001826         將軍澳廣場, 寶邑路
## 30  003160          蓬萊路, 環保大道
## 31  003225          百勝角, 環保大道
## 32  002919           峻瀅, 環保大道
## 33  002928      日出康城領都, 環保大道
## 34  002929      日出康城首都, 環保大道
## 35  003329               日出康城
```

```
stop_name = "將軍澳站, 寶邑路"
direction = "inbound"

# 根据条件筛选DataFrame
filtered_df = df[(df['name_tc'] == stop_name)]

# 获取匹配的stop_id
stop_id = filtered_df['stop_id'].values[0]

# 打印stop_id
print(stop_id)



###################################################################################################
#
```

```
## 001825
```

```
def get_eta(company_id, stop_id, route):
    url = f"https://rt.data.gov.hk/v2/transport/citybus/eta/{company_id}/{stop_id}/{route}"  # 替换为ETA API的URL
    response = requests.get(url)
    data = response.json()
    return data

company_id = "CTB"
route = "A28"
stop_id = "001825"

eta_data = get_eta(company_id, stop_id, route)

print(eta_data)

# 提取数据字段
```

```
## {'type': 'ETA', 'version': '2.0', 'generated_timestamp': '2024-03-08T19:10:28+08:00', 'data': [{'co': 'CTB', 'route': 'A28', 'dir': 'I', 'seq': 29, 'stop': '001825', 'dest_tc': '日出康城', 'dest_en': 'LOHAS Park', 'eta': '2024-03-08T19:53:40+08:00', 'rmk_tc': '', 'eta_seq': 1, 'dest_sc': '日出康城', 'rmk_en': '', 'rmk_sc': '', 'data_timestamp': '2024-03-08T19:10:23+08:00'}]}
```

```
company_id = eta_data['data'][0]['co']
route = eta_data['data'][0]['route']
direction = eta_data['data'][0]['dir']
stop_id = eta_data['data'][0]['stop']
destination = eta_data['data'][0]['dest_tc']
eta = eta_data['data'][0]['eta']

# 创建数据集（DataFrame）
data = {'公司ID': [company_id], '路线': [route], '方向': [direction],
        '停靠站ID': [stop_id], '目的地': [destination], '预计到达时间': [eta]}
df = pd.DataFrame(data)

# 打印数据集（DataFrame）
print(df)
```

```
##    公司ID   路线  方向    停靠站ID    目的地                      预计到达时间
## 0  CTB  A28   I  001825  日出康城  2024-03-08T19:53:40+08:00
```

2.

```
##################################################################################################
#

# 2. POST request

from openai import AzureOpenAI

client = AzureOpenAI(
    api_key="63d53d8ef5074a17ac71f85bd7de1fd0",
    api_version="2023-05-15",
    azure_endpoint="https://hkust.azure-api.net"
)

response = client.chat.completions.create(
    model="gpt-35-turbo",
    messages=[
        {"role":"system","content": "You are a helpful assistant."},
        {"role":"user","content": "what is openAI?"},
    ],
)

print(response.choices[0].message.content)
```

```
## OpenAI is a research organization focused on creating artificial intelligence in a way that
is safe and beneficial for all. It was founded by a group of technology leaders, philanthropist
s, and thinkers who are concerned about the potential dangers of AI and want to ensure that it
is developed responsibly. OpenAI's mission is to advance digital intelligence in a way that hel
ps humanity as a whole, rather than just benefit a few individuals or corporate interests. Open
AI is committed to developing AI that is transparent, controllable, and capable of solving comp
lex problems. It also promotes open collaboration and sharing of knowledge to advance the field
of AI globally.
```

```
response = client.chat.completions.create(
    model="gpt-35-turbo",
    messages=[
        {"role":"system","content": "You are a helpful assistant."},
        {"role":"user","content": "what is Virtual Youtuber?"},
    ],
)

print(response.choices[0].message.content)
```

```
## A virtual YouTuber, also known as VTuber, is a YouTuber or online personality who uses a vir
tual avatar generated by computer-generated graphics and animation. The avatar can be controlle
d by the YouTuber's voice and movements through a motion capture technology or other methods. V
irtual YouTubers have become very popular in Japan and other parts of the world and create cont
ent such as gaming videos, music performances, and live streams.
```

3.

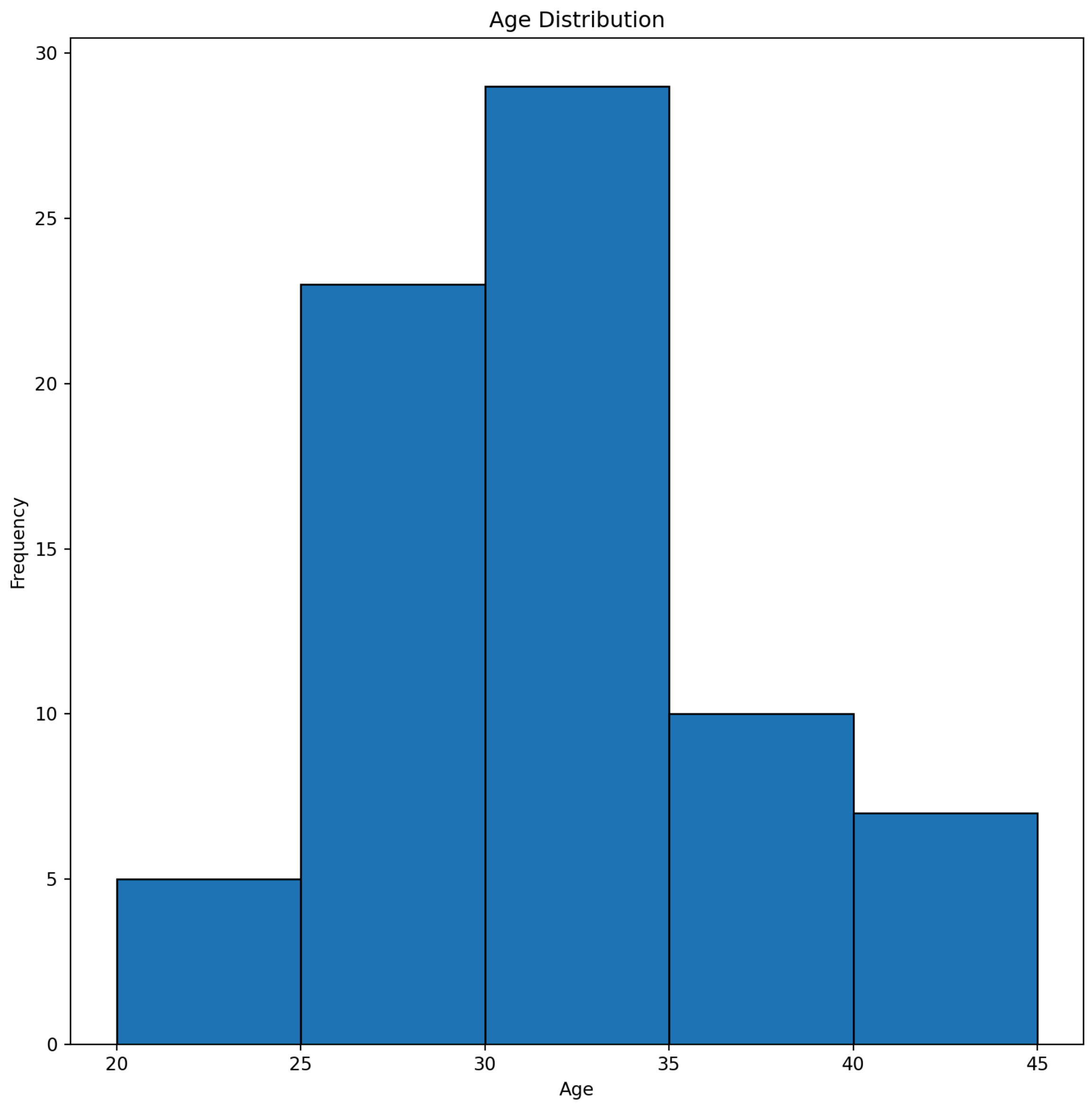
```
##################################################################################################
#
# 3. Web Scraping
import numpy as np
import pandas as pd
import requests
import json
from bs4 import BeautifulSoup

url = f"https://en.wikipedia.org/wiki/List_of_Formula_One_World_Drivers%27_Champions"

from selenium import webdriver
from selenium.webdriver.chrome.service import Service
from selenium.webdriver.chrome.options import Options
from selenium.webdriver.common.by import By

ser = Service(r'D:\app\chromedriver\chromedriver.exe')
options = Options()
options.add_argument("headless")              # headless is the option to whether to have a bro
wser popping out
driver = webdriver.Chrome(service=ser, options=options)
driver.get(url)

elements = driver.find_elements(By.XPATH, '//table[@class="wikitable sortable jquery-tablesorte
r"][@style="font-size:85%; text-align:center;"]/tbody/tr[position() >= 1 and position() <= last
()]/td[position() = 3]')
data_list1 = [element.text for element in elements]
data_list1[5]='43'
print(data_list1)
```

```
## ['44', '40', '34', '35', '43', '43', '44', '45', '46', '29', '33', '34', '34', '33', '27',
'30', '29', '40', '31', '39', '30', '28', '32', '25', '34', '27', '26', '29', '28', '38', '29',
'34', '29', '34', '31', '35', '30', '31', '35', '28', '34', '30', '31', '39', '38', '25', '26',
'36', '26', '30', '31', '31', '32', '33', '34', '35', '24', '25', '28', '23', '29', '23', '24',
'25', '26', '29', '30', '31', '32', '33', '34', '35', '24', '25', '26']
```

```
data_list1 = [int(age) if age.isdigit() else 0 for age in data_list1]
mean_age = np.mean(data_list1)

import matplotlib.pyplot as plt
# Create a bar chart to display the age distribution
fig = plt.figure(figsize=(10,10), dpi=300)
plt.hist(data_list1, bins=range(20, 50, 5), edgecolor='black')
```

```
## (array([ 5., 23., 29., 10.,  7.]), array([20., 25., 30., 35., 40., 45.]), <BarContainer obje
ct of 5 artists>)
```

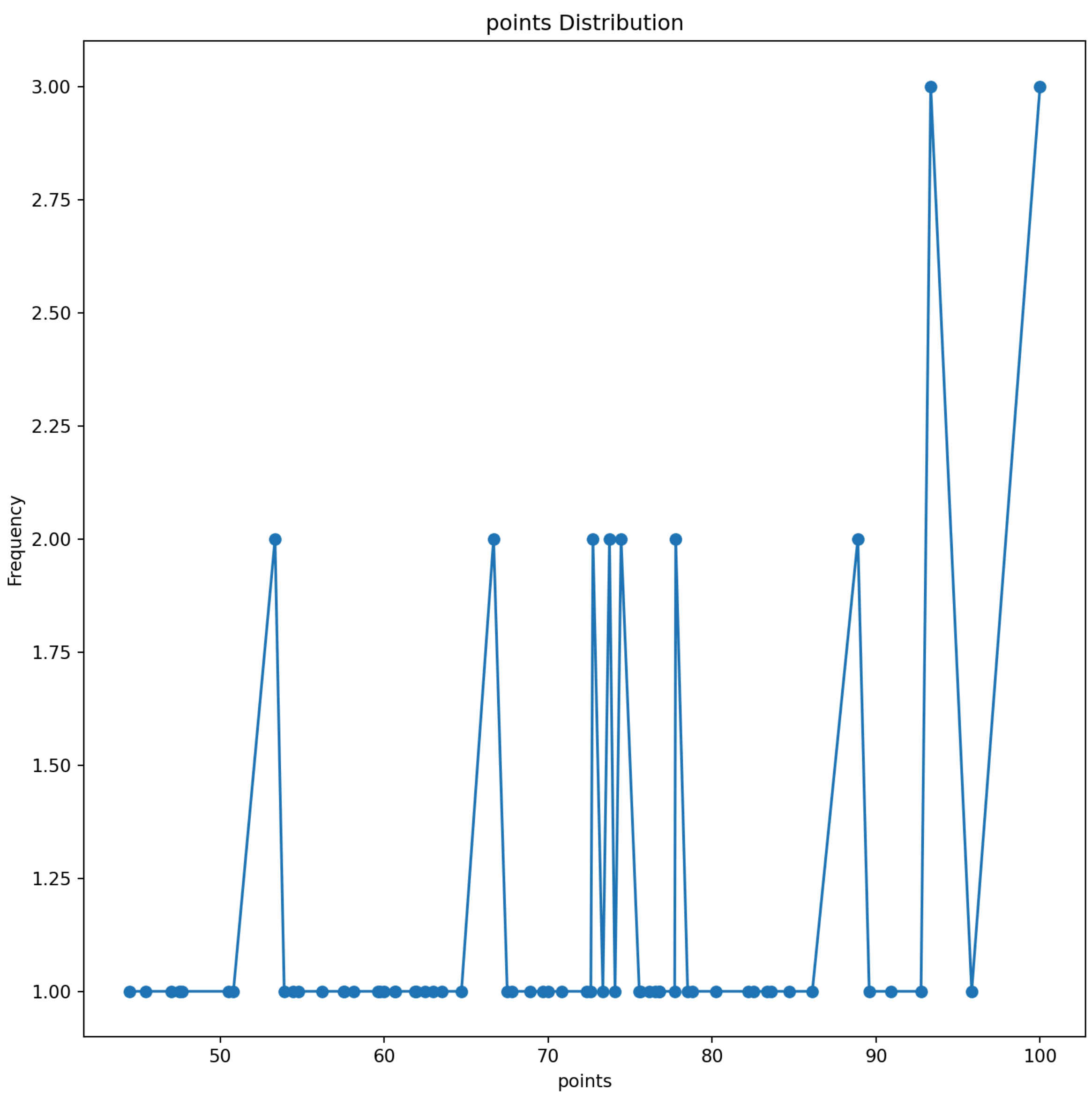
```
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.title('Age Distribution')
plt.show()


######################################################################
```



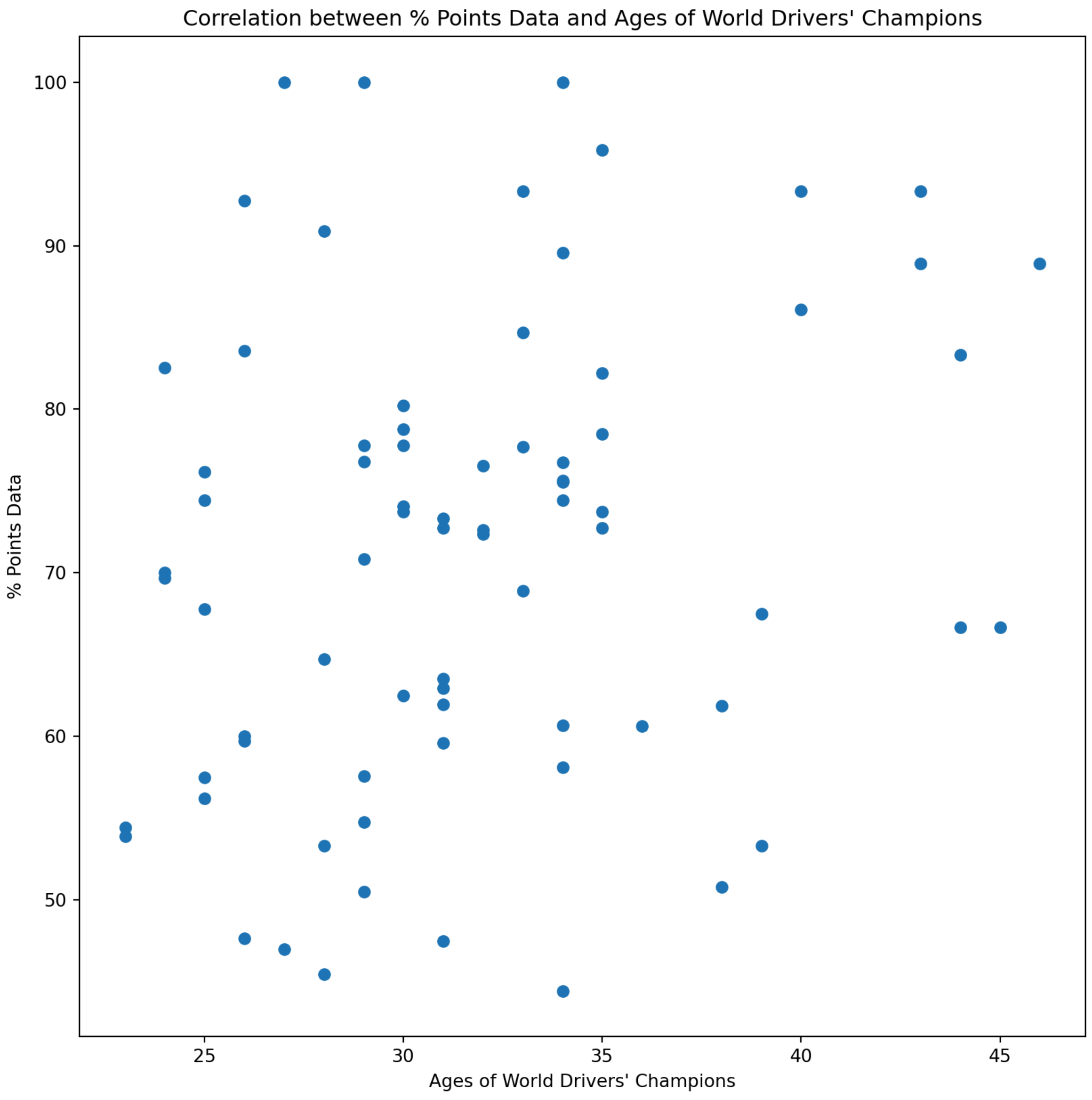
```
elements = driver.find_elements(By.XPATH, '//table[@class="wikitable sortable jquery-tablesorte
r"][@style="font-size:85%; text-align:center;"]/tbody/tr[position() >= 1 and position() <= last
()]/td[position() = 12]')
data_list2 = [element.text for element in elements]
data_list2.insert(6, '66.667 (45.833)')

for i in range(len(data_list2)):
    data_list2[i] = data_list2[i][:6]

print(data_list2)
```

```
## ['83.333', '86.111', '100.00', '95.833', '93.333', '88.889', '66.667', '66.667', '88.889',
'77.778', '68.889', '89.583', '75.556', '93.333', '100.00', '74.074', '100.00', '93.333', '62.9
63', '53.333', '77.778', '45.455', '76.543', '67.778', '60.684', '47.009', '59.722', '54.762',
'53.333', '50.794', '70.833', '74.444', '50.505', '44.444', '59.596', '72.727', '73.737', '72.7
27', '73.737', '90.909', '76.768', '78.788', '61.935', '67.500', '61.875', '57.500', '60.000',
'60.625', '47.647', '62.500', '47.500', '63.529', '72.353', '84.706', '58.125', '82.222', '70.0
00', '74.444', '64.706', '54.444', '57.576', '53.895', '82.526', '56.200', '83.579', '76.800',
'80.211', '73.333', '72.600', '77.714', '75.641', '78.507', '69.692', '76.174', '92.742']
```

```
data_list2 = [float(points) for points in data_list2]

points_counts = {points: data_list2.count(points) for points in set(data_list2)}
sorted_points = sorted(points_counts.keys())
freq = [points_counts[points] for points in sorted_points]

# Construct a line chart to depict the distribution
fig = plt.figure(figsize=(10,10), dpi=300)
plt.plot(sorted_points, freq, marker='o')
plt.xlabel('points')
plt.ylabel('Frequency')
plt.title('points Distribution')
plt.show()

######################################################################
```



```
fig = plt.figure(figsize=(10,10), dpi=300)
plt.scatter(data_list1, data_list2)
plt.xlabel("Ages of World Drivers' Champions")
plt.ylabel("% Points Data")
plt.title("Correlation between % Points Data and Ages of World Drivers' Champions")
plt.show()
```


Correlation between % Points Data and Ages of World Drivers' Champions
% Points Data
Ages of World Drivers' Champions
100
90
80
70
60
50
25
30
35
40
45