



CentraleSupélec

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*ML Engineer
Project 2*

*Cleaning and exploratory analysis of public
nutrition data*



Menu

- Data cleaning
 - ◆ Features selection
 - ◆ Application idea
 - ◆ Outliers
 - ◆ Missing data
- 2. Exploratory analysis
 - ◆ Univariate
 - ◆ Multivariate



1.

Data cleaning

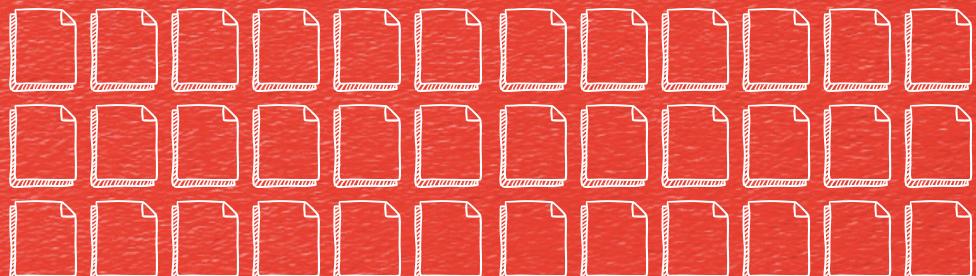
With pandas



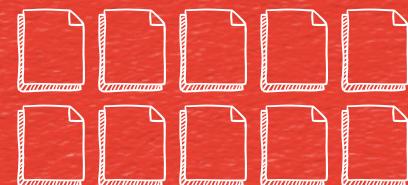
Dataframe size

df.shape

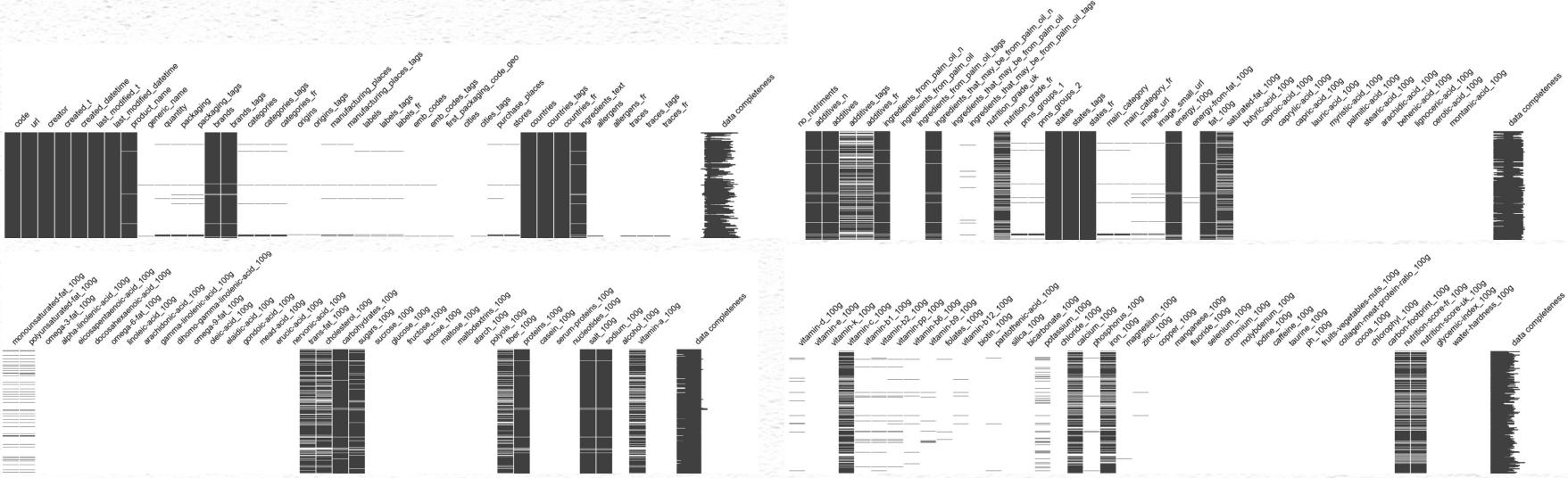
(320772, 162)



Cleaning required



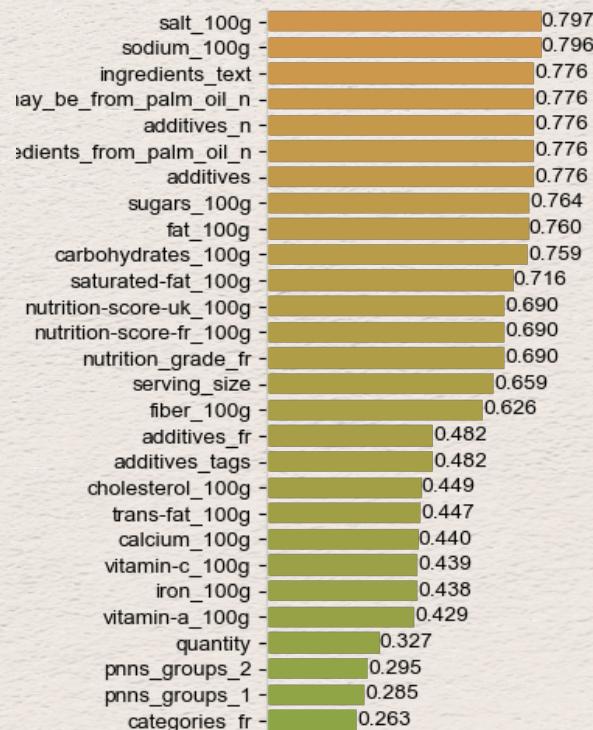
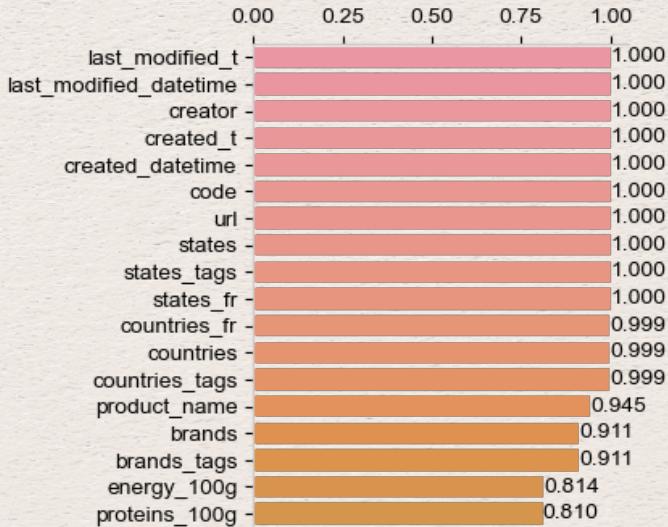
Missing data overview



- ◆ 1 column out of 2 is empty or almost empty
- ◆ Vast majority of columns are incomplete

Missing data sorted by filling percengage

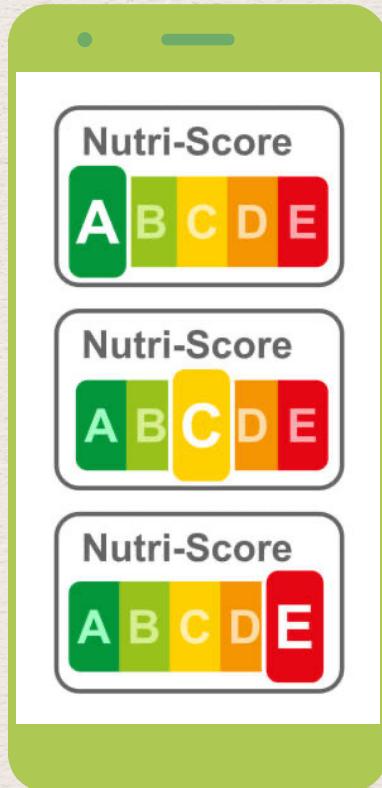
Proportion of filled data for each feature



- ◆ Selection of relevant variables for the application



Application idea



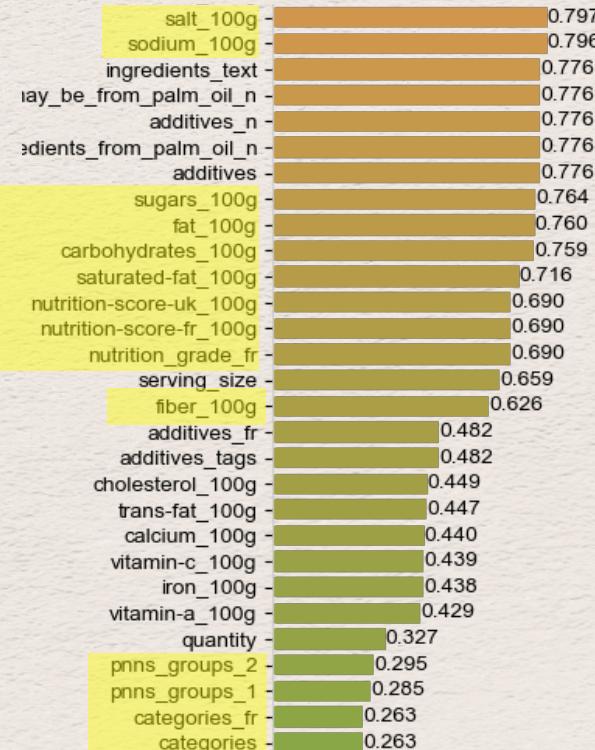
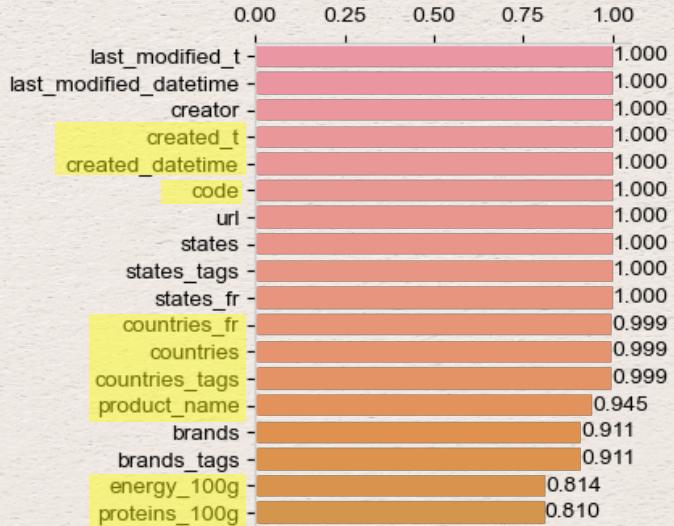
Determine meals with an estimation of the best possible nutrition score possible.

Application for France only.



Missing data sorted by filling percentage

Proportion of filled data for each feature



- ◆ Selection of relevant variables for the application

Cleaning roadmap

Removing duplicated



Treating countries



Products names



Nutrigrade



Application idea and
first features selection



Treating time



Catergories



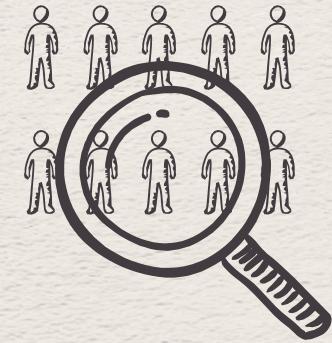
Energy and
nutriments



Removing duplicates

- ◆ Detection of duplicates through 'code' feature
- ◆ Counting number of NaN per row
- ◆ Sorting rows by missing values
- ◆ Dropping rows that contain more NaN

→ Removal of 133 duplicates



Treating of time



- ◆ Interesting only in creation date
- ◆ Two different features: created_t, created_datetime
 - ❖ Conversion in a common format
`pd.to_datetime(df[i], unit='s', errors='coerce')`
 - ❖ Comparison
 - ❖ Deletion of the least well filled format

→ Conservation of 'created_datetime'



Treatment of countries



- ◆ Objective: France only
- ◆ 3 variables:
 - ◆ countries_fr
 - ◆ countries
 - ◆ countries_tags → retenu
- ◆ Formatting of tags
 - ◆ value_counts = 717
 - ◆ If several countries per row, keep only the first one
- ◆ Deletion of rows that do not concern France

Categories

- ◆ Comparison of categories variables:
'pnns_groups_1', 'pnns_groups_2', 'categories_fr', 'categories',
'categories_Tags', 'main_category', 'main_category_fr'
- ◆ Selection of 'pnns_groups_1'
- ◆ Replacing redundant values through a dictionary
ex: {'sugary-snacks':'Sugary snacks'}



Products names

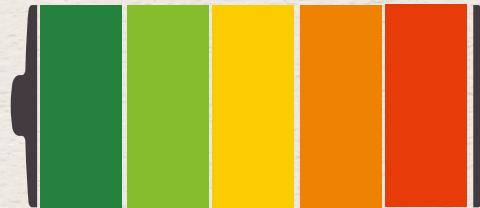
- ◆ Objective : have a product name per row
- ◆ Detection and deletion of missing date, using the feature 'product_name'
- ◆ 4 produit out of 5 makes a unique appearance



Energy and nutriments

Energy

- .describe() shows values over 3700kJ, that can't be
- Replacement of outliers by the median value



Energy and nutriments

Nutriments

- ◆ Concerns:
'proteins_100g','salt_100g','sugars_100g','fat_100g','carbohydrates_100g','saturated-fat_100g','fiber_100g','fruits-vegetables-nuts_100g','sodium_100g'
- ◆ Replacing negative values by 0
- ◆ Replacing values > 100g by NaN

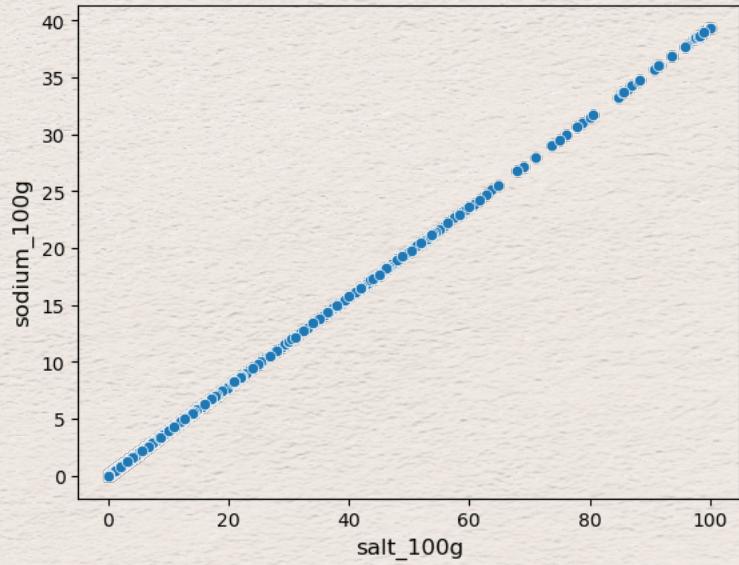


Energy and nutriments

Salt or Sodium?

- ◆ Comparison between salt and sodium
- ◆ Deletion of sodium feature

Sodium as a function of salt



Energy and nutriments

Sum of nutriments < 100g

- ◆ Sum of columns

'carbohydrates_100g','proteins_100g','fat_100g',
'fiber_100g'

- ◆ Deletion of rows where the total exceeds 100g



Energy and nutriments

Remplissage des nutriments

- ◆ Pour 'fiber_100g': NaN remplacés par 0
- ◆ Pour les autres nutriments:
 - ◆ Groupement par catégorie
 - ◆ Remplissage par la médiane associée à chaque catégorie



Nutrigrade

Determination by KNN imputer

- ◆ One-hot encoding of categories of 'pnns_groups_1' and 'nutrition_grade_fr'
- ◆ Training on following variables:
'energy_100g', 'sugars_100g', 'saturated-fat_100g', 'salt_100g',
'fruits-vegetables-nuts_100g', 'fiber_100g', 'proteins_100g',
'carbohydrates_100g', 'fat_100g' + one-hot encoding

Cleaned dataframe

61K rows

15 columns



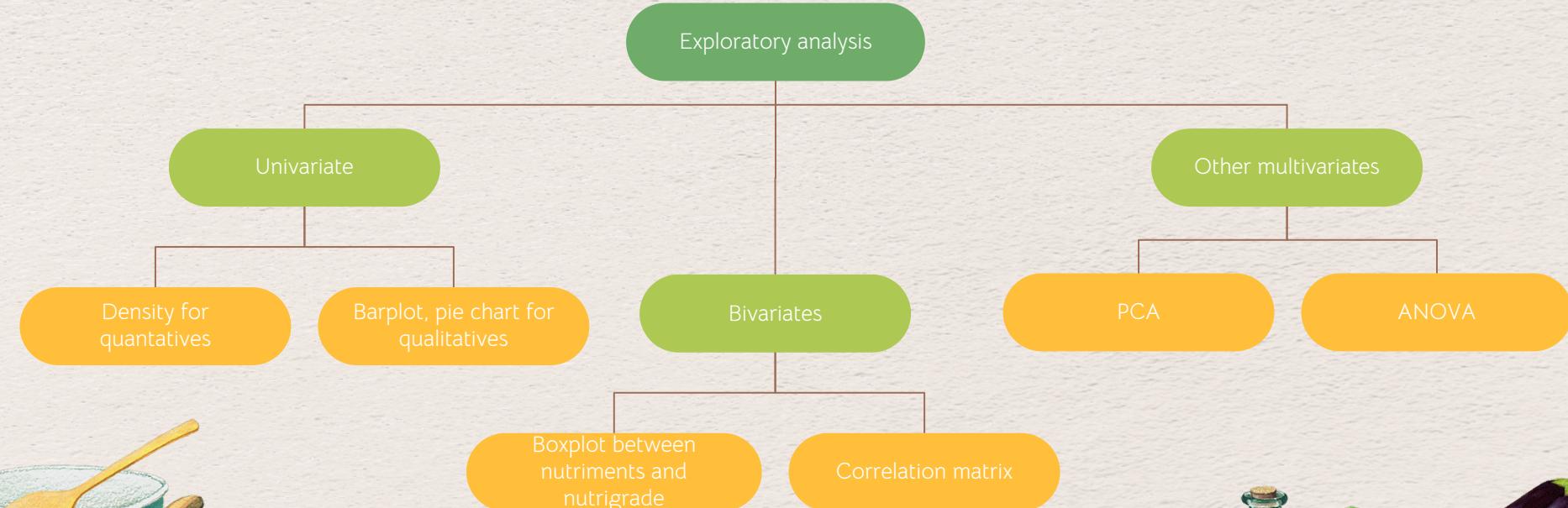
2.

Exploratory analysis

With pandas, matplotlib, and seaborn

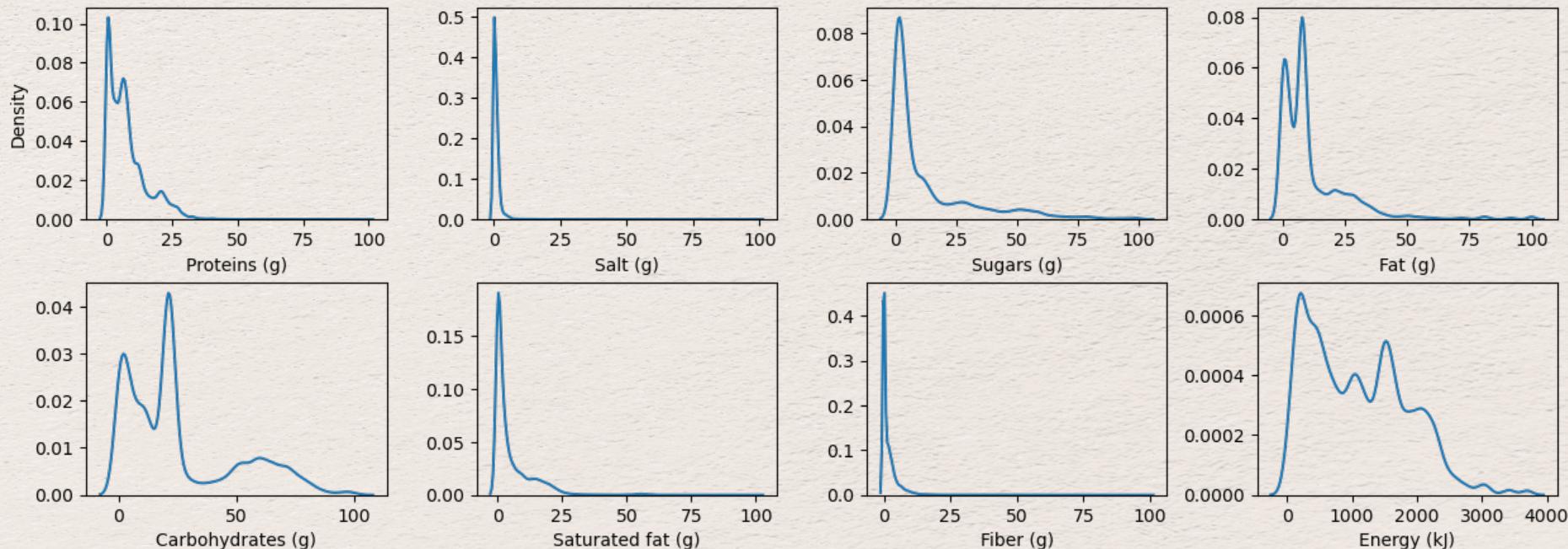


Analysis types



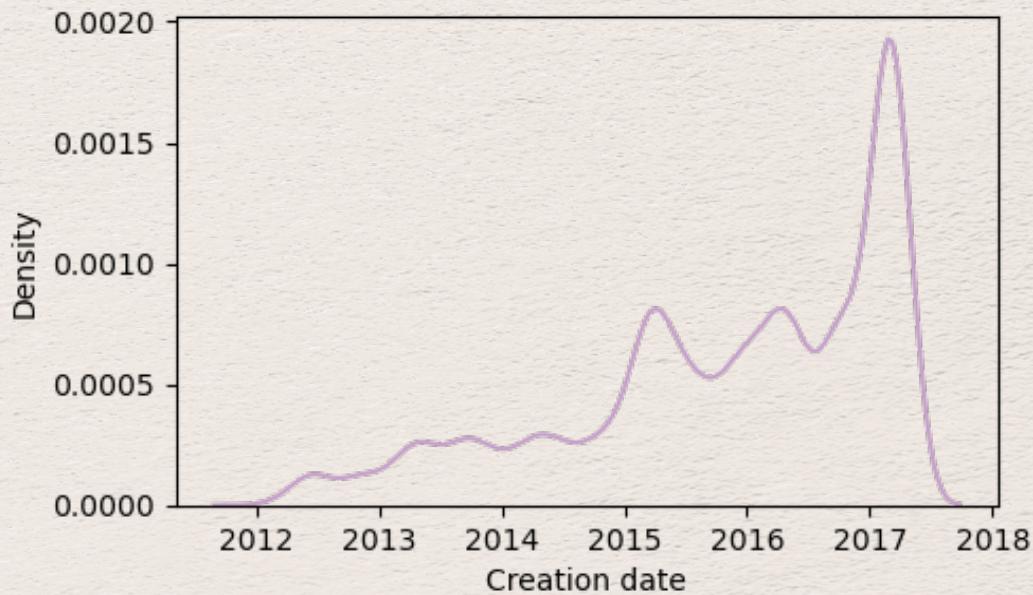
Univariate analysis

Distribution of nutriments features



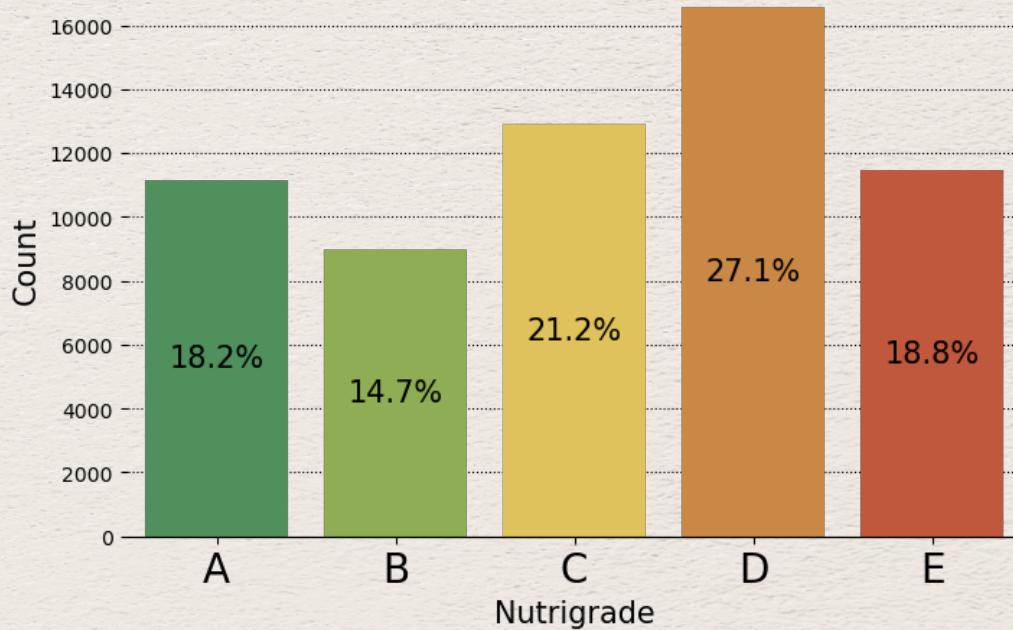
Univariate analysis

Distribution of creation date



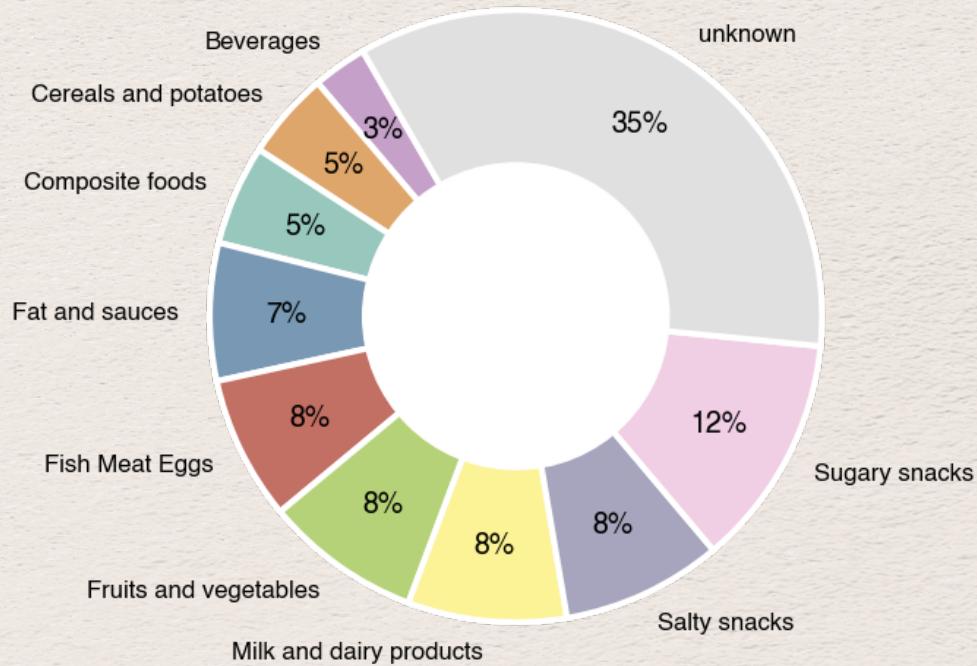
Univariate analysis

Nutrigrade distribution



Univariate analysis

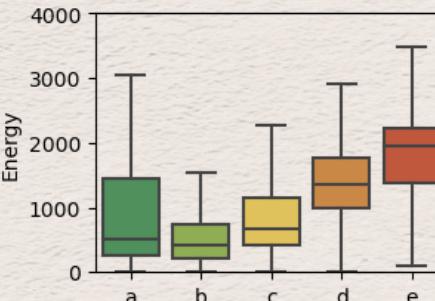
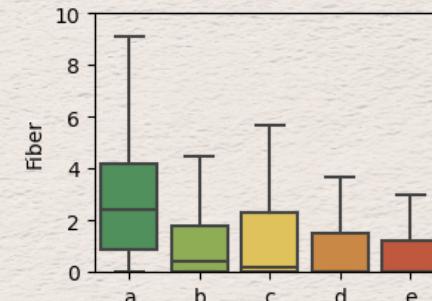
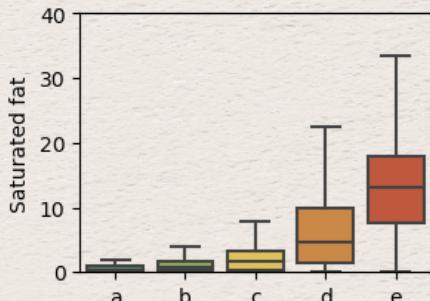
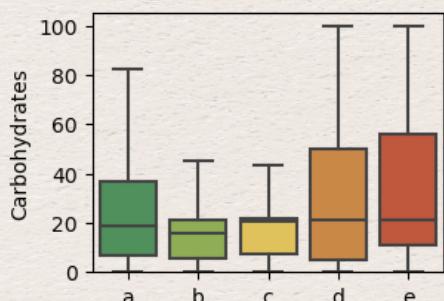
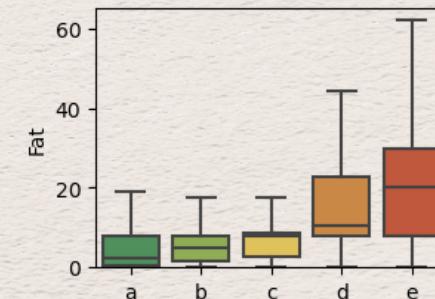
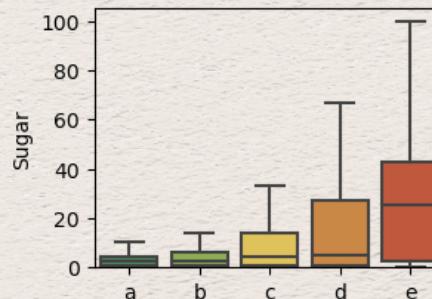
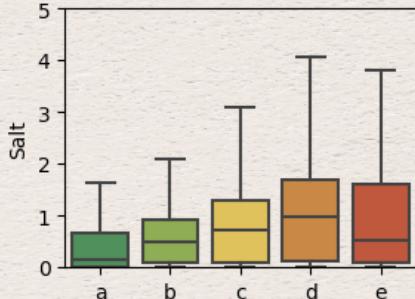
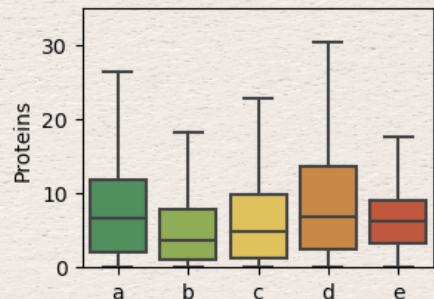
Categories



Bivariate analysis



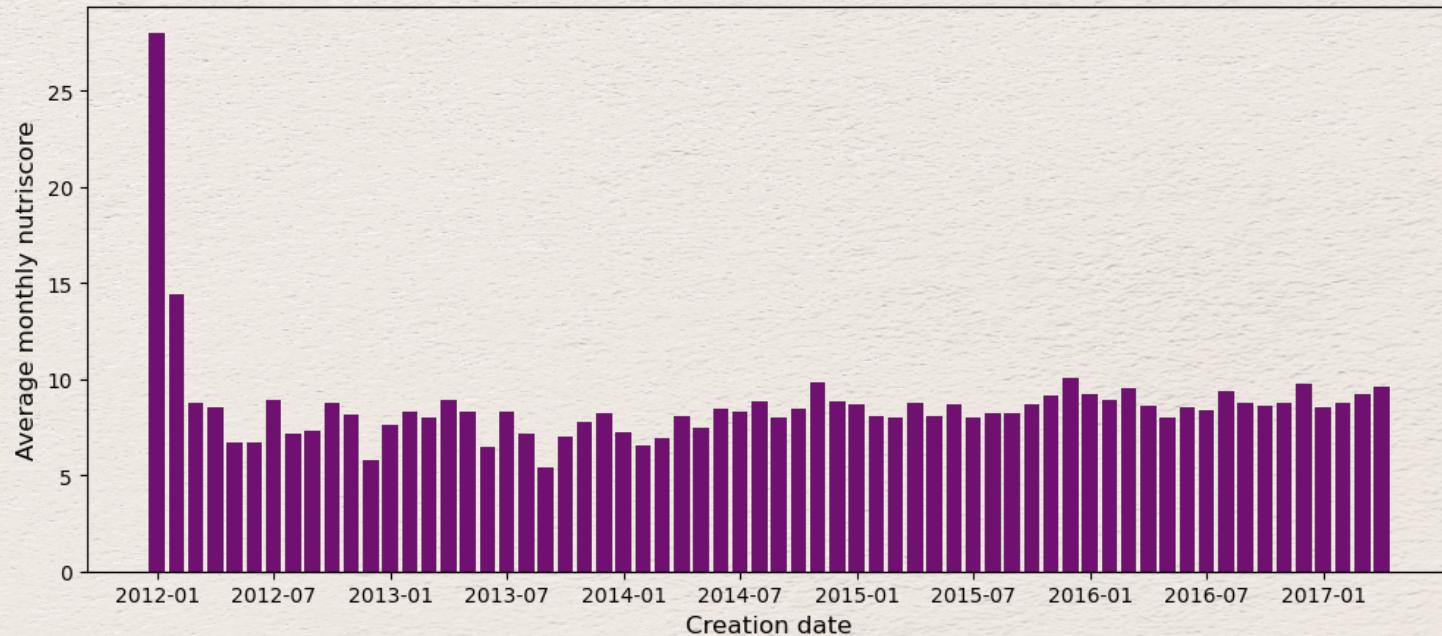
Distribution of nutriments in relation to nutrigrade



Bivariate analysis



Nutriscore evolution along time



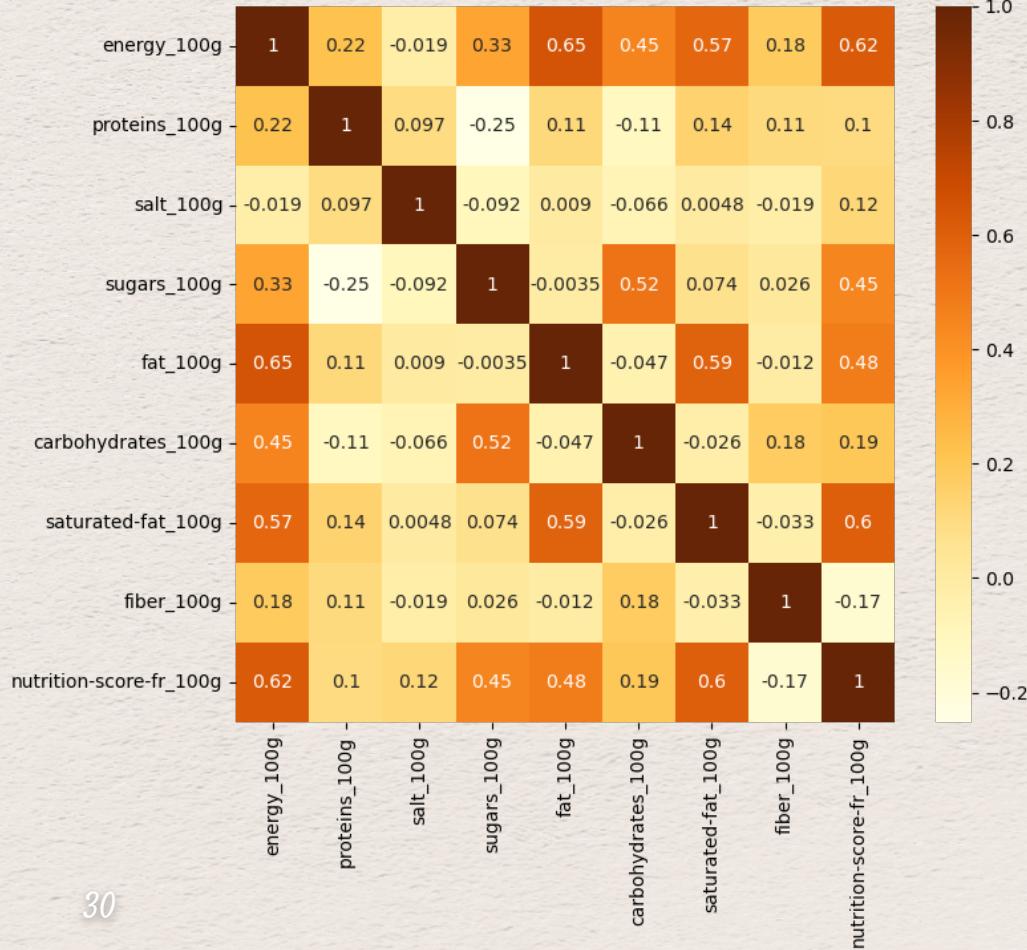
Correlation matrix between nutriments

Bivariate analysis



- ◆ Observed correlations:
 - ❖ Energy: fat, proteins, carbs
 - ❖ Carbs: sugar, fiber
 - ❖ Fat: saturated fat

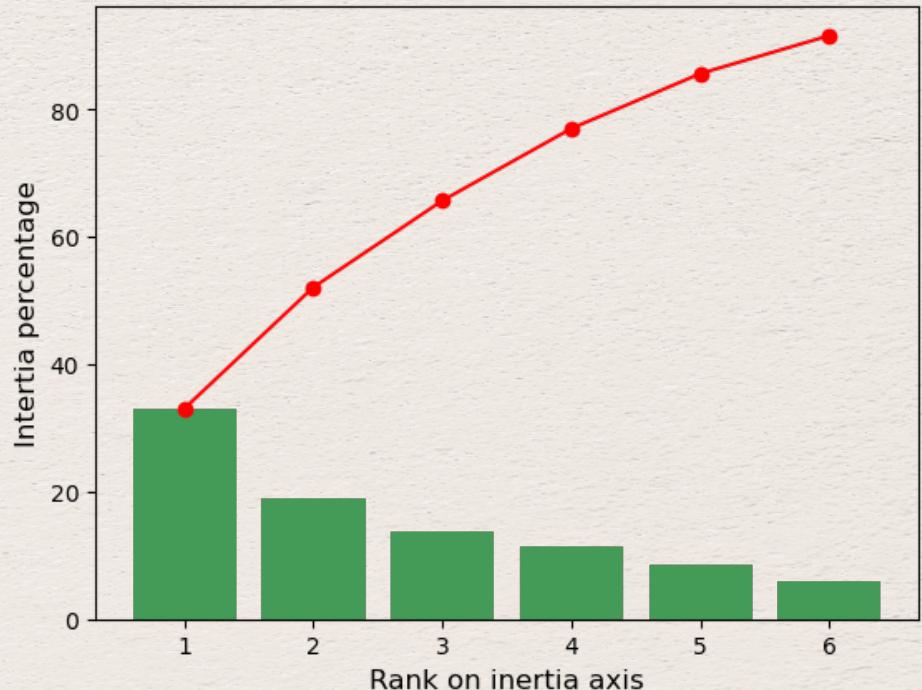
- ◆ Anti-correlations:
 - ❖ Proteins: sugar



Multivariate analysis



Scree plot



Principal component analysis

- ◆ Concerns

'energy_100g','proteins_100g','salt_100g','sugars_100g','fat_100g', 'carbohydrates_100g' 'saturated-fat_100g','fiber_100g','nutrition-score-fr_100g'

- ◆ Normalization

- ◆ Principal components calculation

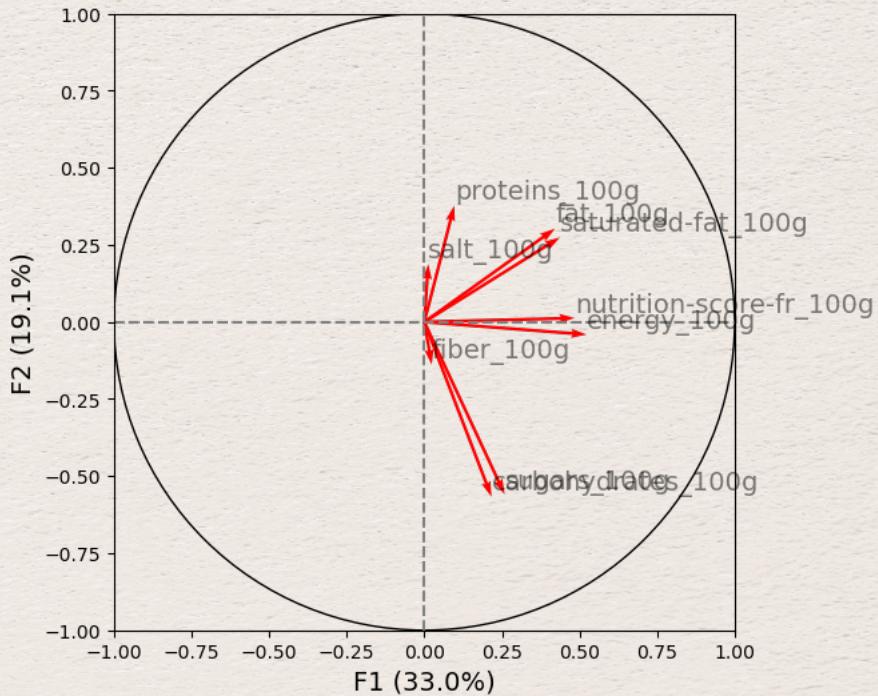
- ◆ Scree plot

- ◆ More than 50% of inertia is on the 2 first axis

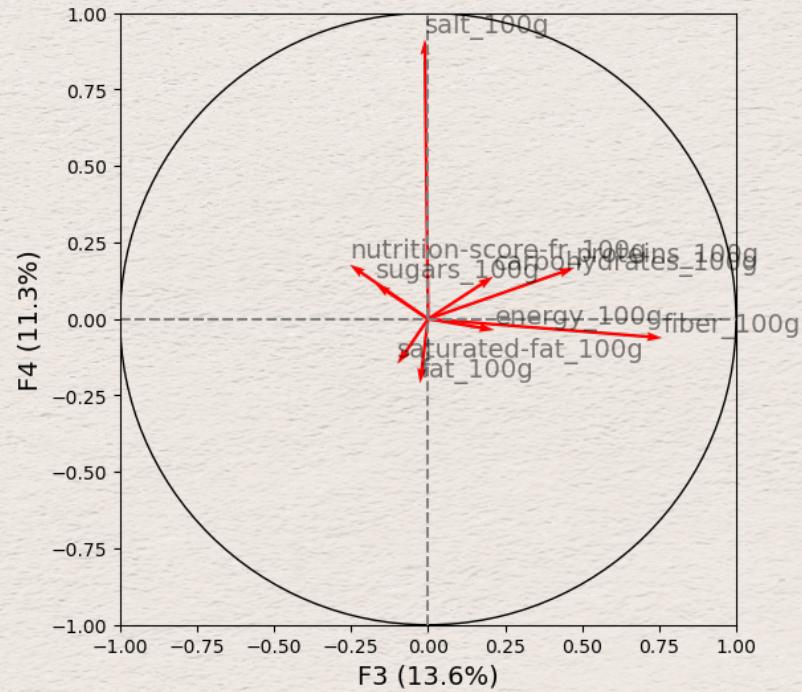
Multivariate analysis



Correlation circle (F1 and F2)



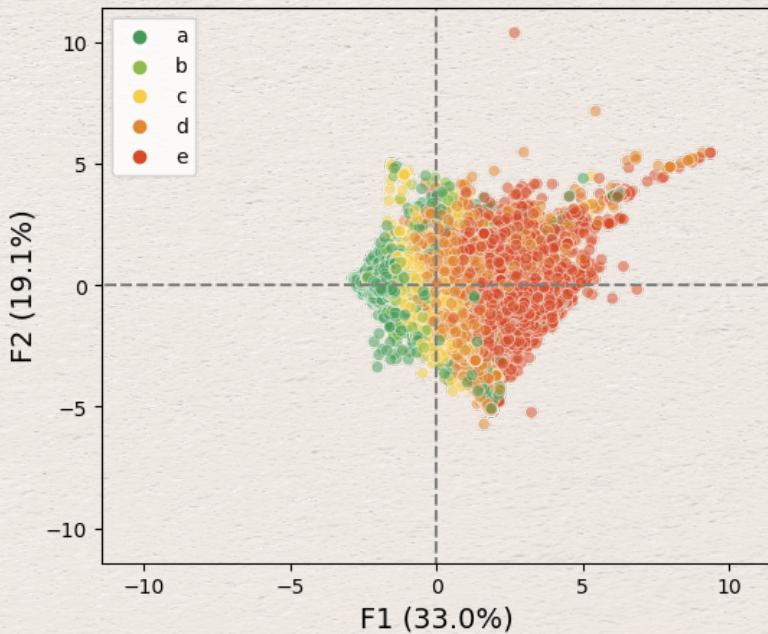
Correlation circle (F3 and F4)



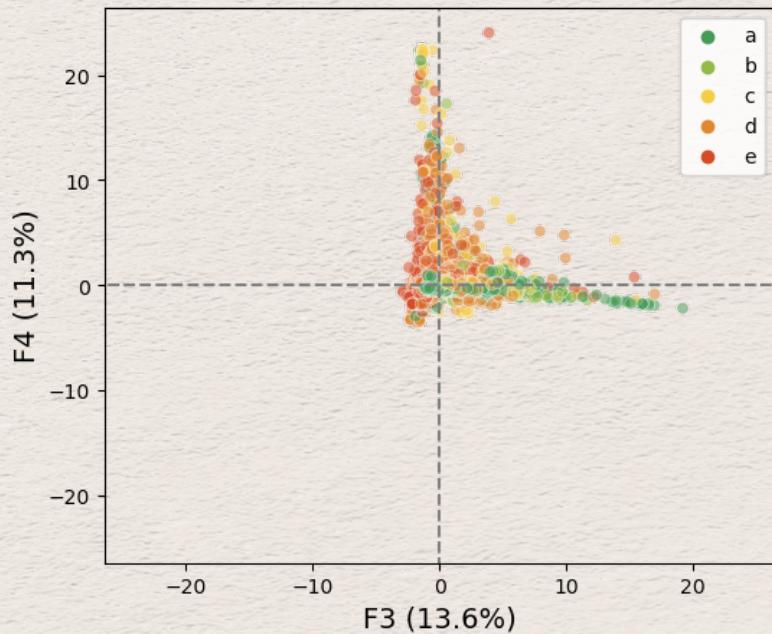
Multivariate analysis



Projection fo points on F1 et F2



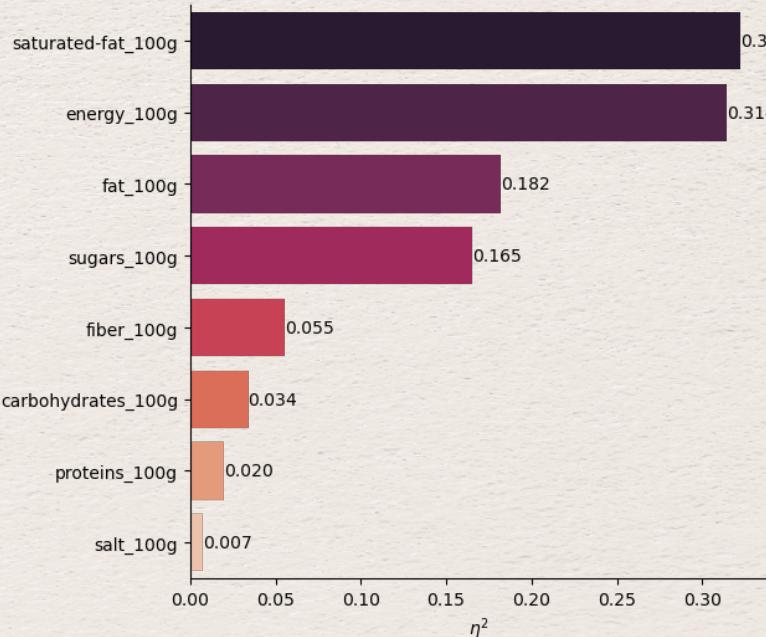
Projection fo points on F3 et F4



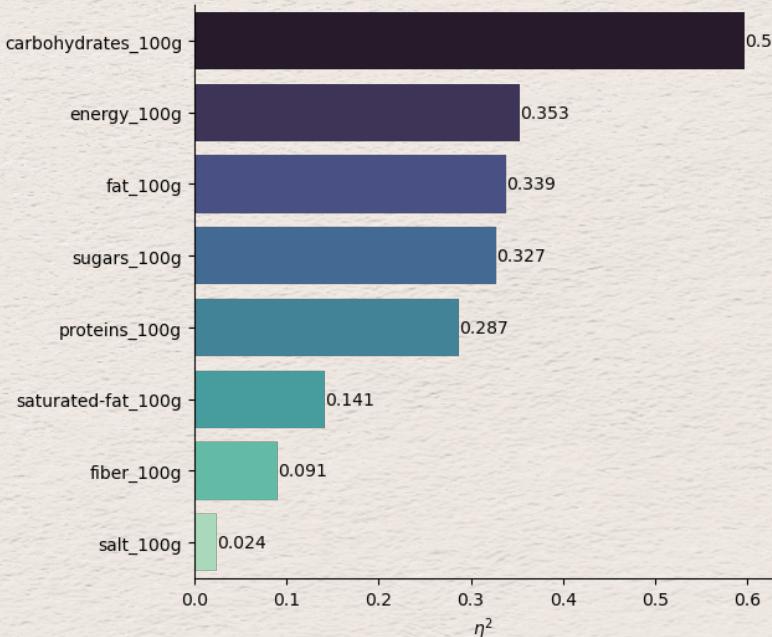
Multivariate analysis



ANOVA between nutriments and nutrigrade



ANOVA between nutriments and catégories





Thank you !

Do you have any questions?

