Weather Data APIs

PGA ShotLink Data Team

Why Weather Data APIs?

- Our project relies on having historical weather data to explore its effect on golfer performance
- How much data?
  - ~40 golf tournaments a year, four days in a tournament, max 15 hours a day
  - This is ~2,400 (hourly) observations per year, from 160 days
  - If we analyze five years, then we need 12,000 observations/hours

NOAA Web Portal

- Positives
  - Free (5/ second and 10,000/day)
  - Global
  - 40+ year history
  - Data transaction:
    - Webservice API
    - csv file
- Limitations
  - No Python package
  - Multiple, confusing endpoints:
    - Climate Data Online
    - Historical Observing Metadata Repository
    - National Weather Service
  - Searchable only by weather station or ZIP code

Weather Underground API

- Positives
  - Free (500 calls/day)
    - 24 observations/call
    - 12,000 observations/day
  - Historical data per city
    - Hourly
    - Wind speed/direction
    - Precipitation
    - Temperature
  - Python package: WunderWeather
- Limitations
  - API
    - United States
    - No latitude/longitude
  - Ease of Use
    - 10 calls/minute
    - $$$ to upgrade
- https://www.wunderground.com/weather/api/

WEATHER UNDERGROUND

Weather Underground API

Example Python Usage

```
from pprint import pprint
import arrow
from WunderWeather import weather

# setup
api_key = "API KEY"
location = 'WA/Seattle'
extractor = weather.Extract(api_key)

# Get data
date = arrow.get("19870930", "YYYYMMDD")
response = extractor.date(location, date.format('YYYYMMDD'))
pprint(response.data)
```

Example Output

```
{'conds': 'Clear',
      'date': {'hour': '07',
      'mday': '30',
      'min': '00',
      'mon': '09',
      'pretty': '7:00 AM PDT on September 30, 1987',
      'tzname': 'America/Los_Angeles',
      'year': '1987'},
'precipi': '-9999.00',
'precipm': '-9999.00',
'rain': '0',
'snow': '0',
'tempi': '51.1',
'visi': '10.0',
'wdird': '130',
'wdire': 'SE',
'wspdi': '3.5',
'wspdm': '5.6'}
}
```

Dark Sky API

- Positives
  - Free (1,000 calls/day => 24,000 weather observations/day)
  - 10,000 additional calls for $1
  - No rate limit
  - Hourly data per lat/lon location, including wind speed, wind direction, precipitation, temperature, humidity, dew point
  - Global
  - Multiple Python packages
- Limitations
  - Requires separate lookup to obtain lat/lon (but can enable data from closer to course)
- https://darksky.net/dev

Dark Sky API - HTTP GET with JSON, darkskylib

Example Python Usage

```
from darksky import forecast

api_key = "API KEY"
data = forecast(api_key, 34.0498, -118.5013, '2017-02-19T00:00:00')

print(data['currently'])



# data[‘hourly’] holds a list of 24 observations, each like ‘currently’
# but for a different hour of the day
```

Example Output


```
{ 'apparentTemperature': 51.93,
  'cloudCover': 0,
  'dewPoint': 49.99,
  'humidity': 0.93,
  'icon': 'clear-night',
  'precipIntensity': 0,
  'precipProbability': 0,
  'pressure': 1007.2,
  'summary': 'Clear',
  'temperature': 51.93,
  'time': 1487491200,
  'visibility': 9.96,
  'windBearing': 15,
  'windSpeed': 0.52 }
```

Our plan

- Write code so that it doesn’t matter where the weather data comes from
- Start with Dark Sky, try others if needed