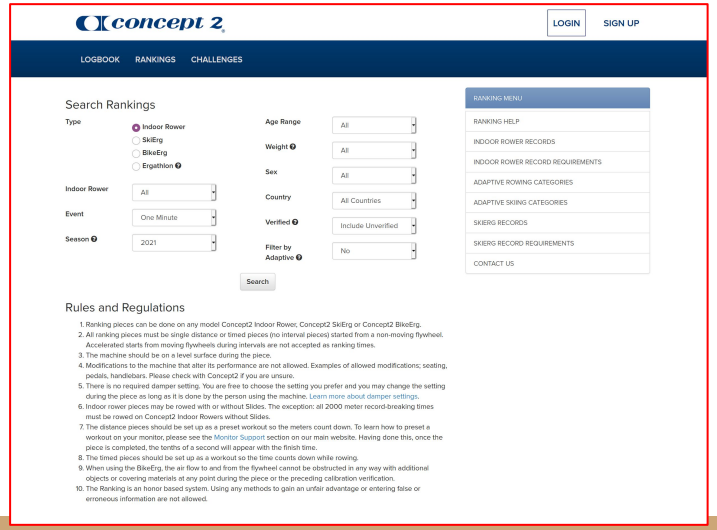
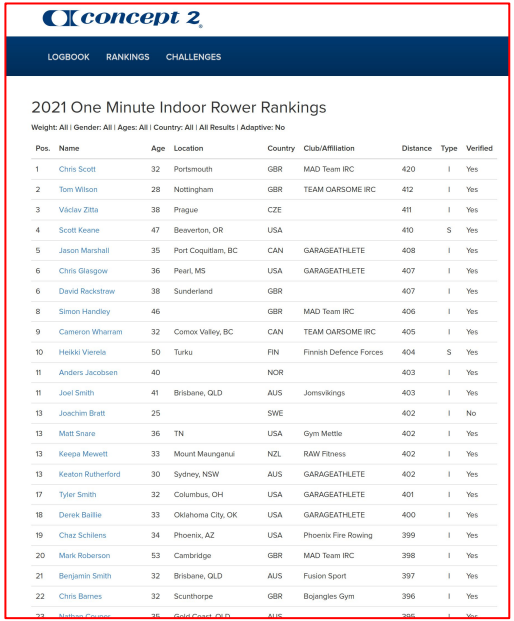
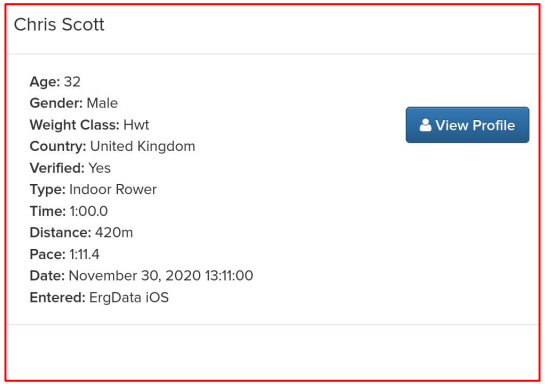
Concept 2
Logbook Scraper

https://github.com/adhardy/Concept2-Logbook-Scraper

The Website


concept 2
LOGIN
SIGN UP
LOGBOOK
RANKINGS
CHALLENGES
Search Rankings
Type
Indoor Rower
SkiErg
BikeErg
Ergathlon
Indoor Rower
All
Event
One Minute
Season
2021
Age Range
All
Weight
All
Sex
All
Country
All Countries
Verified
Include Unverified
Filter by Adaptive
No
Search
RANKING MENU
RANKING HELP
INDOOR ROWER RECORDS
INDOOR ROWER RECORD REQUIREMENTS
ADAPTIVE ROWING CATEGORIES
ADAPTIVE SKIING CATEGORIES
SKIERG RECORDS
SKIERG RECORD REQUIREMENTS
CONTACT US
Rules and Regulations
1. Ranking pieces can be done on any model Concept2 Indoor Rower, Concept2 SkiErg or Concept2 BikeErg.
2. All ranking pieces must be single distance or timed pieces (no interval pieces) started from a non-moving flywheel. Accelerated starts from moving flywheels during intervals are not accepted as ranking times.
3. The machine should be on a level surface during the piece.
4. Modifications to the machine that alter its performance are not allowed. Examples of allowed modifications; seating, pedals, handlebars. Please check with Concept2 if you are unsure.
5. There is no required damper setting. You are free to choose the setting you prefer and you may change the setting during the piece as long as it is done by the person using the machine. Learn more about damper settings.
6. Indoor rower pieces may be rowed with or without Slides. The exception: all 2000 meter record-breaking times must be rowed on Concept2 Indoor Rowers without Slides.
7. The distance pieces should be set up as a preset workout so the meters count down. To learn how to preset a workout on your monitor, please see the Monitor Support section on our main website. Having done this, once the piece is completed, the tenths of a second will appear with the finish time.
8. The timed pieces should be set up as a workout so the time counts down while rowing.
9. When using the BikeErg, the air flow to and from the flywheel cannot be obstructed in any way with additional objects or covering materials at any point during the piece or the preceding calibration verification.
10. The Ranking is an honor based system. Using any methods to gain an unfair advantage or entering false or erroneous information are not allowed.


concept 2
LOGBOOK
RANKINGS
CHALLENGES
2021 One Minute Indoor Rower Rankings
Weight: All | Gender: All | Ages: All | Country: All | All Results | Adaptive: No
Pos. Name Age Location Country Club/Affiliation Distance Type Verified
1 Chris Scott 32 Portsmouth GBR MAD Team IRC 420 I Yes
2 Tom Wilson 28 Nottingham GBR TEAM OARSOME IRC 412 I Yes
3 Václav Zitta 38 Prague CZE 411 I Yes
4 Scott Keane 47 Beaverton, OR USA 410 S Yes
5 Jason Marshall 35 Port Coquitlam, BC CAN GARAGEATHLETE 408 I Yes
6 Chris Glasgow 36 Pearl, MS USA GARAGEATHLETE 407 I Yes
6 David Rockstraw 38 Sunderland GBR 407 I Yes
8 Simon Handley 46 GBR MAD Team IRC 406 I Yes
9 Cameron Wharram 32 Comox Valley, BC CAN TEAM OARSOME IRC 405 I Yes
10 Heikki Vierela 50 Turku FIN Finnish Defence Forces 404 S Yes
11 Anders Jacobsen 40 NOR 403 I Yes
11 Joel Smith 41 Brisbane, QLD AUS Jomsvikings 403 I Yes
13 Joachim Bratt 25 SWE 402 I No
13 Matt Snare 36 TN USA Gym Mettle 402 I Yes
13 Keepa Mewett 33 Mount Maunganui NZL RAW Fitness 402 I Yes
13 Keaton Rutherford 30 Sydney, NSW AUS GARAGEATHLETE 402 I Yes
17 Tyler Smith 32 Columbus, OH USA GARAGEATHLETE 401 I Yes
18 Derek Baillie 33 Oklahoma City, OK USA GARAGEATHLETE 400 I Yes
19 Chaz Schilens 34 Phoenix, AZ USA Phoenix Fire Rowing 399 I Yes
20 Mark Roberson 53 Cambridge GBR MAD Team IRC 398 I Yes
21 Benjamin Smith 32 Brisbane, QLD AUS Fusion Sport 397 I Yes
22 Chris Barnes 32 Scunthorpe GBR Bojangles Gym 396 I Yes


Chris Scott
Age: 32
Gender: Male
Weight Class: Hwt
Country: United Kingdom
Verified: Yes
Type: Indoor Rower
Time: 1:00.0
Distance: 420m
Pace: 1:11.4
Date: November 30, 2020 13:11:00
Entered: ErgData iOS
View Profile


Chris Scott
Age: 33
Country: United Kingdom
Location: Portsmouth
Affiliation: MAD Team IRC
Team: MAD Men (MAD Team IRC)
Height: 6 ft 6 in
Weight: 260 lb
Wingspan: 6 ft 10 in
Logbook ID: 1169265
Member since: December 07, 2017

3 years

7,500 Ranking Tables

20,000 pages

81,000 athletes

332,000 workouts

430,000 get requests

Multi-Webbing

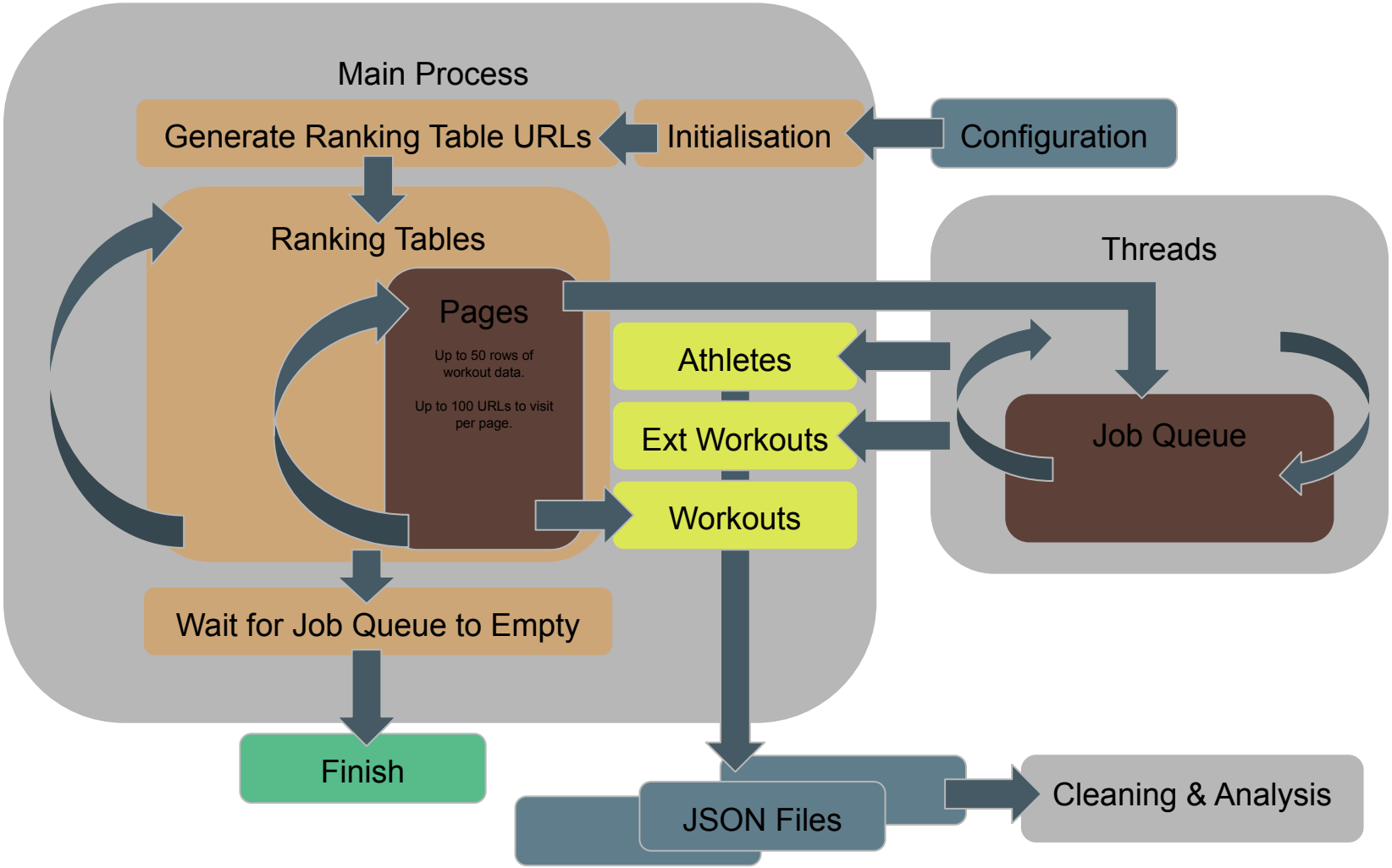
https://github.com/adhardy/Multi-Webbing

Built on the Threading module.

Allows parallel get requests

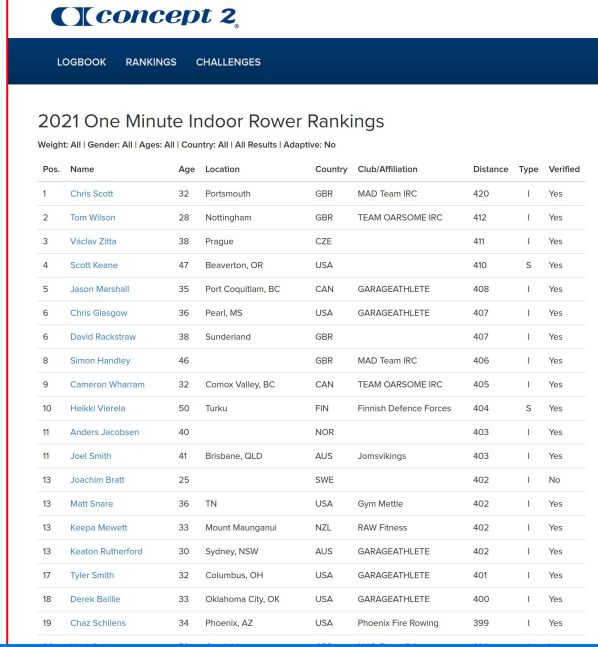
Supports “requests” and “selenium”

pip install multi_webbing


Main Process
Generate Ranking Table URLs
Initialisation
Configuration
Ranking Tables
Pages
Up to 50 rows of workout data.
Up to 100 URLs to visit per page.
Threads
Athletes
Ext Workouts
Workouts
Job Queue
Wait for Job Queue to Empty
Finish
JSON Files
Cleaning & Analysis

Ranking Tables

```
...

tree = html.fromstring(r.text)
table_tree = tree.xpath('//html/body/div[2]/div/main/section[@class="content"]/table' )

#get column headings
columns = table_tree[0].xpath('thead/tr/th')
column_headings = [column.text for column in columns]

rows_tree = table_tree[0].xpath('tbody/tr')
for row in range(0,num_rows):
        row_tree = rows_tree[row]
        self.data.workouts[workout_ID] = get_workout_data(row_tree, column
...
```



concept 2

LOGBOOK RANKINGS CHALLENGES

2021 One Minute Indoor Rower Rankings

Weight: All | Gender: All | Ages: All | Country: All | All Results | Adaptive: No

Pos.	Name	Age	Location	Country	Club/Affiliation	Distance	Type	Verified
1	Chris Scott	32	Portsmouth	GBR	MAD Team IRC	420	I	Yes
2	Tom Wilson	28	Nottingham	GBR	TEAM OARSOME IRC	412	I	Yes
3	Václav Zitta	38	Prague	CZE		411	I	Yes
4	Scott Keane	47	Beaverton, OR	USA		410	S	Yes
5	Jason Marshall	35	Port Coquitlam, BC	CAN	GARAGEATHLETE	408	I	Yes
6	Chris Glasgow	36	Pearl, MS	USA	GARAGEATHLETE	407	I	Yes
6	David Rackstraw	38	Sunderland	GBR		407	I	Yes
8	Simon Handley	46		GBR	MAD Team IRC	406	I	Yes
9	Cameron Wharram	32	Comox Valley, BC	CAN	TEAM OARSOME IRC	405	I	Yes
10	Heikki Vierela	50	Turku	FIN	Finnish Defence Forces	404	S	Yes
11	Anders Jacobsen	40		NOR		403	I	Yes
11	Joel Smith	41	Brisbane, QLD	AUS	Jomsvikings	403	I	Yes
13	Joachim Bratt	25		SWE		402	I	No
13	Matt Snare	36	TN	USA	Gym Mettle	402	I	Yes
13	Keepa Mewett	33	Mount Maunganui	NZL	RAW Fitness	402	I	Yes
13	Keaton Rutherford	30	Sydney, NSW	AUS	GARAGEATHLETE	402	I	Yes
17	Tyler Smith	32	Columbus, OH	USA	GARAGEATHLETE	401	I	Yes
18	Derek Baillie	33	Oklahoma City, OK	USA	GARAGEATHLETE	400	I	Yes
19	Chaz Schilens	34	Phoenix, AZ	USA	Phoenix Fire Rowing	399	I	Yes

```
▼<tr>
    <th>Pos.</th>
    <th>Name</th>
    <th class="hidden-mobile">Age</th>
    <th class="hidden-xs">Location</th>
    <th>Country</th>
    <th class="hidden-xs">Club/Affiliation</th>
    <th>Distance</th>
    <th>Type</th>
    <th>Verified</th>
  </tr>
</thead>
```

Ranking Tables

```
<tbody>
  <tr id="1">
    <td>1</td>
    <td>…</td>
    <td class="hidden-mobile">32</td>
    <td class="hidden-xs">Portsmouth</td>
    <td>GBR</td>
    <td class="hidden-xs">MAD Team IRC</td>
    <td>420</td>
    <td class="text-center">I</td>
    <td>Yes</td>
  </tr>
  <tr id="2">…</tr>
  <tr id="3">…</tr>
  <tr id="4">…</tr>
  <tr id="5">…</tr>
  <tr id="6">…</tr>
  <tr id="6">…</tr>
  <tr id="8">…</tr>
  <tr id="9">…</tr>
```

```
def get_workout_data(row_tree, column_headings, ranking_table, profile_ID):
    workout_data = []
    row_data_tree = row_tree.xpath('td | td/a')
    del row_data_tree[1] #remove unwanted element

    #get data elements from each column
    row_list = [x.text  for x in row_data_tree]

    #add data from the search parameters
    workout_data = lists2dict(map(str.lower, column_headings),row_list)
    workout_data["year"] = ranking_table.year
    workout_data["machine"] = ranking_table.machine
    workout_data["event"] = ranking_table.event
    workout_data["retrieved"] = strftime("%d-%m-%Y %H:%M:%S", gmtime())
    workout_data["profile_id"] = profile_ID
    for key, val in ranking_table.query_parameters.items():
        Workout_data[key] = val
    return workout_data
```

Athlete Profiles

```
def get_athlete_data(r):

...

    #profile labels that are contained in <a> tags
    a_tag_labels = ["Affiliation:", "Team:"]
    content = tree.xpath('//section[@class="content"]')

    #store profile labels as list
    athlete_profile_labels = content[0].xpath('p/strong')
    athlete_profile_labels = [label.text  for label in athlete_profile_labels]

    #profile values not contained in tags
    for profile_label in athlete_profile_labels:
        #cycle through each profile label and search for the matching value
        if profile_label in a_tag_labels:
            profile_value = content[0].xpath('p/strong[contains(text(), "'  + profile_label +'")]/following-sibling::a/text()')
        else:
            profile_value = content[0].xpath('p/strong[contains(text(), "'  + profile_label +'")]/following-sibling::text()[1]')

...
```

```
<p>
    33
    <strong>Age:</strong>
    <br>
    <strong>Country:</strong>
    United Kingdom
    <br>
    <strong>Location:</strong>
    Portsmouth
    <br>
    <strong>Affiliation:</strong>
    whitespace
    <a href="https://log.concept2.com/affiliation/123">MAD Team IRC</a>
```

Data Storage - JSON

Pro

Flexible format useful when pages have different/missing data

Highly structured

Easily created from python dictionary

Con

Large - duplication of data labels

Slow to load into pandas!

Ideal → AWS RDS

Easily queried
Compact
Fast
Backed Up

Data Cleaning and Analysis

Merge the three datasets together

```
    def merge_frames(self, how="inner"):
        self.merge = pd.merge(
                        left=(
                            pd.merge(
                                left=self.workouts,
                                right=self.athletes,
                                left_on='profile_id',
                                right_on="profile_id",
                                right_index=True,
                                how=how
                            )
                        ),
                        right = self.extended,
                        left_on='workout_id',
                        right_on="workout_id",
                        right_index=True,
                        how=how
                    )
```

Assign missing values to NaN

```
df.replace(
            {"":np.nan,
            "None":np.nan,
            None:np.nan},
        inplace=True)
```

Missing Data - Distance

Missing distances <1% of dataset - Drop

```
clean.df.merge = clean.df.merge[clean.df.merge["distance"].notnull()]
clean.df.merge = clean.df.merge.astype({"distance":int})
```

Height & Weight Conversion

Sample input “5 ft 11 in”, convert to cm

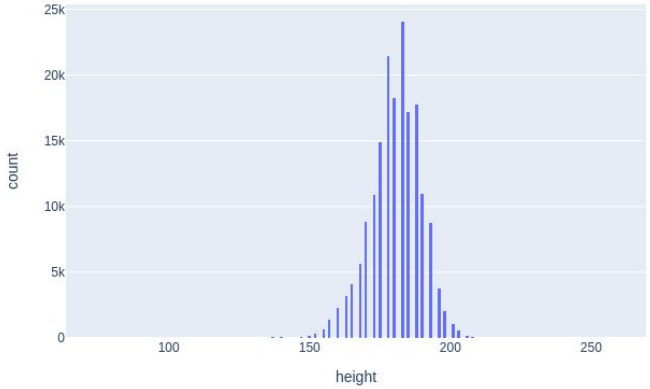
```
df_heights = df_heights.replace({' ft ':' ', ' in':' '}, regex=True)
df_heights = df_heights.str.split(expand=True)
df_heights = df_heights.astype(datatypes)
df_heights["height"] = round(df_heights[0] *  ft_to_cm + df_heights[1] * in_to_cm,0)
```

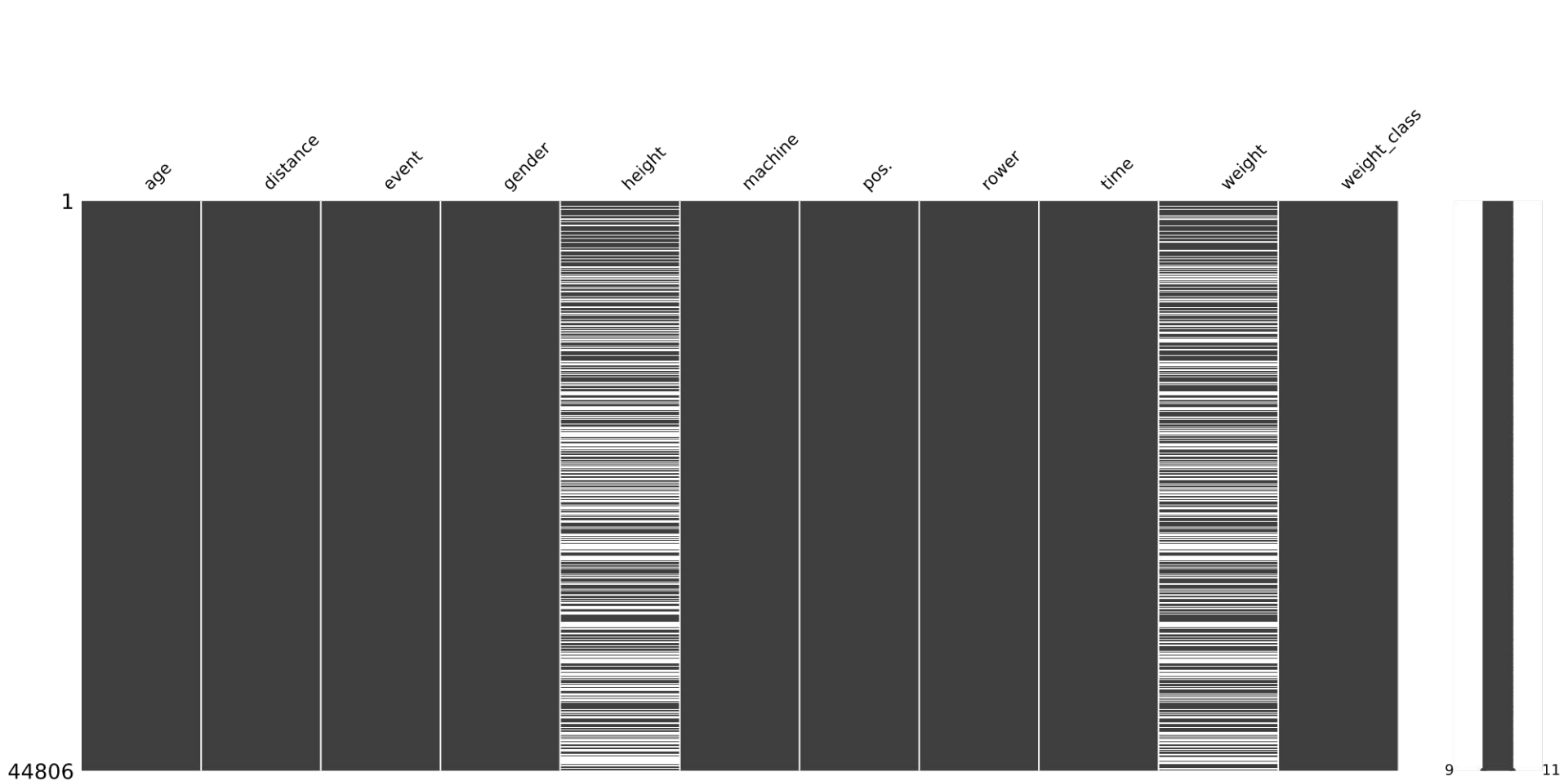
Sample input “160 lbs”, convert to kg

```
df_weights = clean.df.merge[col].replace({' lb':''}, regex=True)
df_weights = df_weights.astype(float)
df_weights = round(df_weights * lbs_kg,1)
```

Form Data (People are Stupid)

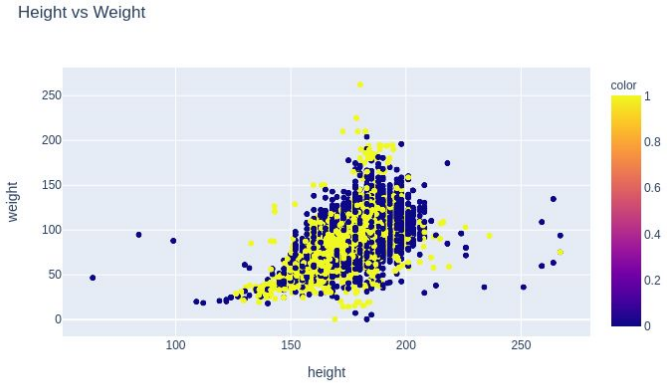
```
def clean_heights(height):
    ft_to_cm = 30.48
    tallest_human = 272 # weed out impossible heights
    smallest_human = 60
# some people entered cm instead of ft and inch, so can recover this by converting back to ft
    wrong_unit_low = 4300
    wrong_unit_high = 6096
    if height > wrong_unit_low and height < wrong_unit_high:
        return round(height * 1/ft_to_cm,0)
    if height < smallest_human or height > tallest_human:
        return np.nan
    return height
```




age
distance
event
gender
height
machine
pos.
rower
time
weight
weight_class
1
44806
9
11

Imputing Height and Weight

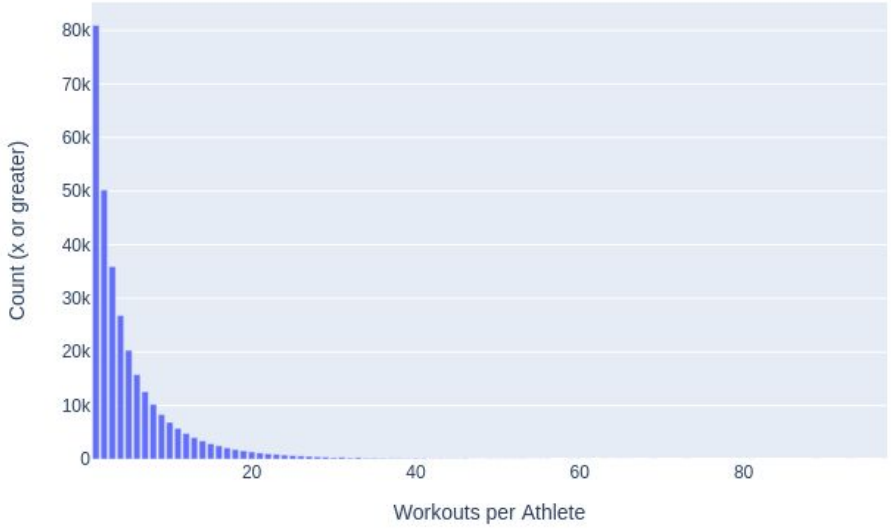
```
#binarize category columns
str_cols = df_predict[["event", "gender", "machine", "rower", "weight_class"]].columns

clfs = {c:LabelEncoder() for c in str_cols}
for col, clf in clfs.items():
    df_predict[col] = clfs[col].fit_transform(df_predict[col])

#run imputer
impute_knn = KNNImputer(n_neighbors=3, weights="distance")
arr_knn = impute_knn.fit_transform(df_predict)
df_knn = pd.DataFrame(data=arr_knn, columns=df_predict.columns)
```



Predicting

Given: height, weight, gender, time/distance in other events

Predict: distance/time in new event



Summary

- Multi-thread scraper for simultaneous requests
  - Spun off pip installable module
- Running on EC2
- Site login
- Object Oriented Code Base
- ~300,000 rows
- Cleaned data
  - Strings to integers/floats
  - Bad data dropped/repaired
- Missing data
  - Dropped
  - Imputed

Logging In

Lots of profiles hidden to logged out users.

```
def C2_login(session, url_login, username, password, url_login_success):
    login = session.get(url_login)
    login_tree = html.fromstring(login.text)
    hidden_inputs = login_tree.xpath(r'//form//input[@type="hidden"]')
    form = {x.attrib["name"]: x.attrib["value"] for x in hidden_inputs} #get csrf token
    form['username'] = username
    form['password'] = password
    response = session.post(url_login, data=form)
    if response.url != url_login_success: #see that we get to the expected page
        sys.exit("Unable to login to the logbook, quitting.")
    else:
        print("Login")
    return session
```