Foodboost

February 21, 2023

[1]:

```
# import necessary libraries - (CELL 1)
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

# available dataframes
recipes = pd.read_csv("/data/foodboost/recipes.csv")
ingredients = pd.read_csv("/data/foodboost/ingredients.csv")
nutritions = pd.read_csv("/data/foodboost/nutritions.csv")
tags = pd.read_csv("/data/foodboost/tags.csv")
```

[2]:

```
# EXPLORE: RECIPES DATAFRAME - (CELL 2)
display(recipes.head())
print(recipes.info())
display(recipes.describe())
print(recipes.shape)
```

```
   Unnamed: 0                               title  persons  time  calories  \
0           0        Kruidnoten met choco-discodip        4    25       260
1           0             Kruidnoten in marsepein        4    25       265
2           0            Kruidnoten met chocodips        4    25       335
3           0  Pepernotentaart met marsepeinstrik       10    30       560
4           0                           Perencake       12    10       265

   stars                                              url  \
0      0  https://www.ah.nl/allerhande/recept/R-R1195893…
1      0  https://www.ah.nl/allerhande/recept/R-R1195892…
2      0  https://www.ah.nl/allerhande/recept/R-R1195891…
3      0  https://www.ah.nl/allerhande/recept/R-R1195887…
4      0  https://www.ah.nl/allerhande/recept/R-R1195790…

                                               image
0  https://static.ah.nl/static/recepten/img_RAM_P…
1  https://static.ah.nl/static/recepten/img_RAM_P…
2  https://static.ah.nl/static/recepten/img_RAM_P…
3  https://static.ah.nl/static/recepten/img_RAM_P…
4  https://static.ah.nl/static/recepten/img_RAM_P…
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8706 entries, 0 to 8705
Data columns (total 8 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   Unnamed: 0  8706 non-null   int64
 1   title       8706 non-null   object
 2   persons     8706 non-null   int64
 3   time        8706 non-null   int64
 4   calories    8706 non-null   int64
 5   stars       8706 non-null   int64
 6   url         8706 non-null   object
 7   image       8706 non-null   object
dtypes: int64(5), object(3)
memory usage: 544.2+ KB
None

       Unnamed: 0      persons         time     calories   stars
count      8706.0  8706.000000  8706.000000  8706.000000  8706.0
mean          0.0     5.405697    22.093039   453.029405     0.0
std           0.0     4.791495    13.387928   231.581738     0.0
min           0.0     1.000000     1.000000     0.000000     0.0
25%           0.0     4.000000    15.000000   270.000000     0.0
50%           0.0     4.000000    20.000000   460.000000     0.0
75%           0.0     4.000000    30.000000   615.000000     0.0
max           0.0   100.000000   320.000000  3320.000000     0.0

(8706, 8)
```

[3]:

```
# DATA PREPROCESSING 1: some title errors (&amp; &nbsp;) due to HTML web␣
 ↪scraping - (CELL 3)

error_replacement = {
    '&amp;': '&',
    '&nbsp;': ' '
}

affected_dfs = [(recipes, 'title'), (ingredients, 'recipe'), (nutritions,␣
 ↪'recipe'), (tags, 'recipe'), (tags, 'tag')]

# execute for each error in each dataframe column
for df in affected_dfs:
    for error in error_replacement.keys():
        # find error titles
        error_filter = df[0][df[1]].str.contains(error)
        error_titles = df[0].loc[error_filter, df[1]]
        #print(error_titles.head())
        # quantify the amount of errors
        error_count = len(error_titles)
        error_perc = round((error_count / len(df[0][df[1]])) * 100, 1)
        print(f'Total of {error_count}  {error} errors which is {error_perc}%␣
↪of all rows')

        # fix errors
        df[0][df[1]] = df[0][df[1]].str.replace(error, error_replacement.
↪get(error))
        print(f'{error} error has been fixed')

        # check if errors still exist
        corrected_filter = df[0][df[1]].str.contains(error_replacement.
↪get(error))
        corrected_titles = df[0].loc[corrected_filter, df[1]]
        #print(corrected_titles.head())
        error_titles = df[0].loc[error_filter, df[1]]
        error_count = len(error_titles)
        error_perc = round((error_count / len(df[0][df[1]])) * 100, 1)
        print(f'Total of {error_count}  {error} errors which is {error_perc}%␣
↪of all rows \n')

        # TO DO: assert statements
```

```
Total of 646  &amp; errors which is 7.4% of all rows
&amp; error has been fixed
Total of 646  &amp; errors which is 7.4% of all rows

Total of 2  &nbsp; errors which is 0.0% of all rows
&nbsp; error has been fixed
Total of 2  &nbsp; errors which is 0.0% of all rows

Total of 5646  &amp; errors which is 7.9% of all rows
&amp; error has been fixed
Total of 5646  &amp; errors which is 7.9% of all rows

Total of 16  &nbsp; errors which is 0.0% of all rows
&nbsp; error has been fixed
Total of 16  &nbsp; errors which is 0.0% of all rows

Total of 4634  &amp; errors which is 7.9% of all rows
&amp; error has been fixed
Total of 4634  &amp; errors which is 7.9% of all rows

Total of 16  &nbsp; errors which is 0.0% of all rows
&nbsp; error has been fixed
Total of 16  &nbsp; errors which is 0.0% of all rows
Total of 3266  &amp; errors which is 7.1% of all rows
&amp; error has been fixed
Total of 3266  &amp; errors which is 7.1% of all rows

Total of 9  &nbsp; errors which is 0.0% of all rows
&nbsp; error has been fixed
Total of 9  &nbsp; errors which is 0.0% of all rows

Total of 283  &amp; errors which is 0.6% of all rows
&amp; error has been fixed
Total of 283  &amp; errors which is 0.6% of all rows

Total of 0  &nbsp; errors which is 0.0% of all rows
&nbsp; error has been fixed
Total of 0  &nbsp; errors which is 0.0% of all rows
```

[4]:

```
# DATA PREPROCESSING 2: some useless columns (Unnamed: 0) - (CELL 4)

# delete unnecessary columns
recipes.drop(columns='Unnamed: 0', inplace=True)
ingredients.drop(columns='Unnamed: 0', inplace=True)
nutritions.drop(columns='Unnamed: 0', inplace=True)
tags.drop(columns='Unnamed: 0', inplace=True)
```

[5]:

```
# EXPLORE: NUTRITIONS DATAFRAME - (CELL 5)
display(nutritions.head(10), "\n")
print(nutritions.info(), "\n")
display(nutritions.describe(), "\n")
print(nutritions.shape, "\n")
```

```
                          recipe          nutrition     value
0  Kruidnoten met choco-discodip            energie  260 kcal
1  Kruidnoten met choco-discodip        koolhydraten      34 g
2  Kruidnoten met choco-discodip     waarvan suikers      22 g
3  Kruidnoten met choco-discodip             natrium    200 mg
4  Kruidnoten met choco-discodip               eiwit       3 g
5  Kruidnoten met choco-discodip                 vet      12 g
6  Kruidnoten met choco-discodip  waarvan verzadigd       7 g
7  Kruidnoten met choco-discodip              vezels       1 g
8        Kruidnoten in marsepein            energie  265 kcal
9        Kruidnoten in marsepein        koolhydraten      43 g

'\n'

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 58765 entries, 0 to 58764
Data columns (total 3 columns):
 #   Column     Non-Null Count  Dtype
---  ------     --------------  -----
 0   recipe     58765 non-null  object
 1   nutrition  58765 non-null  object
 2   value      58765 non-null  object
dtypes: object(3)
memory usage: 1.3+ MB
None
```

```
                               recipe nutrition  value
count                           58765     58765  58765
unique                           8706         8   1192
top     Kruidnoten met choco-discodip   energie    1 g
freq                                8      8706   2079
```

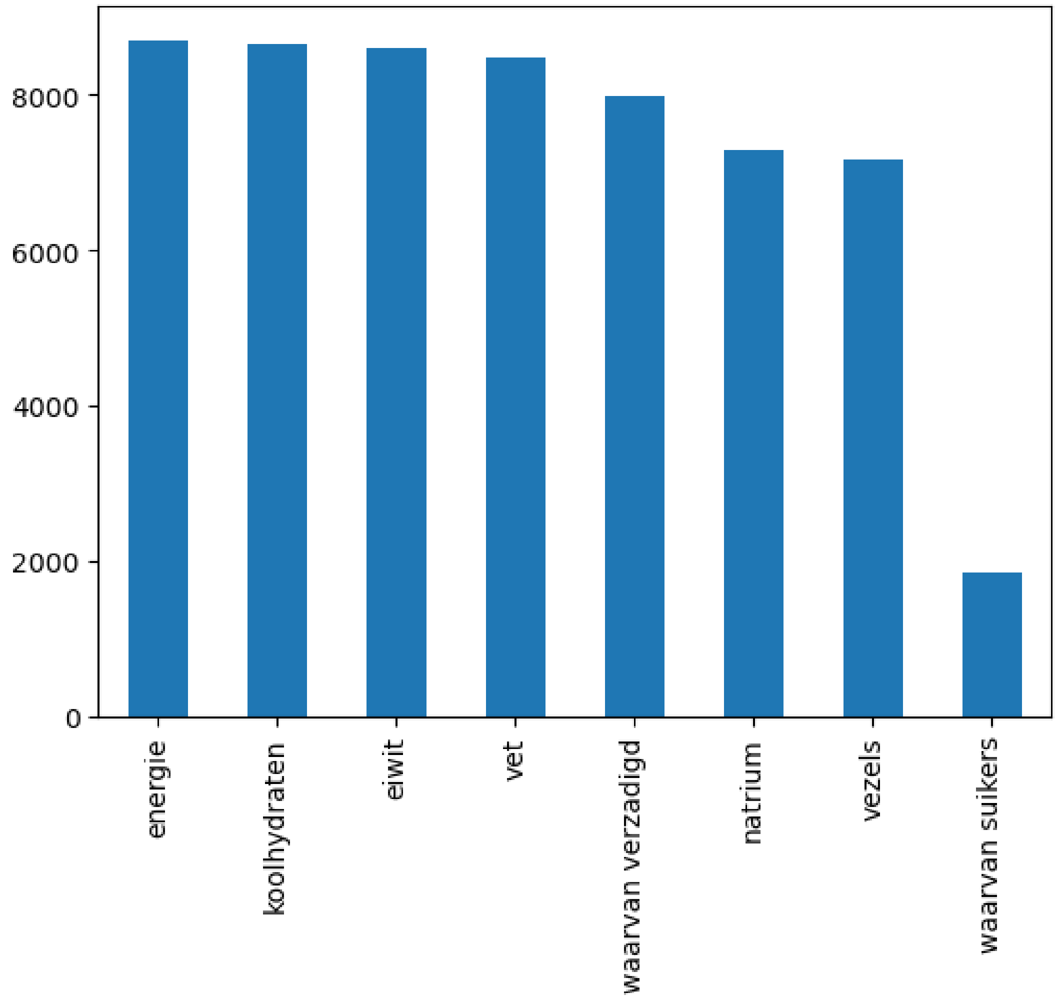
```
'\n'
```

```
(58765, 3)
```

[6]:

```
# get unique nutrition categories and quantify (1 recipe has a maximum of 8␣
 ↪nutrition categories) - (CELL 6)
nutritions_categories = nutritions['nutrition'].unique()
print(nutritions_categories, '\n')

nutritions_counts = nutritions['nutrition'].value_counts()
print(nutritions_counts)
nutritions_counts.plot.bar()

# create filter for each category
nutritions_filters = {}
for category in nutritions_categories:
    nutritions_filters.update({category: nutritions['nutrition'] == category})
```

```
['energie' 'koolhydraten' 'waarvan suikers' 'natrium' 'eiwit' 'vet'
 'waarvan verzadigd' 'vezels']

energie              8706
koolhydraten         8663
eiwit                8596
vet                  8480
waarvan verzadigd    7992
natrium              7302
vezels               7173
waarvan suikers      1853
Name: nutrition, dtype: int64
```

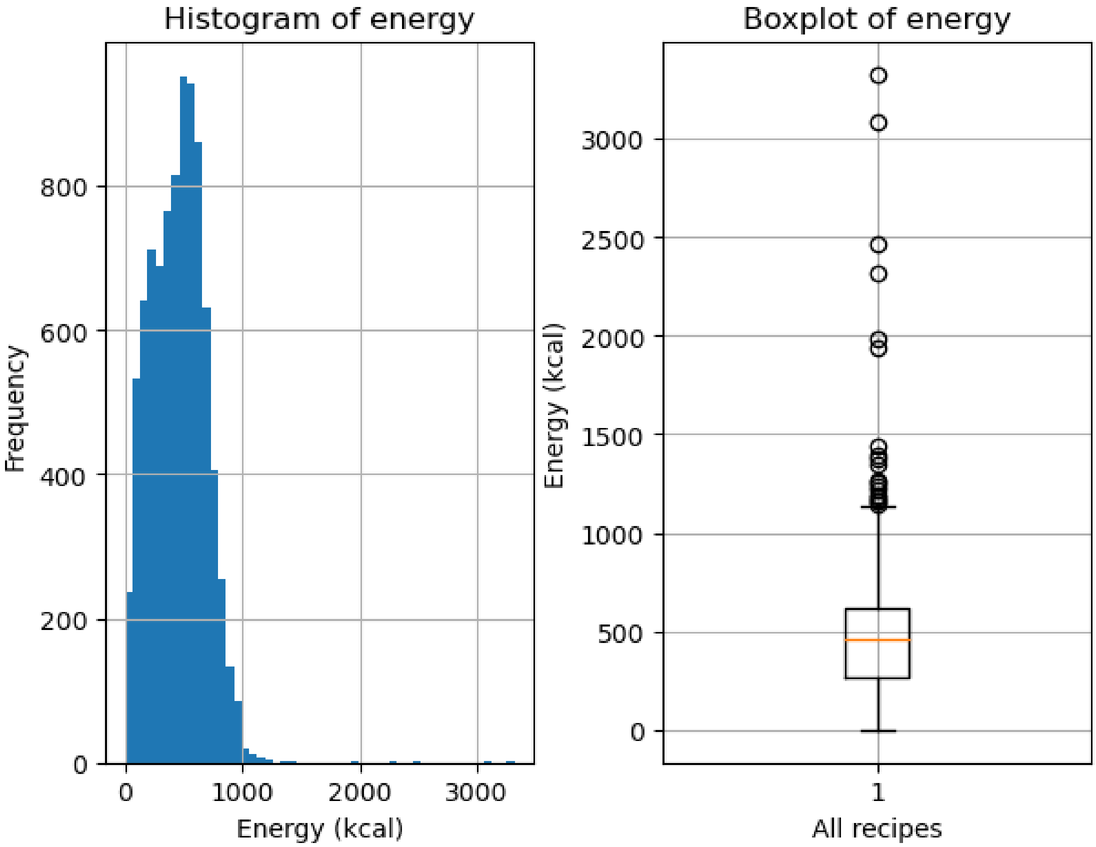


[7]:

```
# ANALYSE 1: ENERGY CATEGORY - (CELL 7)

# make dataframe copy for energy
nutritions_energy = nutritions[nutritions_filters.get('energie')].copy()
nutritions_energy = nutritions_energy.set_index('recipe')

# convert 'value' column type to int64
nutritions_energy['value'] = nutritions_energy['value'].str.replace(' kcal',␣
  ↪'').astype(int)

# retain unit of measurement
nutritions_energy['unit'] = 'kcal'
display(nutritions_energy.head())

# histogram and boxplot of energy
fig, (energy_ax1, energy_ax2) = plt.subplots(1, 2)
```

```
fig.tight_layout(pad=2.0)

# histogram
energy_ax1.hist(nutritions_energy['value'], bins=50)
energy_ax1.set_xlabel('Energy (kcal)')
energy_ax1.set_ylabel('Frequency')
energy_ax1.set_title('Histogram of energy')
energy_ax1.grid()

# boxplot
energy_ax2.boxplot(nutritions_energy['value'])
energy_ax2.set_xlabel('All recipes')
energy_ax2.set_ylabel('Energy (kcal)')
energy_ax2.set_title('Boxplot of energy')
energy_ax2.grid()

plt.show()
```

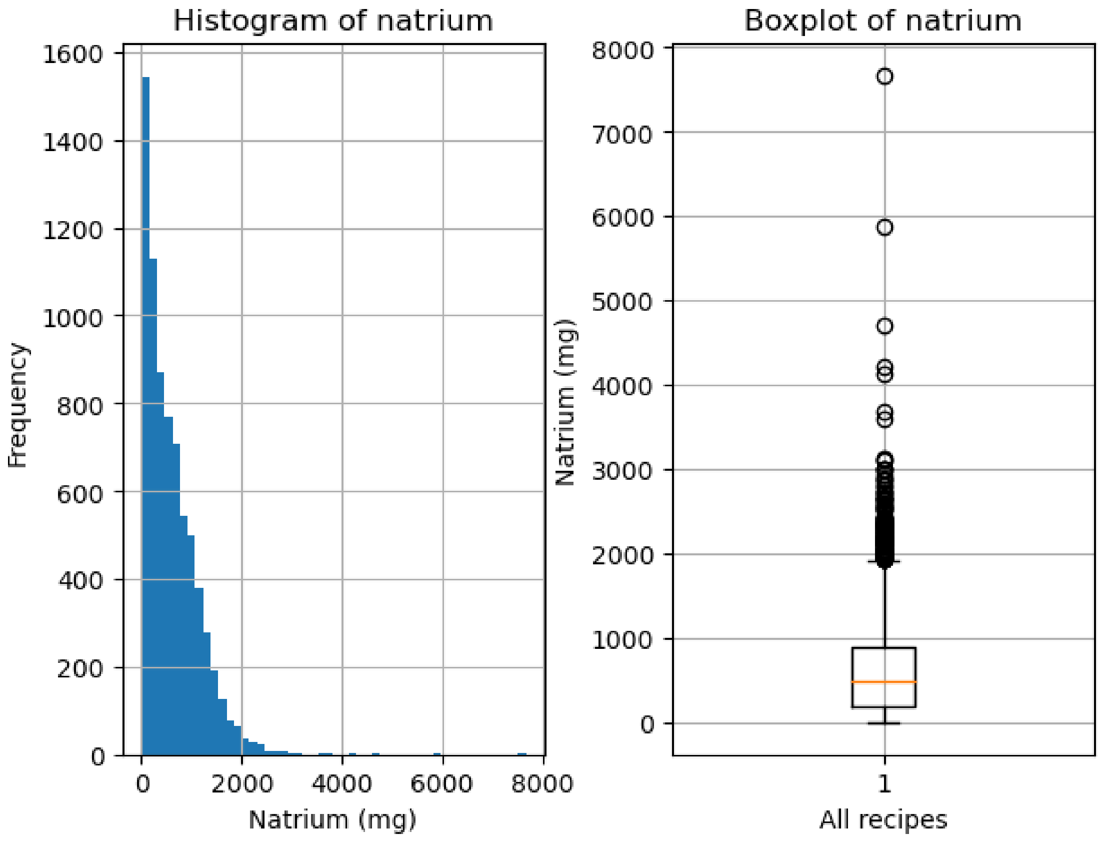
```
                                   nutrition  value  unit
recipe
Kruidnoten met choco-discodip        energie    260  kcal
Kruidnoten in marsepein              energie    265  kcal
Kruidnoten met chocodips             energie    335  kcal
Pepernotentaart met marsepeinstrik   energie    560  kcal
Perencake                            energie    265  kcal
```



[8]:
```
# ANALYSE 2: NATRIUM CATEGORY - (CELL 8)

# make dataframe copy for natrium
nutritions_natrium = nutritions[nutritions_filters.get('natrium')].copy()
nutritions_natrium = nutritions_natrium.set_index('recipe')

# convert 'value' column type to int64
nutritions_natrium['value'] = nutritions_natrium['value'].str.replace(' mg',␣
 ↪'').astype(float).astype(int)

# retain unit of measurement
nutritions_natrium['unit'] = 'mg'
display(nutritions_natrium.head())

# histogram and boxplot of natrium
fig, (natrium_ax1, natrium_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
natrium_ax1.hist(nutritions_natrium['value'], bins=50)
```

```
natrium_ax1.set_xlabel('Natrium (mg)')
natrium_ax1.set_ylabel('Frequency')
natrium_ax1.set_title('Histogram of natrium')
natrium_ax1.grid()

# boxplot
natrium_ax2.boxplot(nutritions_natrium['value'])
natrium_ax2.set_xlabel('All recipes')
natrium_ax2.set_ylabel('Natrium (mg)')
natrium_ax2.set_title('Boxplot of natrium')
natrium_ax2.grid()

plt.show()
```

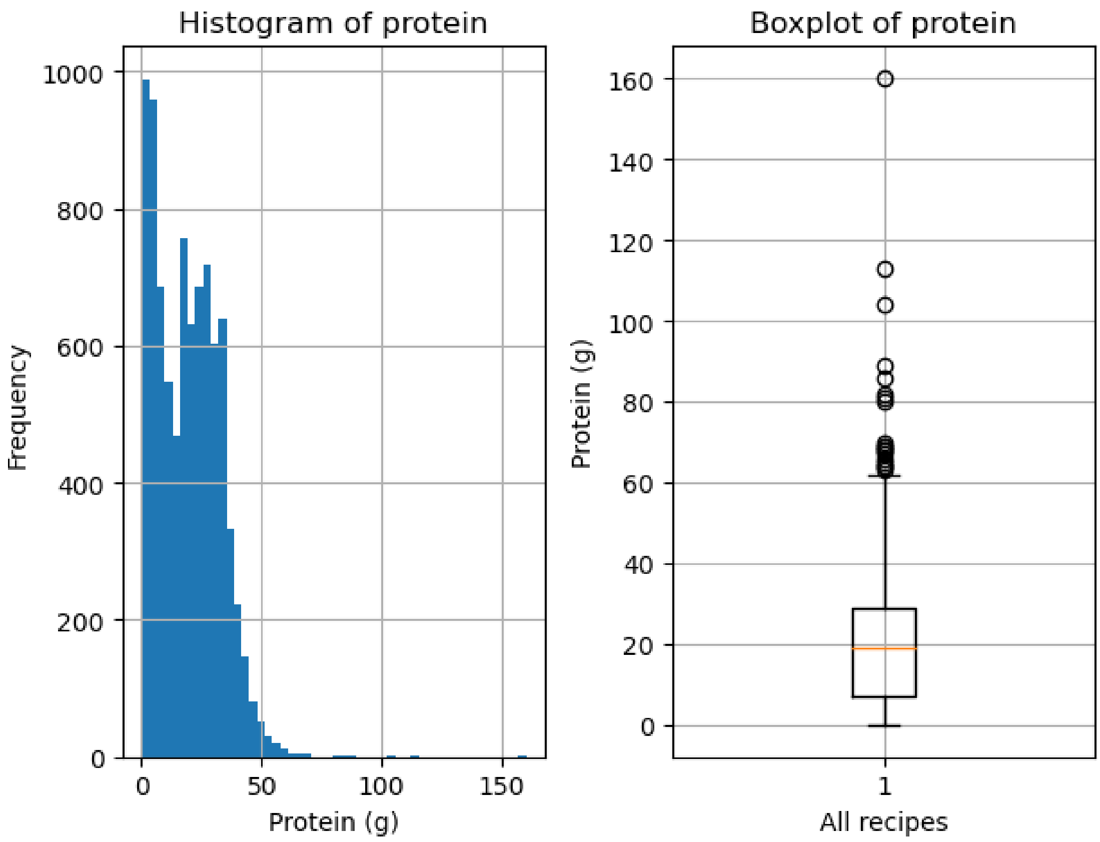
```
                                   nutrition  value unit
recipe
Kruidnoten met choco-discodip        natrium    200   mg
Kruidnoten in marsepein              natrium    120   mg
Kruidnoten met chocodips             natrium    160   mg
Pepernotentaart met marsepeinstrik   natrium    240   mg
Perencake                            natrium    120   mg
```



[9]:

```
# ANALYSE 3: EIWIT CATEGORY - (CELL 9)

# make dataframe copy for protein
nutritions_protein = nutritions[nutritions_filters.get('eiwit')].copy()
nutritions_protein = nutritions_protein.set_index('recipe')

# convert 'value' column type to int64
nutritions_protein['value'] = nutritions_protein['value'].str.replace(' g', '').
 ↪astype(float).astype(int)

# retain unit of measurement
nutritions_protein['unit'] = 'g'
display(nutritions_protein.head())

# histogram and boxplot of protein
fig, (protein_ax1, protein_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
protein_ax1.hist(nutritions_protein['value'], bins=50)
protein_ax1.set_xlabel('Protein (g)')
protein_ax1.set_ylabel('Frequency')
protein_ax1.set_title('Histogram of protein')
protein_ax1.grid()

# boxplot
protein_ax2.boxplot(nutritions_protein['value'])
protein_ax2.set_xlabel('All recipes')
protein_ax2.set_ylabel('Protein (g)')
protein_ax2.set_title('Boxplot of protein')
protein_ax2.grid()

plt.show()
```

```
                                     nutrition  value unit
recipe
Kruidnoten met choco-discodip            eiwit      3    g
Kruidnoten in marsepein                  eiwit      3    g
Kruidnoten met chocodips                 eiwit      5    g
Pepernotentaart met marsepeinstrik       eiwit      5    g
Perencake                                eiwit      5    g
```

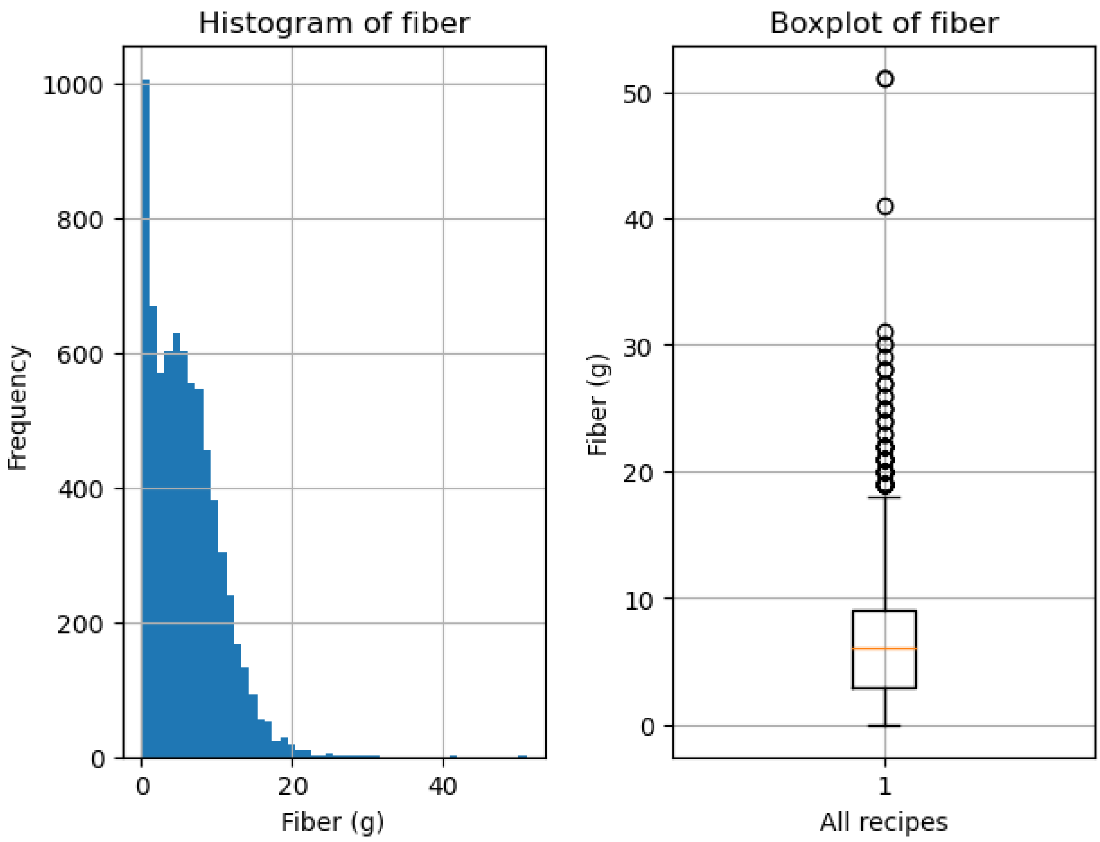


[10]:

```
# ANALYSE 4: VEZELS CATEGORY - (CELL 10)

# make dataframe copy for fiber
nutritions_fiber = nutritions[nutritions_filters.get('vezels')].copy()
nutritions_fiber = nutritions_fiber.set_index('recipe')

# convert 'value' column type to int64
nutritions_fiber['value'] = nutritions_fiber['value'].str.replace(' g', '').
  ↪astype(float).astype(int)

# retain unit of measurement
nutritions_fiber['unit'] = 'g'
display(nutritions_fiber.head())

# very large outlier filtering
fiber_outlier_filter = nutritions_fiber['value'] < 85
# fiber_values = nutritions_fiber['value'].value_counts()
# print(fiber_values)

# histogram and boxplot of fiber
```

```python
fig, (fiber_ax1, fiber_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
fiber_ax1.hist(nutritions_fiber.loc[fiber_outlier_filter, 'value'], bins=50)
fiber_ax1.set_xlabel('Fiber (g)')
fiber_ax1.set_ylabel('Frequency')
fiber_ax1.set_title('Histogram of fiber')
fiber_ax1.grid()

# boxplot
fiber_ax2.boxplot(nutritions_fiber.loc[fiber_outlier_filter, 'value'])
fiber_ax2.set_xlabel('All recipes')
fiber_ax2.set_ylabel('Fiber (g)')
fiber_ax2.set_title('Boxplot of fiber')
fiber_ax2.grid()

plt.show()

# show excluded outliers
fiber_excluded = nutritions_fiber[~fiber_outlier_filter]
display(fiber_excluded)
```

```
                                   nutrition  value unit
recipe
Kruidnoten met choco-discodip         vezels      1    g
Kruidnoten in marsepein               vezels      1    g
Kruidnoten met chocodips              vezels      6    g
Pepernotentaart met marsepeinstrik    vezels      1    g
Perencake                             vezels      1    g
```

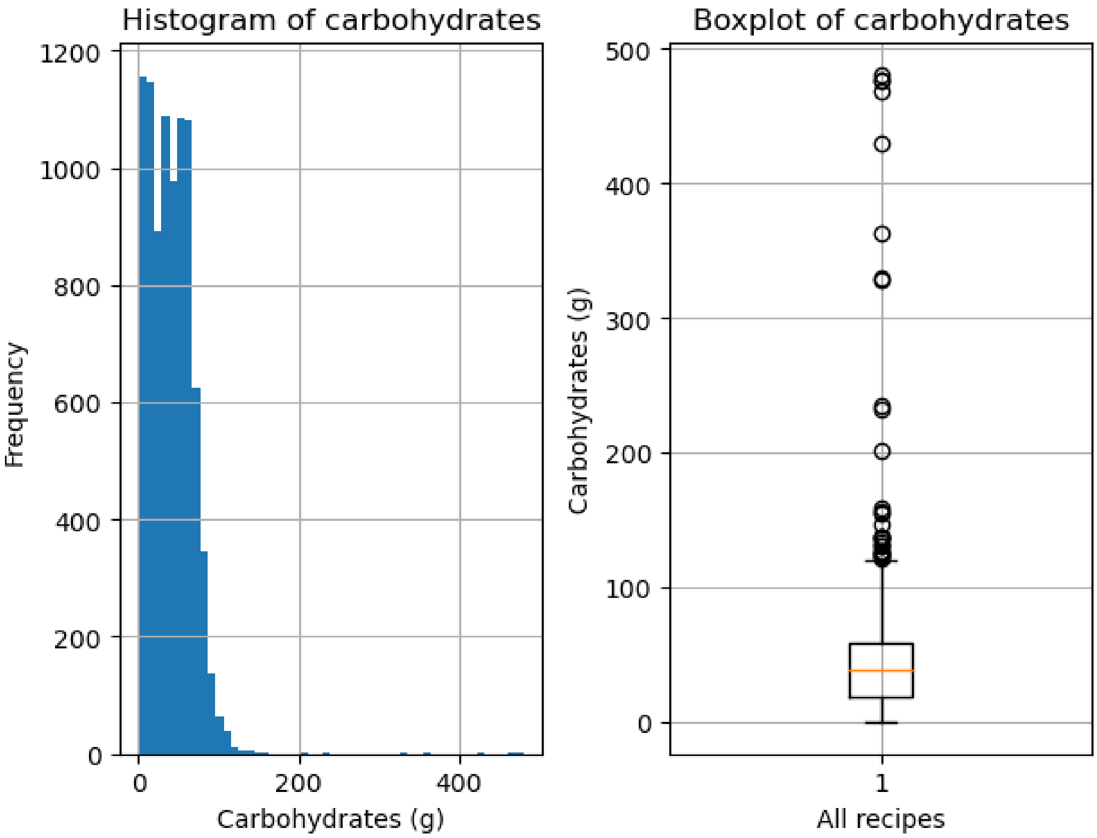


```
                                                     nutrition  value unit
recipe
Gevulde flatbreads met vegaballetjes en zelfgem…       vezels   1640    g
Bart van Olphens zalmcarpaccio                         vezels    190    g
Roggebrood met noten en bessen                         vezels     85    g
Pompoen-kaasschotel                                    vezels    400    g
```

[11]:
```
# ANALYSE 5: KOOLHYDRATEN CATEGORY - (CELL 11)

# make dataframe copy for carbohydrates
nutritions_carbs = nutritions[nutritions_filters.get('koolhydraten')].copy()
nutritions_carbs = nutritions_carbs.set_index('recipe')

# convert 'value' column type to int64
nutritions_carbs['value'] = nutritions_carbs['value'].str.replace(' g', '').
  ↪astype(float).astype(int)

# retain unit of measurement
nutritions_carbs['unit'] = 'g'
display(nutritions_carbs.head())
```

```python
# histogram and boxplot of carbohydrates
fig, (carbs_ax1, carbs_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
carbs_ax1.hist(nutritions_carbs['value'], bins=50)
carbs_ax1.set_xlabel('Carbohydrates (g)')
carbs_ax1.set_ylabel('Frequency')
carbs_ax1.set_title('Histogram of carbohydrates')
carbs_ax1.grid()

# boxplot
carbs_ax2.boxplot(nutritions_carbs['value'])
carbs_ax2.set_xlabel('All recipes')
carbs_ax2.set_ylabel('Carbohydrates (g)')
carbs_ax2.set_title('Boxplot of carbohydrates')
carbs_ax2.grid()

plt.show()
```

```
                                       nutrition  value unit
recipe
Kruidnoten met choco-discodip       koolhydraten     34    g
Kruidnoten in marsepein             koolhydraten     43    g
Kruidnoten met chocodips            koolhydraten     35    g
Pepernotentaart met marsepeinstrik  koolhydraten     60    g
Perencake                           koolhydraten     36    g
```

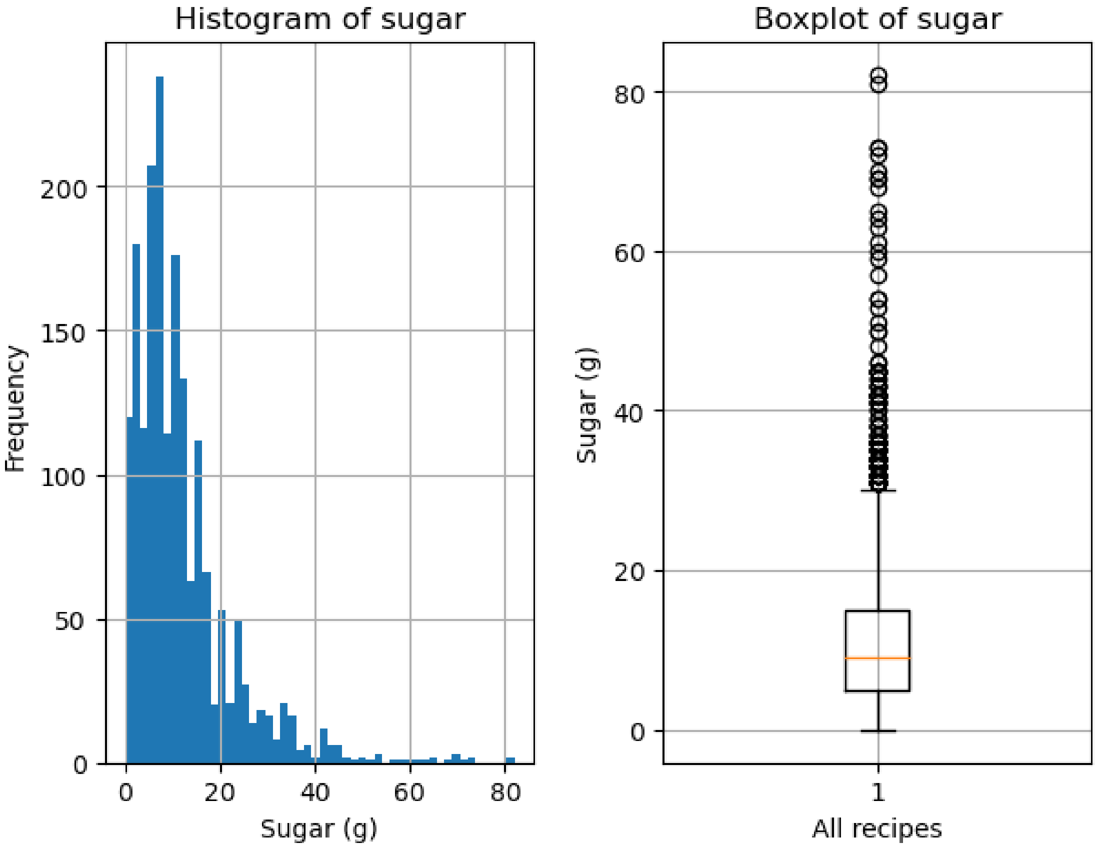


[12]:

```
# ANALYSE 6: WAARVAN SUIKERS CATEGORY - (CELL 12)

# make dataframe copy for sugar
nutritions_sugar = nutritions[nutritions_filters.get('waarvan suikers')].copy()
nutritions_sugar = nutritions_sugar.set_index('recipe')

# convert 'value' column type to int64
nutritions_sugar['value'] = nutritions_sugar['value'].str.replace(' g', '').
 ↪astype(float).astype(int)

# retain unit of measurement
nutritions_sugar['unit'] = 'g'
display(nutritions_sugar.head())

# very large outlier filtering
sugar_outlier_filter = nutritions_sugar['value'] < 100
# sugar_values = nutritions_sugar['value'].value_counts()
# print(fiber_values)

# histogram and boxplot of sugar
```

```
fig, (sugar_ax1, sugar_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
sugar_ax1.hist(nutritions_sugar.loc[sugar_outlier_filter, 'value'], bins=50)
sugar_ax1.set_xlabel('Sugar (g)')
sugar_ax1.set_ylabel('Frequency')
sugar_ax1.set_title('Histogram of sugar')
sugar_ax1.grid()

# boxplot
sugar_ax2.boxplot(nutritions_sugar.loc[sugar_outlier_filter, 'value'])
sugar_ax2.set_xlabel('All recipes')
sugar_ax2.set_ylabel('Sugar (g)')
sugar_ax2.set_title('Boxplot of sugar')
sugar_ax2.grid()

plt.show()

# show excluded outliers
sugar_excluded = nutritions_sugar[~sugar_outlier_filter]
display(sugar_excluded)
```

```
                                           nutrition  value unit
recipe
Kruidnoten met choco-discodip       waarvan suikers     22    g
Kruidnoten in marsepein             waarvan suikers     34    g
Kruidnoten met chocodips            waarvan suikers     23    g
Pepernotentaart met marsepeinstrik  waarvan suikers     39    g
Perencake                           waarvan suikers     21    g
```

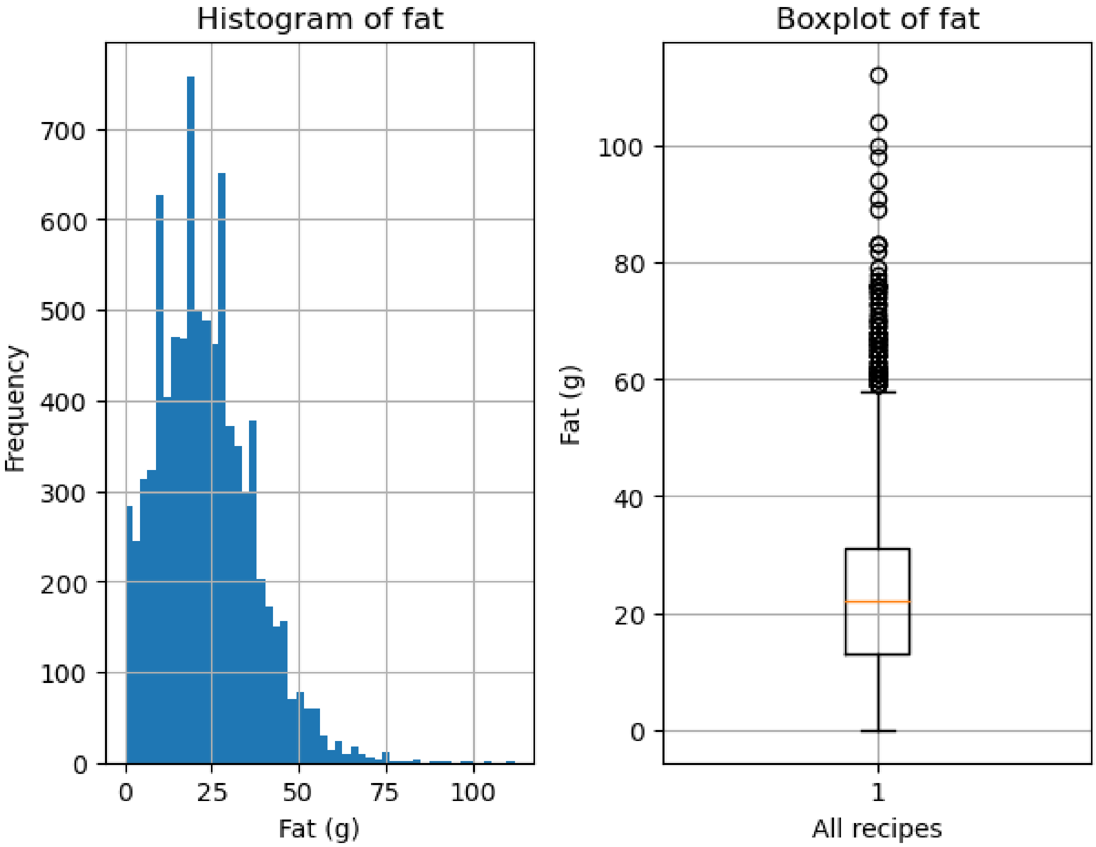


```
                           nutrition  value unit
recipe
Nectarinejam        waarvan suikers    201    g
Druivenjam maken    waarvan suikers    233    g
Appelschillenboter  waarvan suikers    125    g
```

[13]:
```
# ANALYSE 7: VET CATEGORY - (CELL 13)

# make dataframe copy for fat
nutritions_fat = nutritions[nutritions_filters.get('vet')].copy()
nutritions_fat = nutritions_fat.set_index('recipe')

# convert 'value' column type to int64
nutritions_fat['value'] = nutritions_fat['value'].str.replace(' g', '').
  ↪astype(float).astype(int)

# retain unit of measurement
nutritions_fat['unit'] = 'g'
display(nutritions_fat.head())
```

```python
# very large outlier filtering
fat_outlier_filter = nutritions_fat['value'] < 125
# fat_values = nutritions_fat['value'].value_counts()
# print(fat_values)

# histogram and boxplot of fat
fig, (fat_ax1, fat_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
fat_ax1.hist(nutritions_fat.loc[fat_outlier_filter, 'value'], bins=50)
fat_ax1.set_xlabel('Fat (g)')
fat_ax1.set_ylabel('Frequency')
fat_ax1.set_title('Histogram of fat')
fat_ax1.grid()

# boxplot
fat_ax2.boxplot(nutritions_fat.loc[fat_outlier_filter, 'value'])
fat_ax2.set_xlabel('All recipes')
fat_ax2.set_ylabel('Fat (g)')
fat_ax2.set_title('Boxplot of fat')
fat_ax2.grid()

plt.show()

# show excluded outliers
fat_excluded = nutritions_fat[~fat_outlier_filter]
display(fat_excluded)
```

```
                                   nutrition  value unit
recipe
Kruidnoten met choco-discodip            vet     12    g
Kruidnoten in marsepein                  vet      9    g
Kruidnoten met chocodips                 vet     18    g
Pepernotentaart met marsepeinstrik       vet     33    g
Perencake                                vet     11    g
```

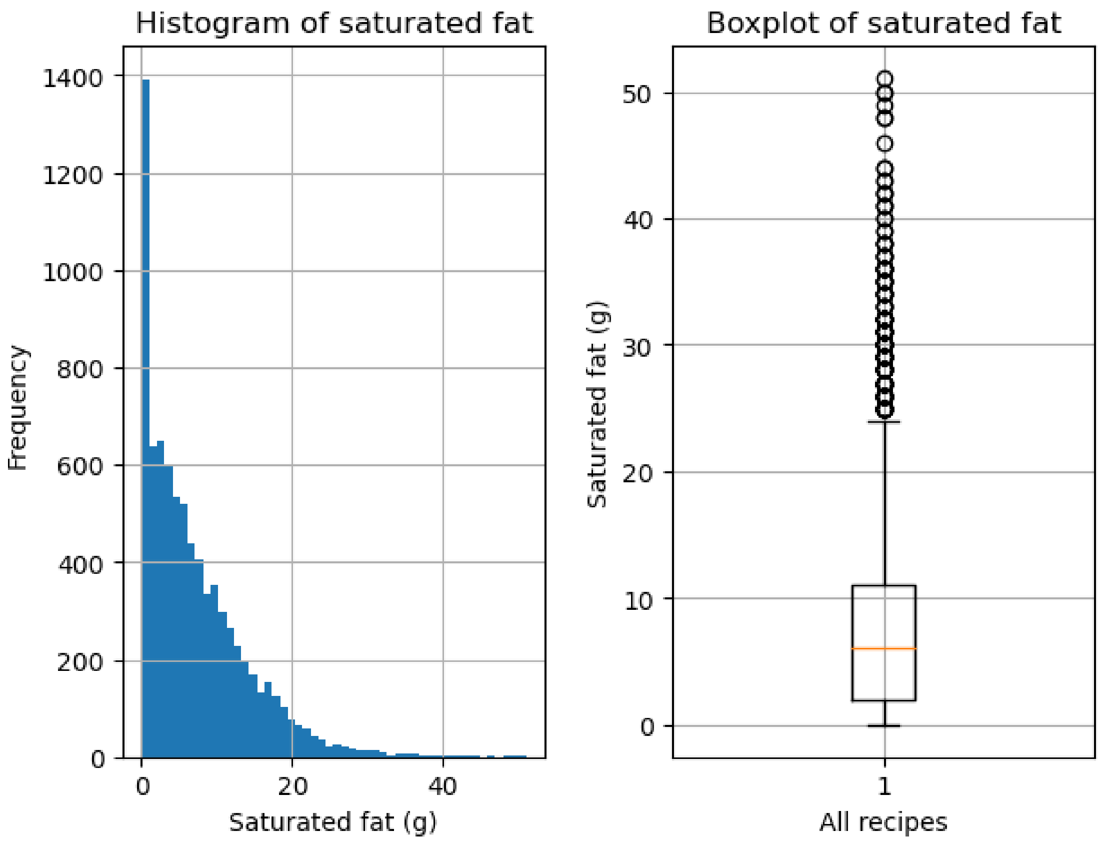


```
                           nutrition  value unit
recipe
Zelfgemaakte pindakaas           vet    253    g
```

[14]:
```
# ANALYSE 8: WAARVAN VERZADIGD CATEGORY - (CELL 14)

# make dataframe copy for saturated fat
nutritions_saturated = nutritions[nutritions_filters.get('waarvan verzadigd')].
  ↪copy()
nutritions_saturated = nutritions_saturated.set_index('recipe')

# convert 'value' column type to int64
nutritions_saturated['value'] = nutritions_saturated['value'].str.replace(' g',␣
  ↪'').astype(float).astype(int)

# retain unit of measurement
nutritions_saturated['unit'] = 'g'
display(nutritions_saturated.head())

# very large outlier filtering
```

```python
saturated_outlier_filter = nutritions_saturated['value'] < 60
# saturated_values = nutritions_saturated['value'].value_counts()
# print(saturated_values)

# histogram and boxplot of saturated fat
fig, (saturated_ax1, saturated_ax2) = plt.subplots(1, 2)
fig.tight_layout(pad=2.0)

# histogram
saturated_ax1.hist(nutritions_saturated.loc[saturated_outlier_filter, 'value'],␣
 ↪bins=50)
saturated_ax1.set_xlabel('Saturated fat (g)')
saturated_ax1.set_ylabel('Frequency')
saturated_ax1.set_title('Histogram of saturated fat')
saturated_ax1.grid()

# boxplot
saturated_ax2.boxplot(nutritions_saturated.loc[saturated_outlier_filter,␣
 ↪'value'])
saturated_ax2.set_xlabel('All recipes')
saturated_ax2.set_ylabel('Saturated fat (g)')
saturated_ax2.set_title('Boxplot of saturated fat')
saturated_ax2.grid()

plt.show()

# show excluded outliers
saturated_excluded = nutritions_saturated[~saturated_outlier_filter]
display(saturated_excluded)
```

```
                                            nutrition  value unit
recipe
Kruidnoten met choco-discodip        waarvan verzadigd      7    g
Kruidnoten in marsepein              waarvan verzadigd      4    g
Kruidnoten met chocodips             waarvan verzadigd     10    g
Pepernotentaart met marsepeinstrik   waarvan verzadigd     21    g
Perencake                            waarvan verzadigd      2    g
```



```
                                                            nutrition  value  \
recipe
Broodje kipburger met snelle salade                 waarvan verzadigd    100
Rendang Padang van Vanja van der Leeden             waarvan verzadigd     68
Runderballetjes met broccoli & kikkererwten uit…  waarvan verzadigd    111

                                                   unit
recipe
Broodje kipburger met snelle salade                   g
Rendang Padang van Vanja van der Leeden               g
Runderballetjes met broccoli & kikkererwten uit…    g
```

[15]:

```
# CREATE FINAL DATAFRAME 'food' - (CELL 15)

food = recipes.loc[:, 'title'].to_frame().copy()
food = food.rename(columns={'title': 'recipe'})
food = food.set_index('recipe')

# link category 1: energy
food = food.join(nutritions_energy)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'energy_kcal'})
food['energy_kcal'] = food['energy_kcal'].fillna(0)
food['energy_kcal'] = food['energy_kcal'].astype(int)

# link category 2: natrium
food = food.join(nutritions_natrium)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'natrium_mg'})
food['natrium_mg'] = food['natrium_mg'].fillna(0)
food['natrium_mg'] = food['natrium_mg'].astype(int)

# link category 3: protein
food = food.join(nutritions_protein)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'protein_g'})
food['protein_g'] = food['protein_g'].fillna(0)
food['protein_g'] = food['protein_g'].astype(int)

# link category 4: fiber
food = food.join(nutritions_fiber)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'fiber_g'})
food['fiber_g'] = food['fiber_g'].fillna(0)
food['fiber_g'] = food['fiber_g'].astype(int)

# link category 5: carbohydrates
food = food.join(nutritions_carbs)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'carbohydrates_total_g'})
food['carbohydrates_total_g'] = food['carbohydrates_total_g'].fillna(0)
food['carbohydrates_total_g'] = food['carbohydrates_total_g'].astype(int)

# link category 6: sugar
food = food.join(nutritions_sugar)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'carbohydrates_sugar_g'})
food['carbohydrates_sugar_g'] = food['carbohydrates_sugar_g'].fillna(0)
food['carbohydrates_sugar_g'] = food['carbohydrates_sugar_g'].astype(int)

# link category 7: fat
food = food.join(nutritions_fat)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'fat_total_g'})
food['fat_total_g'] = food['fat_total_g'].fillna(0)
food['fat_total_g'] = food['fat_total_g'].astype(int)
```

```python
# link category 8: saturated
food = food.join(nutritions_saturated)
food = food.drop(columns=['nutrition', 'unit'])
food = food.rename(columns={'value': 'fat_saturated_g'})
food['fat_saturated_g'] = food['fat_saturated_g'].fillna(0)
food['fat_saturated_g'] = food['fat_saturated_g'].astype(int)

display(food)
print(food.info())
```

```
                                    energy_kcal  natrium_mg  protein_g  \
recipe
Kruidnoten met choco-discodip               260         200          3
Kruidnoten in marsepein                     265         120          3
Kruidnoten met chocodips                    335         160          5
Pepernotentaart met marsepeinstrik          560         240          5
Perencake                                   265         120          5
…                                         …         …        …
Paddenstoelen en courgettegratin            285           0         11
Peren-amandelcoupe                          160           0          1
Ceviche met sint-jakobsschelpen             210           0         14
Pittige truffels                             65           0          1
Biefstuk met rodewijnsaus en ham            360           0         28

                                    fiber_g  carbohydrates_total_g  \
recipe
Kruidnoten met choco-discodip             1                     34
Kruidnoten in marsepein                   1                     43
Kruidnoten met chocodips                  6                     35
Pepernotentaart met marsepeinstrik        1                     60
Perencake                                 1                     36
…                                     …                    …
Paddenstoelen en courgettegratin          0                     13
Peren-amandelcoupe                        0                     29
Ceviche met sint-jakobsschelpen           0                      7
Pittige truffels                          0                      3
Biefstuk met rodewijnsaus en ham          0                      2

                                    carbohydrates_sugar_g  fat_total_g  \
recipe
Kruidnoten met choco-discodip                          22           12
Kruidnoten in marsepein                                34            9
Kruidnoten met chocodips                               23           18
Pepernotentaart met marsepeinstrik                     39           33
Perencake                                              21           11
…                                                   …          …
Paddenstoelen en courgettegratin                        0           20
```

```
Peren-amandelcoupe                                      0             1
Ceviche met sint-jakobsschelpen                         0            13
Pittige truffels                                        0             6
Biefstuk met rodewijnsaus en ham                        0            23

                                    fat_saturated_g
recipe
Kruidnoten met choco-discodip                     7
Kruidnoten in marsepein                           4
Kruidnoten met chocodips                         10
Pepernotentaart met marsepeinstrik               21
Perencake                                         2
…                                              …
Paddenstoelen en courgettegratin                  0
Peren-amandelcoupe                                0
Ceviche met sint-jakobsschelpen                   0
Pittige truffels                                  0
Biefstuk met rodewijnsaus en ham                  0

[8706 rows x 8 columns]
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 8706 entries, Kruidnoten met choco-discodip to Biefstuk met rodewijnsaus
en ham
Data columns (total 8 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   energy_kcal            8706 non-null   int64
 1   natrium_mg             8706 non-null   int64
 2   protein_g              8706 non-null   int64
 3   fiber_g                8706 non-null   int64
 4   carbohydrates_total_g  8706 non-null   int64
 5   carbohydrates_sugar_g  8706 non-null   int64
 6   fat_total_g            8706 non-null   int64
 7   fat_saturated_g        8706 non-null   int64
dtypes: int64(8)
memory usage: 870.2+ KB
None
```

[16]:

```
# EXPLORE: TAG DATAFRAME - (CELL 16)

tag_counts = tags['tag'].value_counts() #118
print(tag_counts.head(10))
print(tags.head(10))
```

```
hoofdgerecht           4595
wat eten we vandaag    2768
oven                   2542
```

```
lactosevrij           1923
glutenvrij            1679
koken                 1588
bakken                1495
vegetarisch           1435
gebak                 1291
bijgerecht            1277
Name: tag, dtype: int64
                          recipe               tag
0  Kruidnoten met choco-discodip          hollands
1  Kruidnoten met choco-discodip             gebak
2  Kruidnoten met choco-discodip             gebak
3  Kruidnoten met choco-discodip       sinterklaas
4  Kruidnoten met choco-discodip  sinterklaasavond
5        Kruidnoten in marsepein          hollands
6        Kruidnoten in marsepein             gebak
7        Kruidnoten in marsepein             gebak
8        Kruidnoten in marsepein       sinterklaas
9        Kruidnoten in marsepein  sinterklaasavond
```

[17]:

```
# label all recipes in 'food' whether they are vegeterian or not - (CELL 17)

vegeterian_filter = tags['tag'] == 'vegetarisch'
vegeterian_recipes = tags[vegeterian_filter]
vegeterian_recipes = vegeterian_recipes.set_index('recipe')
#display(vegeterian_recipes)

#food['vegeterian'] = np.nan
for index, row in food.iterrows():
    if index in vegeterian_recipes.index:
        food.loc[index, 'vegeterian'] = 1
    else:
        food.loc[index, 'vegeterian'] = 0

food['vegeterian'] = food['vegeterian'].astype(int)
display(food)

# assert the right amount of recipes are labeled
assert (food['vegeterian'] == 1).sum() == vegeterian_filter.sum() # 1435
assert (food['vegeterian'] == 0).sum() == len(food['vegeterian']) -␣
 ↪vegeterian_filter.sum() # 7271
```

```
                                    energy_kcal  natrium_mg  protein_g  \
recipe
Kruidnoten met choco-discodip               260         200          3
Kruidnoten in marsepein                     265         120          3
Kruidnoten met chocodips                    335         160          5
Pepernotentaart met marsepeinstrik          560         240          5
```

```
Perencake                                   265         120          5
…                                         …         …        …
Paddenstoelen en courgettegratin            285           0         11
Peren-amandelcoupe                          160           0          1
Ceviche met sint-jakobsschelpen             210           0         14
Pittige truffels                             65           0          1
Biefstuk met rodewijnsaus en ham            360           0         28

                                    fiber_g  carbohydrates_total_g  \
recipe
Kruidnoten met choco-discodip             1                      34
Kruidnoten in marsepein                   1                      43
Kruidnoten met chocodips                  6                      35
Pepernotentaart met marsepeinstrik        1                      60
Perencake                                 1                      36
…                                     …                    …
Paddenstoelen en courgettegratin          0                      13
Peren-amandelcoupe                        0                      29
Ceviche met sint-jakobsschelpen           0                       7
Pittige truffels                          0                       3
Biefstuk met rodewijnsaus en ham          0                       2

                                    carbohydrates_sugar_g  fat_total_g  \
recipe
Kruidnoten met choco-discodip                          22           12
Kruidnoten in marsepein                                34            9
Kruidnoten met chocodips                               23           18
Pepernotentaart met marsepeinstrik                     39           33
Perencake                                              21           11
…                                                   …          …
Paddenstoelen en courgettegratin                        0           20
Peren-amandelcoupe                                      0            1
Ceviche met sint-jakobsschelpen                         0           13
Pittige truffels                                        0            6
Biefstuk met rodewijnsaus en ham                        0           23

                                    fat_saturated_g  vegeterian
recipe
Kruidnoten met choco-discodip                     7           0
Kruidnoten in marsepein                           4           0
Kruidnoten met chocodips                         10           0
Pepernotentaart met marsepeinstrik               21           0
Perencake                                         2           0
…                                             …         …
Paddenstoelen en courgettegratin                  0           0
Peren-amandelcoupe                                0           0
Ceviche met sint-jakobsschelpen                   0           0
Pittige truffels                                  0           0
```

```
Biefstuk met rodewijnsaus en ham                  0            0

[8706 rows x 9 columns]
```

[18]:

```python
# SIMULATE USER INPUT - (CELL 18)

# columns: user_id, gender, age, height_m, weight_kg, bmi, pa_level, pa_activity, daily_kcal

sim_user_amount = 200
np.random.seed(177)

# generate 1: user_id
user_ids = np.array([('U' + str(n).zfill(3)) for n in range(0, sim_user_amount)])
print(user_ids[0:10])

# genereate 2: gender
random_ints = np.random.randint(2, size=sim_user_amount)
genders = np.array(['male' if n == 0 else 'female' for n in random_ints])
print(genders[0:10])

# generate 3: age
ages = np.array([])
group_20_40 = int(0.36 * sim_user_amount) # 72 out of 200 (36%)
group_40_65 = int(0.46 * sim_user_amount) # 92 out of 200 (46%)
group_65_80 = int(0.18 * sim_user_amount) # 36 out of 200 (18%)
ages_20_40 = np.random.randint(20, 40, group_20_40)
ages_40_65 = np.random.randint(40, 65, group_40_65)
ages_65_80 = np.random.randint(65, 80, group_65_80)
ages = np.concatenate((ages_20_40, ages_40_65, ages_65_80))
ages = ages.astype(int)
print(ages[0:10])

# generate 4: height_m
heights = np.array([])
unique, counts = np.unique(genders, return_counts=True) # 106 male, 94 female
gender_amount = dict(zip(unique, counts))
for gender in genders:
    if gender == 'male':
        height_value = np.round(np.random.normal(1.81, 0.06, 1), 2)
        heights = np.append(heights, height_value)
    else:
        height_value = np.round(np.random.normal(1.67, 0.06, 1), 2)
        heights = np.append(heights, height_value)
print(heights[0:10])
```

```
# generate 5: weight_kg
weights = np.array([])
for gender in genders:
    if gender == 'male':
        weight_value = np.round(np.random.normal(85, 4, 1), 0)
        weights = np.append(weights, weight_value)
    else:
        weight_value = np.round(np.random.normal(72, 4, 1), 0)
        weights = np.append(weights, weight_value)
weights = weights.astype(int)
print(weights[0:10])

# generate 6: bmi
bmis = np.round(weights / (heights ** 2), 1)
print(bmis[0:10])

# generate 7 and 8: physical_level and physical_activity
pa_levels = np.array([])
pa_activities = np.array([])
pa_levels_unique = ['sedentary', 'low active', 'active', 'very active']
pa_probabilities = [0.15, 0.45, 0.35, 0.05]
pa_gender_level = {
    'male': {
        'sedentary': 1.00,
        'low active': 1.12,
        'active': 1.27,
        'very active': 1.54
    },
    'female': {
        'sedentary': 1.00,
        'low active': 1.14,
        'active': 1.27,
        'very active': 1.45
    }
}
for gender in genders:
    pa_level = np.random.choice(a=pa_levels_unique, size=1,␣
 ↪p=pa_probabilities)[0]
    pa_levels = np.append(pa_levels, pa_level)
    pa_activity = pa_gender_level.get(gender).get(pa_level)
    pa_activities = np.append(pa_activities, pa_activity)
print(pa_levels[0:10])
print(pa_activities[0:10])

# generate 9: daily_kcal
# male: 864 − 9.72 × age + PA × (14.2 × weight + 503 × height)
# female: 387 − 7.31 × age + PA × (10.9 × weight + 660.7 × height)
```

```
daily_kcals = np.array([])
for gender in genders:
    if gender == 'male':
        calc_kcal = 864 - 9.72 * ages + pa_activities * (14.2 * weights + 503 *␣
 ↪heights)
        daily_kcals = np.round(calc_kcal, 0)
    else:
        calc_kcal = 387 - 7.31 * ages + pa_activities * (10.9 * weights + 660.7␣
 ↪* heights)
        daily_kcals = np.round(calc_kcal, 0)
daily_kcals = daily_kcals.astype(int)
print(daily_kcals[0:10])

# assert all list-likes are a 'numpy.ndarray'
assert type(user_ids) == np.ndarray
assert type(ages) == np.ndarray
assert type(user_ids) == np.ndarray
assert type(heights) == np.ndarray
assert type(weights) == np.ndarray
assert type(pa_levels) == np.ndarray
assert type(pa_activities) == np.ndarray
assert type(daily_kcals) == np.ndarray
```

```
['U000' 'U001' 'U002' 'U003' 'U004' 'U005' 'U006' 'U007' 'U008' 'U009']
['female' 'female' 'male' 'male' 'female' 'male' 'female' 'female'
 'female' 'male']
[33 29 27 35 36 21 23 28 29 29]
[1.6  1.66 1.74 1.76 1.74 1.72 1.66 1.71 1.68 1.71]
[73 66 83 88 74 81 72 73 78 84]
[28.5 24.  27.4 28.4 24.4 27.4 26.1 25.  27.6 28.7]
['sedentary' 'low active' 'low active' 'low active' 'low active' 'active'
 'active' 'active' 'low active' 'low active']
[1.   1.14 1.12 1.12 1.14 1.27 1.27 1.27 1.14 1.12]
[2385 2602 2902 2915 2710 3219 2999 3001 2808 2881]
```

[42]:

```
# TRANSFORM SIMULATED USER INPUT INTO DATAFRAME - (CELL 19)

sim_users = {
    'user_id': user_ids,
    'gender': genders,
    'age': ages,
    'height_m': heights,
    'weight_kg': weights,
    'bmi': bmis,
    'pa_level': pa_levels,
    'pa_activity': pa_activities,
    'daily_kcal': daily_kcals
}
users = pd.DataFrame(data=sim_users)

# ADD DAILY INTAKE COLUMNS CORRESPONDING TO THE 8 NUTRITION CATEGORIES

# 1. daily energy
# already done (daily_kcal)

# 2. daily natrium
users['daily_natrium_min_mg'] = 0
users['daily_natrium_min_mg'] = users['daily_natrium_min_mg'].astype(int)

users['daily_natrium_max_mg'] = 2400
users['daily_natrium_max_mg'] = users['daily_natrium_max_mg'].astype(int)

# 3. daily protein
users['daily_protein_min_g'] = 0.996 * users['weight_kg']
users['daily_protein_min_g'] = users['daily_protein_min_g'].round(0).astype(int)

users['daily_protein_max_g'] = 1.079 * users['weight_kg']
users['daily_protein_max_g'] = users['daily_protein_max_g'].round(0).astype(int)

# 4. daily fiber
users['daily_fiber_min_g'] = (users['daily_kcal'] / 1000) * 14
users['daily_fiber_min_g'] = users['daily_fiber_min_g'].round(0).astype(int)

users['daily_fiber_max_g'] = 55
users['daily_fiber_max_g'] = users['daily_fiber_max_g'].astype(int)

# 5. daily carbohydrates
users['daily_carbohydrates_min_g'] = (0.45 * users['daily_kcal']) / 4
users['daily_carbohydrates_min_g'] = users['daily_carbohydrates_min_g'].
  ↪round(0).astype(int)

users['daily_carbohydrates_max_g'] = (0.65 * users['daily_kcal']) / 4
users['daily_carbohydrates_max_g'] = users['daily_carbohydrates_max_g'].
  ↪round(0).astype(int)

# 6. daily sugar
users['daily_sugar_min_g'] = 0
users['daily_sugar_min_g'] = users['daily_sugar_min_g'].astype(int)

users['daily_sugar_max_g'] = (0.1 * users['daily_kcal']) / 4
users['daily_sugar_max_g'] = users['daily_sugar_max_g'].round(0).astype(int)

# 7 daily fat
users['daily_fat_min_g'] = (0.2 * users['daily_kcal']) / 9
```

```
users['daily_fat_min_g'] = users['daily_fat_min_g'].round(0).astype(int)

users['daily_fat_max_g'] = (0.3 * users['daily_kcal']) / 9
users['daily_fat_max_g'] = users['daily_fat_max_g'].round(0).astype(int)

# daily saturated fat
users['daily_fat_saturated_min_g'] = 0
users['daily_fat_saturated_min_g'] = users['daily_fat_saturated_min_g'].
 ↪astype(int)

users['daily_fat_saturated_max_g'] = (0.1 * users['daily_kcal']) / 9
users['daily_fat_saturated_max_g'] = users['daily_fat_saturated_max_g'].
 ↪astype(int)

display(users.head())
print(users.info())
```

```
  user_id  gender  age  height_m  weight_kg   bmi    pa_level  pa_activity  \
0    U000  female   33      1.60         73  28.5   sedentary         1.00
1    U001  female   29      1.66         66  24.0  low active         1.14
2    U002    male   27      1.74         83  27.4  low active         1.12
3    U003    male   35      1.76         88  28.4  low active         1.12
4    U004  female   36      1.74         74  24.4  low active         1.14

   daily_kcal  daily_natrium_min_mg  …  daily_fiber_min_g  \
0        2385                     0  …                 33
1        2602                     0  …                 36
2        2902                     0  …                 41
3        2915                     0  …                 41
4        2710                     0  …                 38

   daily_fiber_max_g  daily_carbohydrates_min_g  daily_carbohydrates_max_g  \
0                 55                        268                        388
1                 55                        293                        423
2                 55                        326                        472
3                 55                        328                        474
4                 55                        305                        440

   daily_sugar_min_g  daily_sugar_max_g  daily_fat_min_g  daily_fat_max_g  \
0                  0                 60               53               80
1                  0                 65               58               87
2                  0                 73               64               97
3                  0                 73               65               97
4                  0                 68               60               90

   daily_fat_saturated_min_g  daily_fat_saturated_max_g
0                          0                         26
```

```
1                          0                         28
2                          0                         32
3                          0                         32
4                          0                         30

[5 rows x 23 columns]
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 23 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   user_id                      200 non-null    object
 1   gender                       200 non-null    object
 2   age                          200 non-null    int64
 3   height_m                     200 non-null    float64
 4   weight_kg                    200 non-null    int64
 5   bmi                          200 non-null    float64
 6   pa_level                     200 non-null    object
 7   pa_activity                  200 non-null    float64
 8   daily_kcal                   200 non-null    int64
 9   daily_natrium_min_mg         200 non-null    int64
 10  daily_natrium_max_mg         200 non-null    int64
 11  daily_protein_min_g          200 non-null    int64
 12  daily_protein_max_g          200 non-null    int64
 13  daily_fiber_min_g            200 non-null    int64
 14  daily_fiber_max_g            200 non-null    int64
 15  daily_carbohydrates_min_g    200 non-null    int64
 16  daily_carbohydrates_max_g    200 non-null    int64
 17  daily_sugar_min_g            200 non-null    int64
 18  daily_sugar_max_g            200 non-null    int64
 19  daily_fat_min_g              200 non-null    int64
 20  daily_fat_max_g              200 non-null    int64
 21  daily_fat_saturated_min_g    200 non-null    int64
 22  daily_fat_saturated_max_g    200 non-null    int64
dtypes: float64(3), int64(17), object(3)
memory usage: 36.1+ KB
None
```

[20]:
```
# ADD EACH RECIPE AS COLUMN TO USER SIMULATION - (CELL 20)

recipe_cols = food[food['vegeterian'] == 1].transpose()
recipe_cols = recipe_cols.reset_index(drop=True)
recipe_cols = recipe_cols.drop(range(0, len(recipe_cols)))
user_ratings = users.join(recipe_cols)
```

[21]:
```
# FILL EACH RECIPE BY USER A LIKE (1) OR DISLIKE (0) - (CELL 21)
# values that replace NaN
ratings_unique = np.array([0, 1])
ratings_probabilities = np.array([0.5, 0.5])

# row and column indices with NaN
col_inds = np.array(range(9, len(user_ratings.columns)))
row_inds = np.array(range(0, len(user_ratings)))

# change NaN per column per row to value
for col_ind in col_inds:
    for row_ind in row_inds:
        #if user_ratings.iloc[row_ind, 'gender'] == 'female'
        user_ratings.iat[row_ind, col_ind] = np.random.choice(a=ratings_unique,␣
 ↪size=1, p=ratings_probabilities)[0]
    user_ratings.iloc[:, col_ind] = user_ratings.iloc[:, col_ind].astype(int)
display(user_ratings.head())
```

```
  user_id  gender  age  height_m  weight_kg   bmi    pa_level  pa_activity  \
0    U000  female   33      1.60         73  28.5   sedentary         1.00
1    U001  female   29      1.66         66  24.0  low active         1.14
2    U002    male   27      1.74         83  27.4  low active         1.12
3    U003    male   35      1.76         88  28.4  low active         1.12
4    U004  female   36      1.74         74  24.4  low active         1.14

   daily_kcal  Pierogi  …  Aardappel en tomaatpakketjes  Aardappel en prei  \
0        2385        1  …                             0                  0
1        2602        1  …                             0                  1
2        2902        1  …                             0                  0
3        2915        0  …                             0                  1
4        2710        1  …                             0                  1

   Aardappel en peen  Krieltjes en courgette  \
0                  0                       1
1                  0                       1
2                  0                       1
3                  1                       0
4                  0                       1

   Aardappelen en paprika uit de oven  Aardappel en auberginefrites  \
0                                   1                             1
1                                   1                             1
2                                   0                             0
3                                   0                             0
4                                   0                             1

   Aardappel en knolselderij  Falafelburger  Ovenpasta met ei  \
0                          1              1                 0
```

```
1                          0              0                 0
2                          0              1                 0
3                          1              0                 1
4                          0              1                 1

   Honingwortel met abrikoos
0                          1
1                          0
2                          1
3                          1
4                          0

[5 rows x 1444 columns]
```

[22]:

```python
# CREATE COMBINATIONS OF VEGETERIAN RECIPES AND USERS - (CELL 22)

# filter out only vegeterian recipes out of 'food' dataframe
veg_food = food[food['vegeterian'] == 1]
veg_food = veg_food.reset_index()

# create cartesian product of vegeterian recipes and users
veg_food_users = veg_food.merge(users, how='cross')
veg_food_users['rating'] = np.nan

# create some patterns for 'rating' column
mean_protein_g = veg_food_users['protein_g'].mean()
mean_fiber_g = veg_food_users['fiber_g'].mean()
mean_fat_saturated_g = veg_food_users['fat_saturated_g'].mean()
for index, row in veg_food_users.iterrows():
    # male and above average protein = like
    if row['gender'] == 'male' and row['protein_g'] > mean_protein_g:
        veg_food_users.at[index, 'rating'] = 1
    # female and above average fiber = like
    elif row['gender'] == 'female' and row['fiber_g'] > mean_fiber_g:
        veg_food_users.at[index, 'rating'] = 1
    # above average saturated fat = dislike
    elif row['fat_saturated_g'] > mean_fat_saturated_g:
        veg_food_users.at[index, 'rating'] = 0
    # everything else = dislike
    else:
        veg_food_users.at[index, 'rating'] = 0

veg_food_users['rating'] = veg_food_users['rating'].astype(int)
display(veg_food_users.head())
```

```
    recipe  energy_kcal  natrium_mg  protein_g  fiber_g  \
0  Pierogi          115          80          2        1
1  Pierogi          115          80          2        1
```

```
2  Pierogi          115          80          2        1
3  Pierogi          115          80          2        1
4  Pierogi          115          80          2        1

   carbohydrates_total_g  carbohydrates_sugar_g  fat_total_g  fat_saturated_g  \
0                     10                      1            7                5
1                     10                      1            7                5
2                     10                      1            7                5
3                     10                      1            7                5
4                     10                      1            7                5

   vegeterian user_id  gender  age  height_m  weight_kg  bmi   pa_level  \
0           1    U000  female   33      1.60         73  28.5   sedentary
1           1    U001  female   29      1.66         66  24.0  low active
2           1    U002    male   27      1.74         83  27.4  low active
3           1    U003    male   35      1.76         88  28.4  low active
4           1    U004  female   36      1.74         74  24.4  low active

   pa_activity  daily_kcal  rating
0         1.00        2385       0
1         1.14        2602       0
2         1.12        2902       0
3         1.12        2915       0
4         1.14        2710       0
```

[23]:

```
# check like to dislike amount - (CELL 23)
print(veg_food_users['rating'].value_counts())
```

```
0    163838
1    123162
Name: rating, dtype: int64
```