Transport for London

(API & Documentation)

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Our Client

Tourist Company

→ Transport of London

Workflow

1. Information Collection

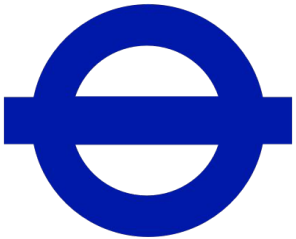
- Big event tomorrow: Air Quality
- Large influx of tourists: Different modes of transport
- Popular: Bike-points (docks), Bus lines and Tube lines (Victoria)
- Heathrow Airport → Tower Bridge?

2. Transport of London API Documentation

3. Gathered Data and Displayed Information

Components Used

- IDE: Jupyter Lab/ Jupyter Notebooks
- Language: Python & Libraries: requests, JSON, pprint
- TfL API & Documentation



https://api.tfl.gov.uk/

API REFERENCE

- AccidentStats
- AirQuality
- BikePoint
- Cabwise
- Journey
- Line
- Mode
- Occupancy
- Place
- Road
- Search
- StopPoint
- TravelTime
- Vehicle

GET REQUESTS

- /AirQuality
- /Line/Meta/Modes
- /BikePoint
- /Line/Mode/bus
- /Line/Mode/tube
- /Line/victoria/StopPoints
- /Journey/JourneyResults /{from}/to/{to}

```
def tfl_api(endpoint_method):
    base_url = "https://api.tfl.gov.uk"
    endpoint_url = base_url + endpoint_method
    res = requests.get(endpoint_url)

    if res.status_code != 200:
        print(f'Error with status code: {status_code}')

    data = res.json()
    return data

tfl_api("/AirQuality")
```

What Was Achieved and How

Business Requirement 1: What are the different modes of transport which are operated by Transport for London? How many of modes do they have?

```
# Using GET /Line/Meta/Modes in Lines section of TfL API
modes = tfl_api('/Line/Meta/Modes')
JSON(modes)
```

```
# return a list of modes of transport AND number of different modes
# iterate through a list of dictionaries
# append mode-name to mode list

mode_list = []

for i in modes:
    mode_list.append(i['modeName'])

print(mode_list)
print(f"Number of different modes of transport is: {len(mode_list)}")
```

['bus', 'cable-car', 'coach', 'cycle', 'cycle-hire', 'dlr', 'interchange-keep-sitting', 'interchange-secure', 'national-rail', 'overground', 'replacement-bus', 'river-bus', 'river-tour', 'taxi', 'tflrail', 'tram', 'tube', 'walking']

Number of different modes of transport is: 18

Business Requirement 2: Print the Air Quality predictions for tomorrow (i.e. Today's date)


```
{  '$id': '3',
   '$type': 'Tfl.Api.Presentation.Entities.CurrentForecast, '
          'Tfl.Api.Presentation.Entities',
   'forecastBand': 'Moderate',
   'forecastID': '34838',
   'forecastSummary': 'Moderate air pollution forecast valid from Friday 14 '
                'January to end of Friday 14 January GMT',
   'forecastText': 'Fine and settled, with some sunshine by day but with '
             'overnight frosts and stubborn fog patches readily '
             'developing, and perhaps staying for lengthy periods in '
             'some areas and suppressing temperatures. Very little wind '
             'expected.&lt;br/&gt; &lt;br/&gt;These settled, still and '
             'foggy conditions could lead to a build up of local '
             'pollutants with Moderate levels of Particulates and '
             'possibly Nitrogen Dioxide being reached at some busy '
             'roadside and industrial locations. '
             '&lt;br/&gt;&lt;br/&gt;Overall, air pollution is expected '
             'to remain &#39;Low&#39; throughout the forecast period '
             'for the following '
             'pollutants:&lt;br/&gt;&lt;br/&gt;Ozone&lt;br/&gt;Sulphur '
             'Dioxide&lt;br/&gt;&lt;br/&gt;&lt;br/&gt;',
   'forecastType': 'Future',
   'nO2Band': 'Moderate',
   'o3Band': 'Low',
   'pM10Band': 'Moderate',
   'pM25Band': 'Moderate',
   'sO2Band': 'Low'}
```


Endpoint Method Used:
/AirQuality

Business Requirement 3: How many BikePoints in London are operated by Transport for London? How many docks are in all BikePoints?

Number of Bikepoints operated by Transport of London: 788

Number of Docks in all BikePoints: 31587

**** Challenging!!

Endpoint Method Used:
/BikePoints

Business Requirement 4: How many tube and bus lines are in London? List names of all tube lines.

```
Names of all tube lines:

Bakerloo
----------------------
Central
----------------------
Circle
----------------------
District
----------------------
Hammersmith & City
----------------------
Jubilee
----------------------
Metropolitan
----------------------
Northern
----------------------
Piccadilly
----------------------
Victoria
----------------------
Waterloo & City
----------------------
```

Number of tube lines in London: 11

Number of bus lines in London: 678

Total number of tubes plus bus lines: 689

Endpoint Method Used:

- /Line/Mode/bus
- /Line/Mode/tube

Business Requirement 5: How many station has victoria line?

Number of stations that have the Victoria line:
16

Endpoint Method Used:
/Line/victoria/StopPoints

Business Requirement 6: Plan the journey from Heathrow Airport to Tower Bridge using Bus and Tube. Which way is faster? (con't)

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```
# Using GET /Journey/JourneyResults/{from}/to/{to} in Journey Planner section of TfL API
# *** Did not use the tfl_api user-defined function as I used params here
url7 = "https://api.tfl.gov.uk/Journey/JourneyResults/1008026/to/1013744"

res7 = requests.get(url7, params = {"mode" : "bus"})
print(res7.status_code)
journey_bus = res7.json()
JSON(journey_bus)
```

Endpoint Method Used:
/Journey/JourneyResults/{from}/to/{to}

Planned Duration
Bus: 122 minutes
Tube: 90 minutes

Tube Wins!!!

Challenges

1. API Key Access

2. Bikepoints - Data not clean?

```
# return the number of bikepoints; use counter variable
# return the number of docks in all Bikepoints; use counter variable
# iterate through a list of dictionaries and dictionaries of that dictionary

total_bike_points = 0
total_docks = 0

for i in bike_points:
    try:
        for j in i["additionalProperties"]:
            if (j["key"] == "NbEmptyDocks" or j["key"] == "NbDocks") and j["value"].isdigit():
                total_docks += int(j["value"])
    except TypeError as e:
        print(e)
        print('Data may not be clean')

    total_bike_points += 1

print(f"Number of Bikepoints operated by Transport of London: {total_bike_points}")
print(f"Number of Docks in all BikePoints: {total_docks}")
```

```
string indices must be integers
Data may not be clean
Number of Bikepoints operated by Transport of London: 788
Number of Docks in all BikePoints: 21587
```

Challenges (con't)

3. Journey Planner - Disambiguation, Parameters

https://api.tfl.gov.uk/Journey/JourneyResults/HeathrowAirport/to/TowerBridge


```
{
    "$type": "Tfl.Api.Presentation.Entities.JourneyPlanner.DisambiguationResult, Tfl.Api.Presentation.Entities",
  "toLocationDisambiguation": {
      "$type": "Tfl.Api.Presentation.Entities.JourneyPlanner.Disambiguation, Tfl.Api.Presentation.Entities",
    "disambiguationOptions": [
      {
        "$type": "Tfl.Api.Presentation.Entities.JourneyPlanner.DisambiguationOption, Tfl.Api.Presentation.Entities",
        "parameterValue": "51.50599630145,-0.07502752221",
        "uri": "/journey/journeyresults/heathrowairport/to/51.50599630145,-0.07502752221",
        "place": {
          "$type": "Tfl.Api.Presentation.Entities.Place, Tfl.Api.Presentation.Entities",
          "url": "/Place/",
          "commonName": "City of London, Tower Bridge",
          "placeType": "StopPoint",
          "additionalProperties": [],
          "lat": 51.50599630145,
          "lon": -0.07502752220999999
        },
        "matchQuality": 913
```


```
# Using GET /Journey/JourneyResults/{from}/to/{to} in Journey Planner section of TfL API
# *** Did not use the tfl_api user-defined function as I used params here
url7 = "https://api.tfl.gov.uk/Journey/JourneyResults/1008026/to/1013744"

res7 = requests.get(url7, params = {"mode" : "bus"})
print(res7.status_code)
journey_bus = res7.json()
JSON(journey_bus)
```

The End!

Thank you!