kettler_1_analysis

January 13, 2024

1 kettler analysis

1.1 intro code

[1]:
```python
import os
import sys
import pandas as pd
from pathlib import Path
from textwrap import wrap
import plotly.express as px
import datetime as dt
import requests

exec(requests.get(
    'https://gist.githubusercontent.com/smeisegeier/
  ↪4944b9a88b7a90cb1b2acc6da0dd906f/raw/'
    ).text)

# * get src directory which *must* be parent
dir_src = Path(os.getcwd()).parent.parent

# # * add to path
# if dir_src.as_posix() not in sys.path:
#     sys.path.append(dir_src.as_posix())

# * display / style settings
pd.options.display.max_rows = 100
pd.options.display.max_colwidth = 160
pd.options.display.precision = 2


# * theme settings
THEME = "dark" # 'light'

if THEME == 'dark':
    THEME_PLOTLY="plotly_dark"
else:
    THEME_PLOTLY="plotly"
```

1.2 load data

```
[2]: df_training=pd.read_parquet('data/trainings.pq')
     df_records=pd.read_parquet('data/records.pq')
```

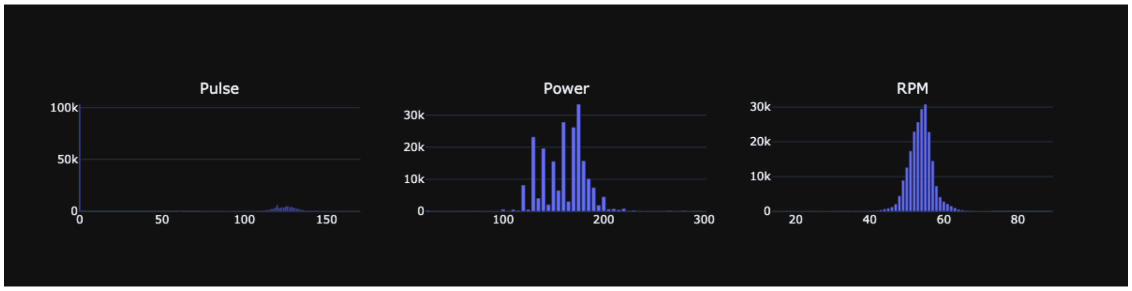
1.3 analysis

```
[22]: describe_df(df_training.iloc[:,1:], 'training', use_columns=False,␣
       ↪use_plot=False)
```

```
*** training ***
shape: (1_119, 13) columns: ['Device', 'Calibration',
'Software', 'Date', 'Time', 'RecordIntervall', 'Transmission', 'Energy',
'TrainingDateTime', 'FileName', 'CreatedAt', 'Duration_minutes', 'Streak_days']
duplicates: 0
***
Duration_minutes(114|float64) min: 0.667 |
max: 73.833 | median: 30.0 | mean: 32.33
| std: 6.61 | cv: 0.204 | sum: 36_181.833
| skew: 2.57 | kurto: 10.938
Streak_days(13|int64) min: 0 | max: 23 |
median: 1.0 | mean: 1.0 | std: 1.69 |
cv: 1.69 | sum: 1_120 | skew: 5.512 |
kurto: 51.997
missings: {'Device': 0, 'Calibration': 0, 'Software': 0, 'Date': 0,
'Time': 0, 'RecordIntervall': 0, 'Transmission': 0, 'Energy': 0,
'TrainingDateTime': 0, 'FileName': 0, 'CreatedAt': 0, 'Duration_minutes': 0,
'Streak_days': 0}

           Device     Calibration Software        Date      Time  \
0  SJ10X SKYLON 5  07655-350-2007     3367  11.01.2014  20:09:26
1  SJ10X SKYLON 5  07655-350-2007     3367  12.01.2014  18:49:44
2  SJ10X SKYLON 5  07655-350-2007     3367  13.01.2014  21:56:13

  RecordIntervall Transmission Energy           TrainingDateTime  \
0              10          9.5    6.0  2014-01-11T20:09:26+01:00
1              10          9.5    6.0  2014-01-12T18:49:44+01:00
2              10          9.5    6.0  2014-01-13T21:56:13+01:00

                             FileName                  CreatedAt  \
0  Training 11.01.2014 20h09m26s.xml 2021-01-07 23:58:46.053121
1  Training 12.01.2014 18h49m44s.xml 2021-01-07 23:58:46.053121
2  Training 13.01.2014 21h56m13s.xml 2021-01-07 23:58:46.053121

   Duration_minutes  Streak_days
0             53.17            0
1             56.67            0
2             59.17            0
```

```
[21]: describe_df(df_records.iloc[:,1:], 'records', use_columns=False, fig_offset=-4)
```

```
*** records ***
shape: (217_091, 7) columns: ['Pulse', 'Power', 'RPM',
'TimePassed_minutes', 'TimePassed_percent', 'Score_10sec', 'TrainingId']
duplicates: 0
***
Pulse(182|int64) min: 0 | max: 220 |
median: 77.0 | mean: 65.01 | std: 64.19 |
cv: 0.987 | sum: 14_112_954 | skew: 0.099
| kurto: -1.737
Power(52|int64) min: 25 | max: 300 |
median: 160.0 | mean: 160.17 | std: 23.31
| cv: 0.146 | sum: 34_770_490 | skew:
-0.635 | kurto: 2.301
RPM(61|int64) min: 14 | max: 89 |
median: 54.0 | mean: 53.63 | std: 3.56 |
cv: 0.066 | sum: 11_642_478 | skew:
-0.813 | kurto: 6.273
TimePassed_minutes(443|float64) min: 0.167 |
max: 73.833 | median: 16.33 | mean: 16.92
| std: 10.77 | cv: 0.637 | sum:
3_674_194.833 | skew: 0.694 | kurto: 0.854
TimePassed_percent(23_272|float64) min: 0.002 |
max: 1.0 | median: 0.5 | mean: 0.5 |
std: 0.29 | cv: 0.574 | sum: 109_105.0 |
skew: -0.0 | kurto: -1.2
Score_10sec(1_028|float64) min: 0.0 |
max: 0.018 | median: 0.01 | mean: 0.01 |
std: 0.0 | cv: 0.186 | sum: 1_602.262 |
skew: -0.12 | kurto: 1.503
TrainingId(1_119|int64) min: 1 | max:
1_122 | median: 518.0 | mean: 528.3 |
std: 334.27 | cv: 0.633 | sum:
114_688_343 | skew: 0.089 | kurto: -1.243
missings: {'Pulse': 0, 'Power': 0, 'RPM': 0, 'TimePassed_minutes':
0, 'TimePassed_percent': 0, 'Score_10sec': 0, 'TrainingId': 0}

   Pulse  Power  RPM  TimePassed_minutes  TimePassed_percent  Score_10sec  \
0      0     50   46                0.17            3.13e-03     1.97e-03
1      0    150   45               36.17            6.80e-01     5.77e-03
2      0    150   49               36.00            6.77e-01     6.28e-03

   TrainingId
0           1
1           1
2           1
```

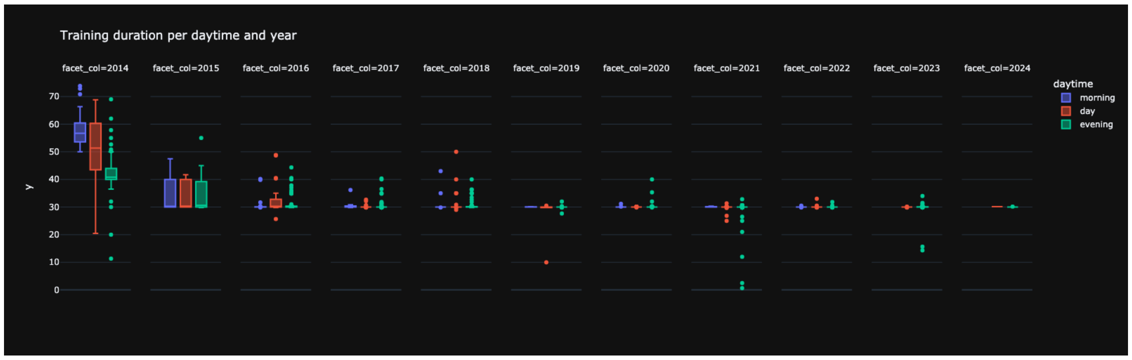


```
[25]: #
      # * tailor and join both tables

      # * id col is new index
      if "Id" in df_training.columns:
          df_training.set_index("Id", inplace=True, drop=True)
      if "Id" in df_records.columns:
          df_records.set_index("Id", inplace=True, drop=True)

      # * convert to proper datetime (remove 'T')
      df_training.TrainingDateTime=pd.to_datetime(df_training.TrainingDateTime,␣
       ↪errors='coerce')

      df_training['daytime']=df_training.TrainingDateTime.dt.hour.map(
          lambda x: "morning" if x < 13 else "day" if x < 18 else "evening"
      )

      # * add day_of_week
      df_training['day_of_week']=df_training.TrainingDateTime.dt.strftime('%A')

      # * join both tables on records level
      df=df_records.join(df_training, on="TrainingId")
      df

      # * drop unneeded columns: filename, createdat, TrainingId
      col_one_item = [col for col in df if len(df[col].unique()) == 1]
      print(f"remove these one-item columns:{col_one_item}")

      df.drop(
          # * subtract columns to make the statement idempotent
          columns=set(df.columns)
          & (set(["FileName", "CreatedAt", "TrainingId"]) | set(col_one_item)),
          inplace=True,
      )

      df[:3]
```

```
remove these one-item columns:['Device', 'Calibration', 'Software',
'RecordIntervall', 'Transmission', 'Energy']
```

[25]:
```
    Pulse  Power  RPM  TimePassed_minutes  TimePassed_percent  Score_10sec  \
Id
1       0     50   46                0.17            3.13e-03     1.97e-03
2       0    150   45               36.17            6.80e-01     5.77e-03
3       0    150   49               36.00            6.77e-01     6.28e-03

          Date      Time          TrainingDateTime  Duration_minutes  \
Id
1   11.01.2014  20:09:26 2014-01-11 20:09:26+01:00             53.17
2   11.01.2014  20:09:26 2014-01-11 20:09:26+01:00             53.17
3   11.01.2014  20:09:26 2014-01-11 20:09:26+01:00             53.17

    Streak_days  daytime day_of_week
Id
1             0  evening    Saturday
2             0  evening    Saturday
3             0  evening    Saturday
```

[87]:
```python
_df = df_training
# * add aux cols for sorting
_df['_daytime'] = pd.Categorical(_df.daytime, ["morning", "day", "evening"])
_df['_year'] = _df.TrainingDateTime.dt.year

_fig = px.box(
    _df.sort_values(by=["_year","_daytime"]),
    y=_df.Duration_minutes,
    template=THEME_PLOTLY,
    color='daytime',
    points="outliers",
    # points=False,
    facet_col=_df.TrainingDateTime.dt.year,
    # height=300,
    width=1600,
    title="Training duration per daytime and year",
    )
_fig.show('png')
```



```
[88]: print('TOP 10 streak days')
      df_training.assign(_year=df_training.TrainingDateTime.dt.year).
        ↪sort_values(by='Streak_days',␣
        ↪ascending=False)[['Streak_days','Date','_year']][:10]
```

```
      TOP 10 streak days

[88]:      Streak_days        Date  _year
      Id
      493           23  02.07.2018   2018
      773           19  15.01.2021   2021
      944           19  05.05.2022   2022
      380           12  08.01.2017   2017
      454           12  23.12.2017   2017
      694           10  07.11.2020   2020
      980            9  28.10.2022   2022
      918            9  22.03.2022   2022
      466            7  26.10.2017   2017
      448            7  23.01.2017   2017
```