Concevez une application au service de la santé publique

Santé publique France

Sommaire

I. Idée d’application

- Scan du produit et proposition de produits de même type/catégorie avec un meilleur nutri-score.
- Calculateur de nutri-score pour produits qui n’ont pas de nutri-score indiqué.

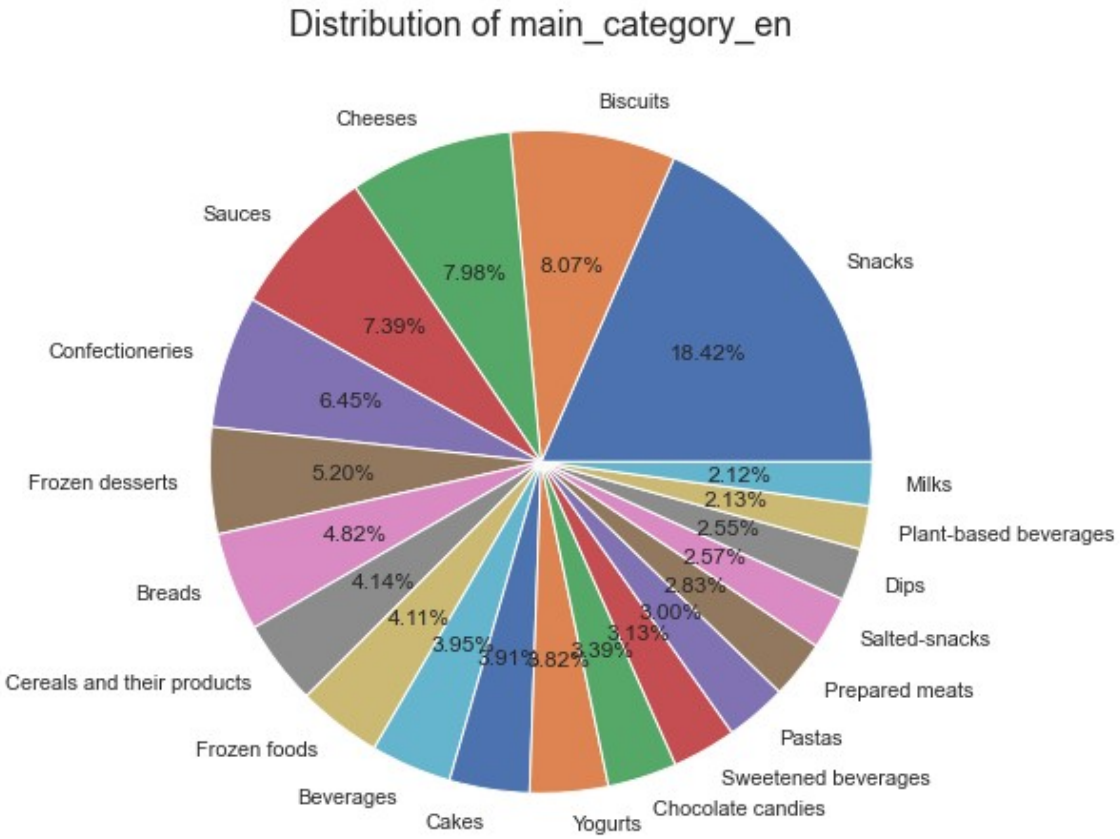
NUTRI-SCORE

A B C D E

NUTRI-SCORE

A B C D E

I. Idée d’application

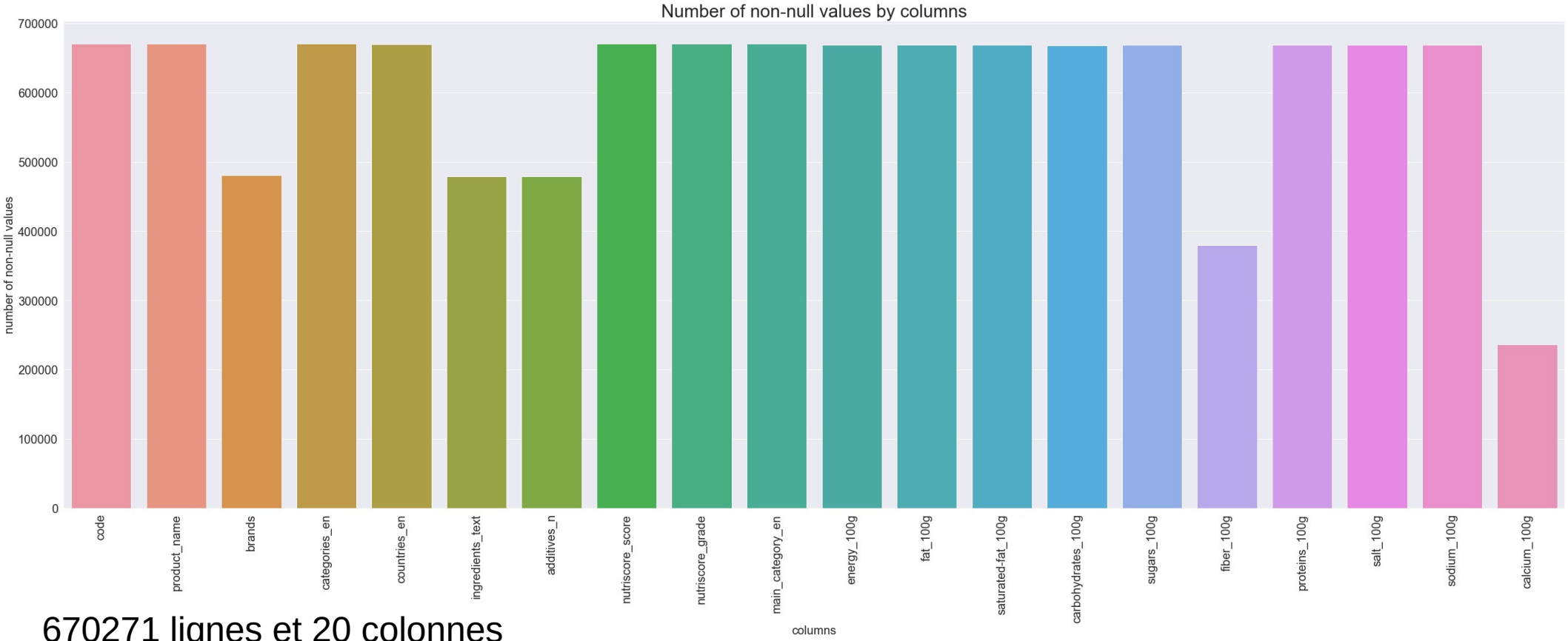


Les 20 catégories de produits les plus communs.

II. Nettoyage effectué

- Suppression des « code » dupliqués.
- Suppression des « code » vides.
- Suppression des « product_name » vides.
- Suppression des « nutriscore_score » vides.
- Suppression des colonnes avec un pourcentage de valeurs manquantes supérieurs à 65 %.
- Suppression des colonnes inutiles.

II. Nettoyage effectué



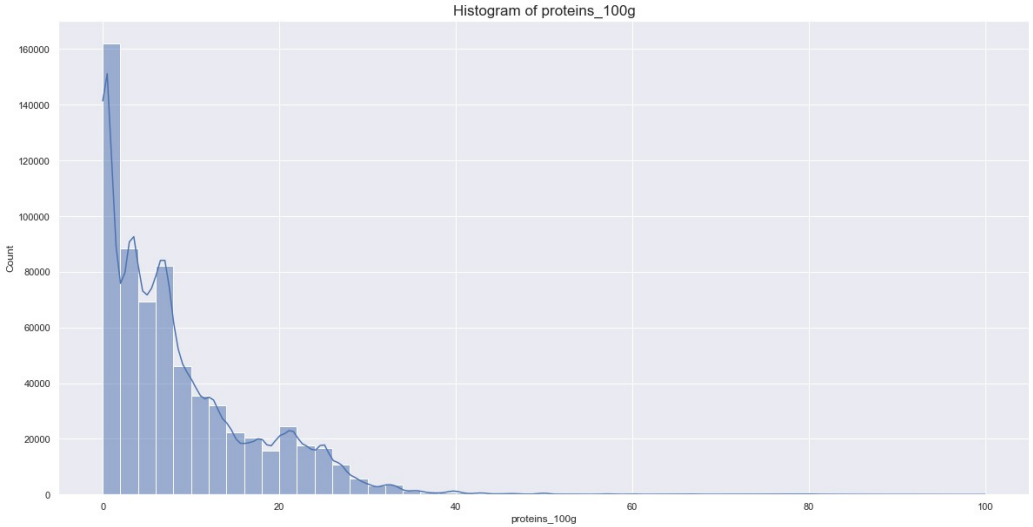
670271 lignes et 20 colonnes

II. Nettoyage effectué

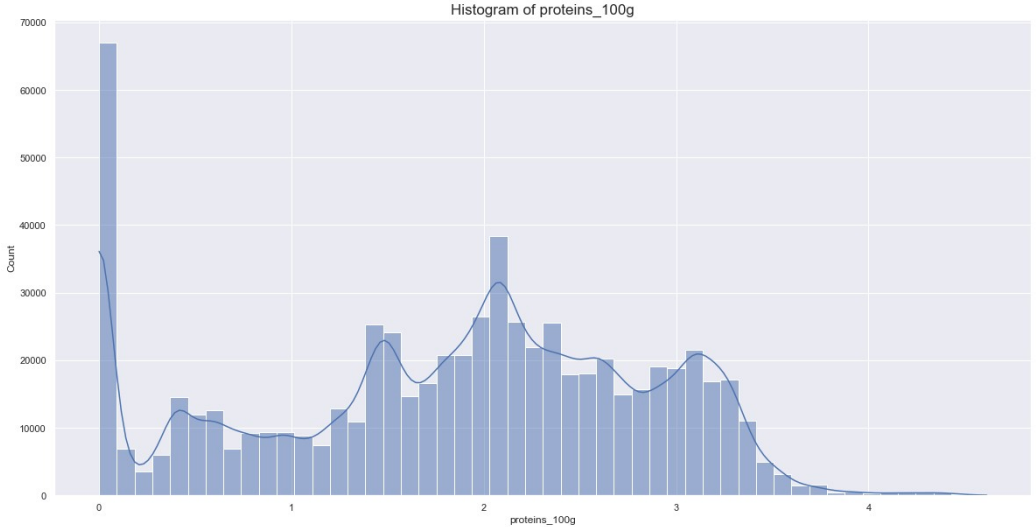
- Suppression des produits avec ‘fat_100g’, ‘saturated-fat_100g’, ‘carbohydrates_100g’, ‘sugars_100g’, ‘fiber_100g’, ‘proteins_100g’, ‘salt_100g’, ‘sodium_100g’ et ‘calcium_100g’ supérieurs à 100g ou inférieurs à 0g.
- Suppression des produits avec ‘energy_100g’ supérieur à 3700KJ ou inférieur à 0KJ.
- En effet, la valeur énergétique de la graisse est la plus élevée :
  - Fat : 37KJ/g
  - Proteins : 29 KJ/g
  - Carbohydrates : 17KJ/g
  - Fiber : KJ/g etc...

II. Nettoyage effectué

Avant log



Après log



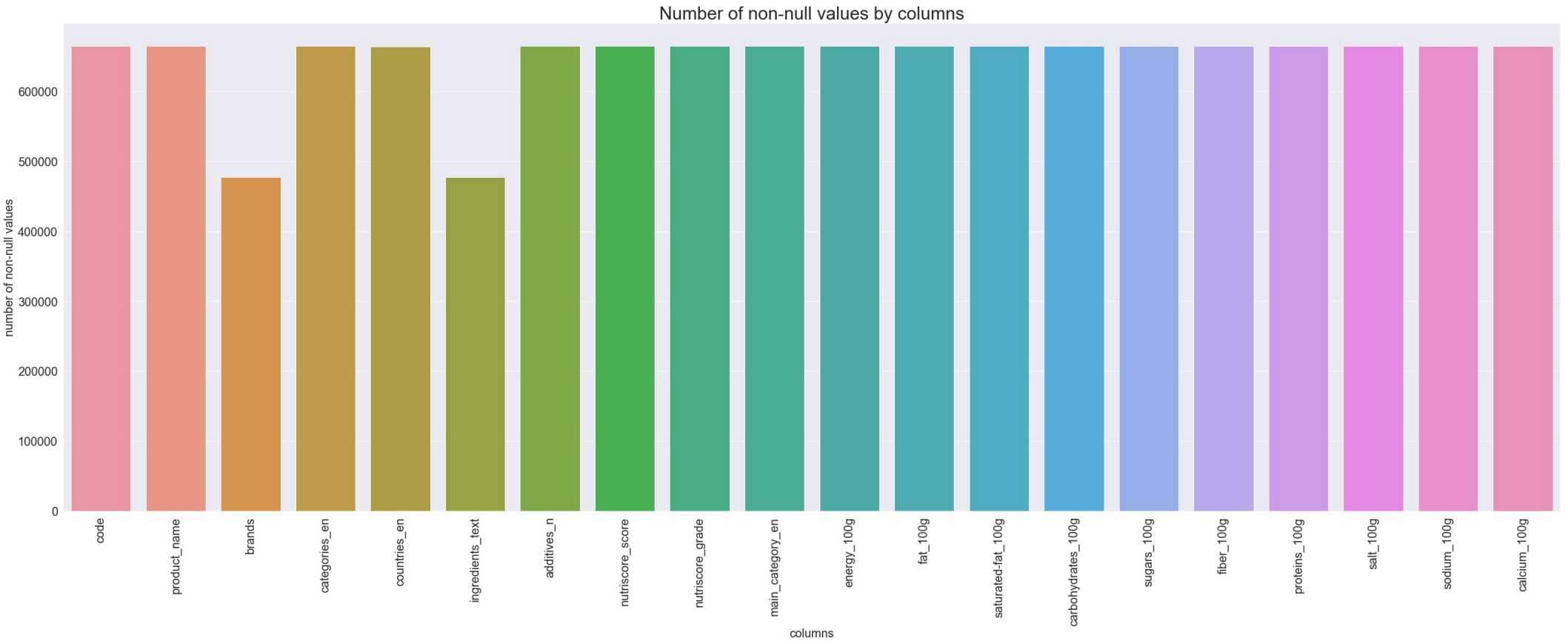
II. Nettoyage effectué

- Application du logarithme népérien sur les colonnes 'additives_n', 'energy_100g', 'fat_100g', 'saturated-fat_100g', 'carbohydrates_100g', 'sugars_100g', 'fiber_100g', 'proteins_100g', 'salt_100g', 'sodium_100g', 'calcium_100g' puis application de la fonction « aberrantvalues » et « aberrantvalues_2 » sur ces colonnes.
- Application du log car la distribution de la variable cible est asymétrique à droite
- Retour aux valeurs initiales avec l’application de la fonction exponentielle.

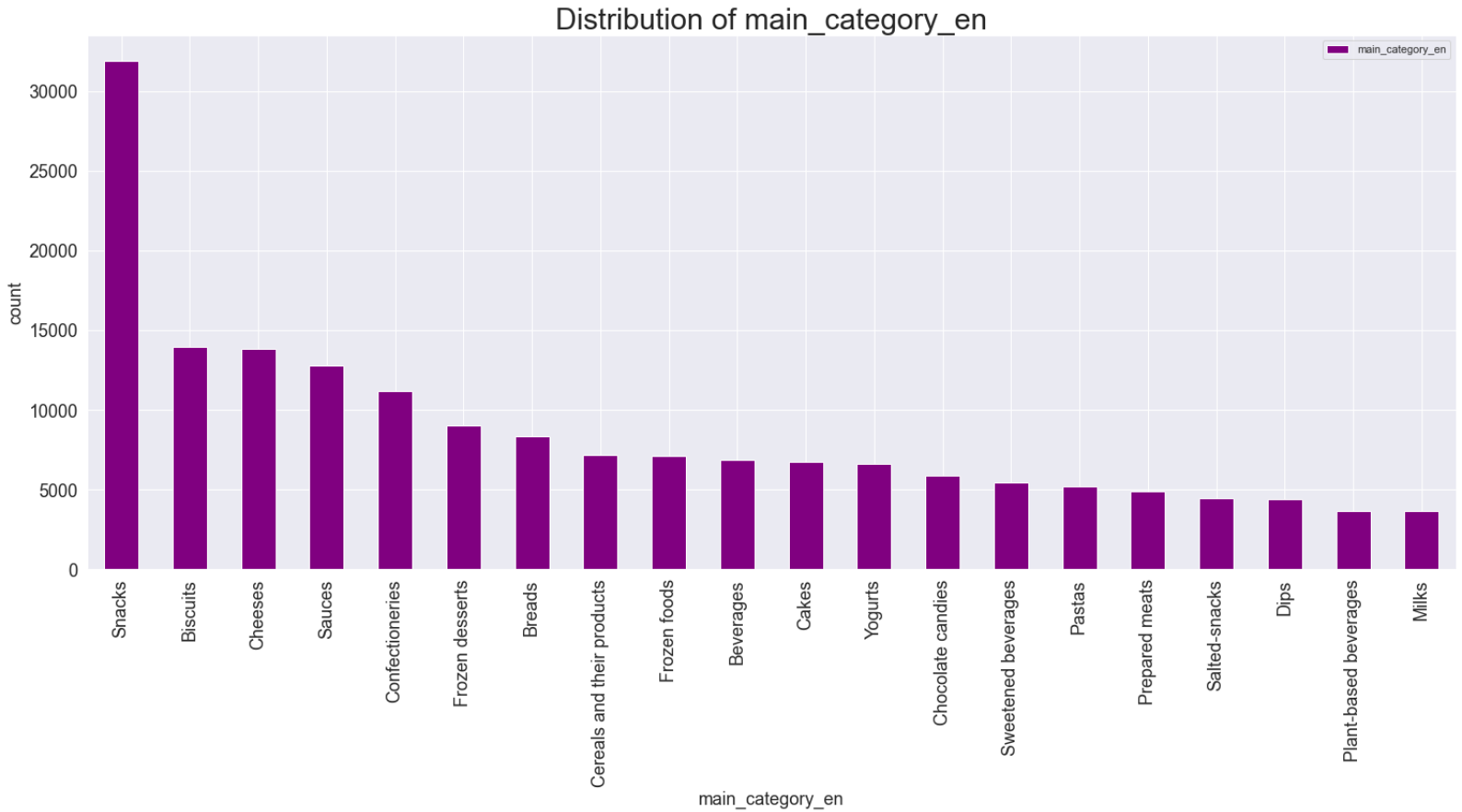
II. Nettoyage effectué

- Détection des valeurs aberrantes par la méthode interquartile et remplacement des valeurs aberrantes par NaN.
- Méthode interquartile :
  - Soit Q1 et Q3 respectivement le 1er quartile et le 3^{e} quartile et k constante positive. On peut définir une donnée aberrante comme étant toute valeur située à l'extérieur de l'intervalle :
    - [Q1 – k(Q3 – Q1), Q3 + k(Q3 – Q1)]
- Imputation des valeurs manquantes dans les colonnes de type float par la moyenne de leur groupe de catégorie.
- Imputation par 0 les valeurs non imputées par la méthode précédente.

II. Nettoyage effectué

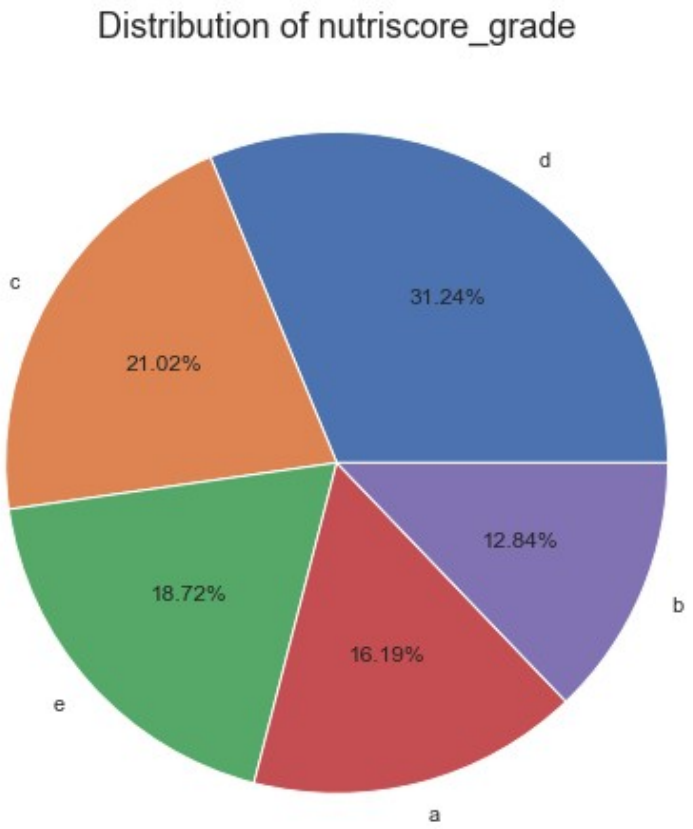


III. Analyse Exploratoire

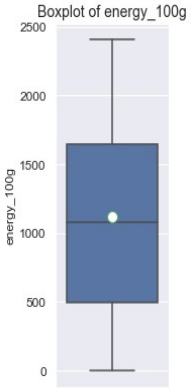


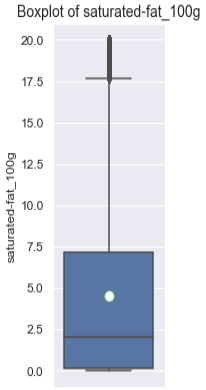
Les 20 catégories de produits les plus communs.

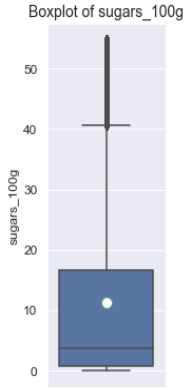
III. Analyse Exploratoire

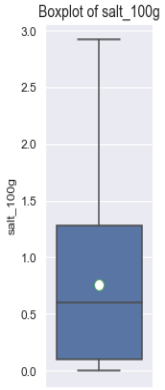


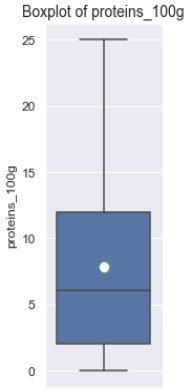
III. Analyse Exploratoire

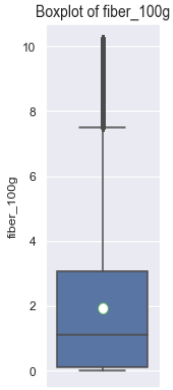












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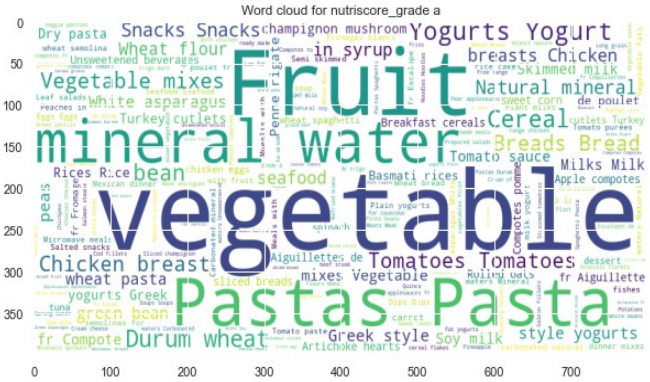

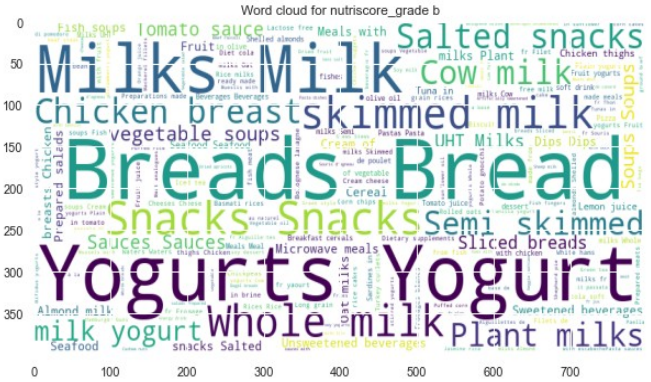

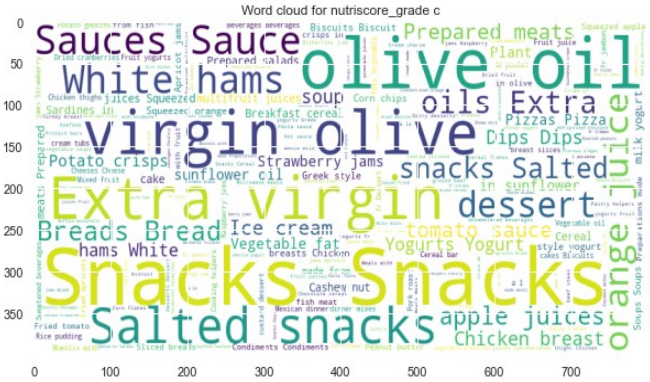

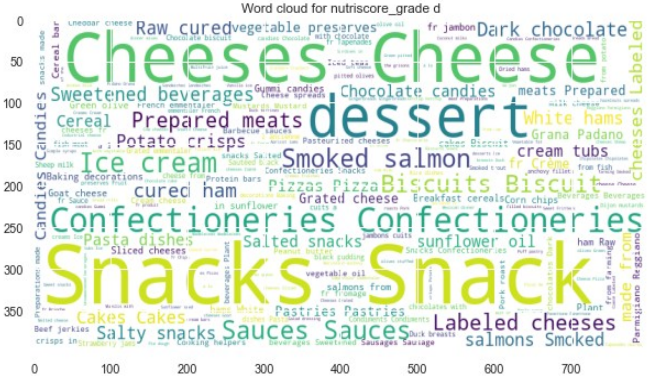

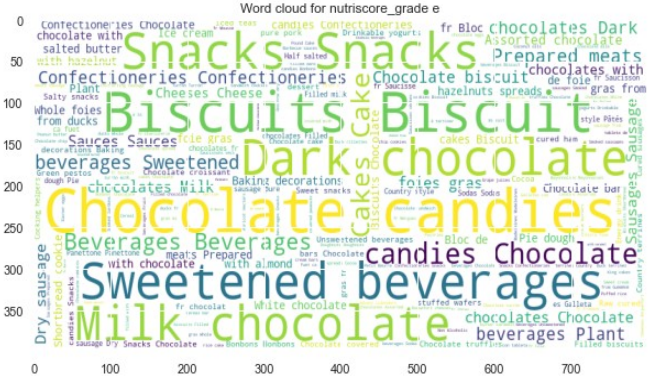

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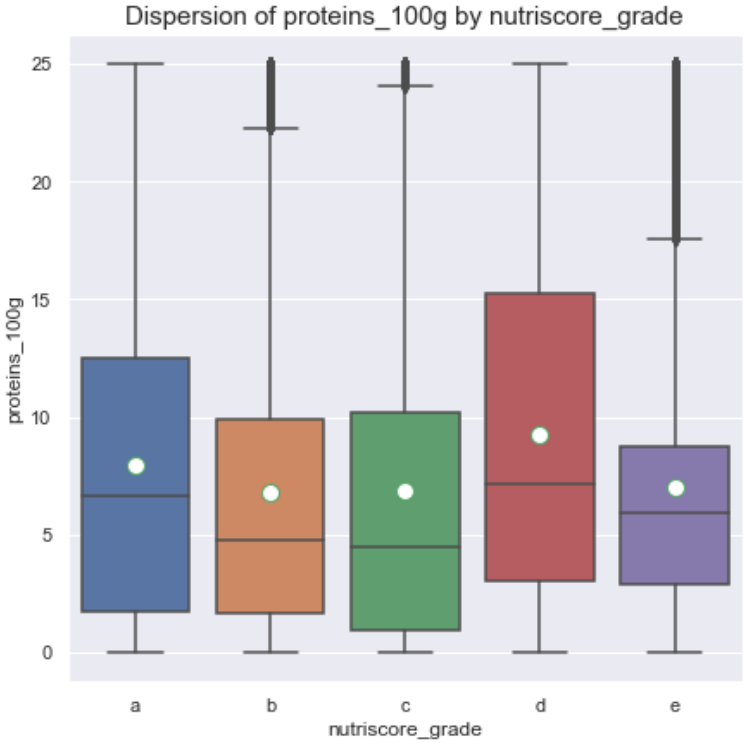
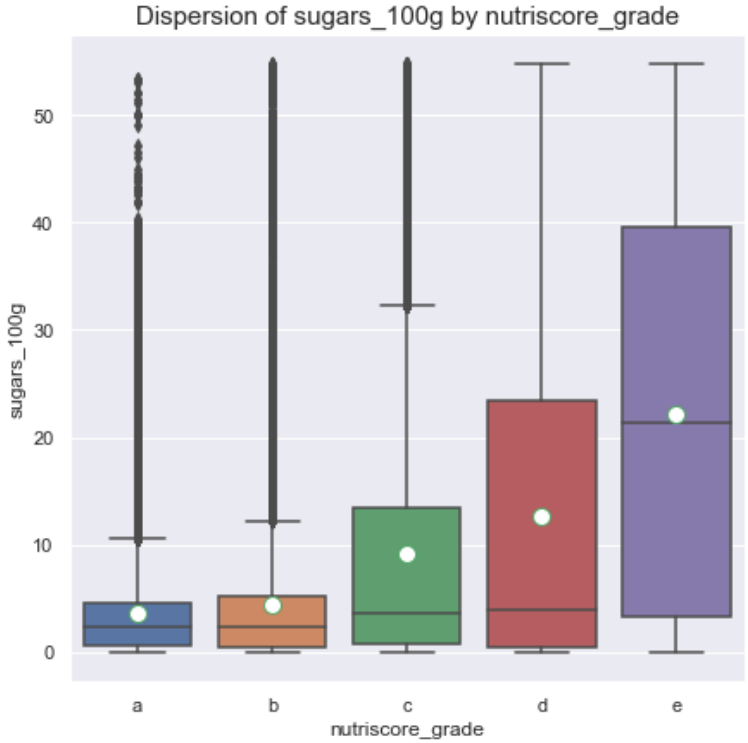


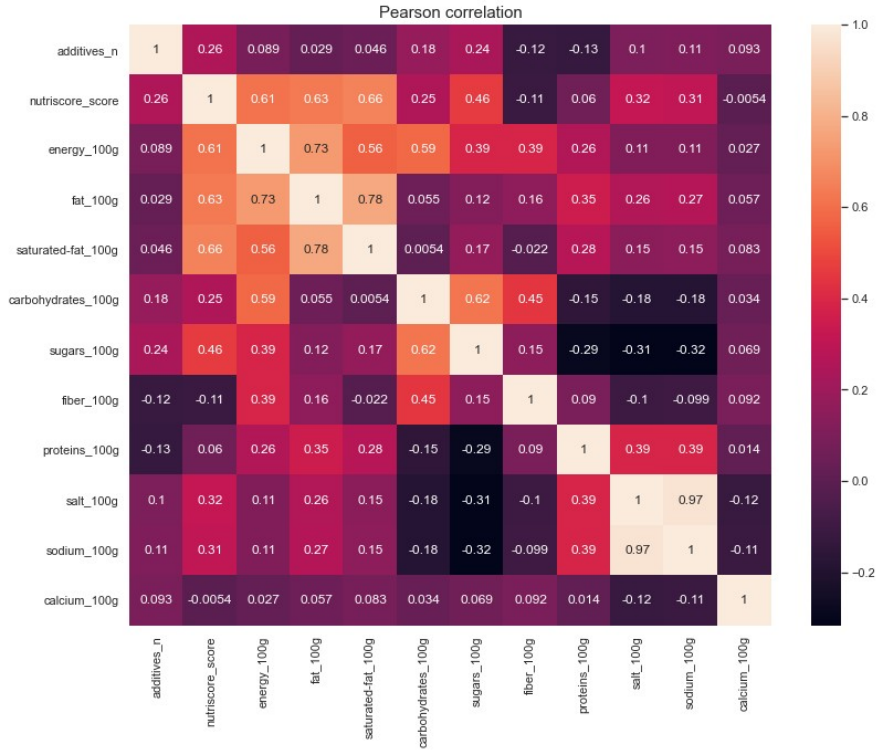


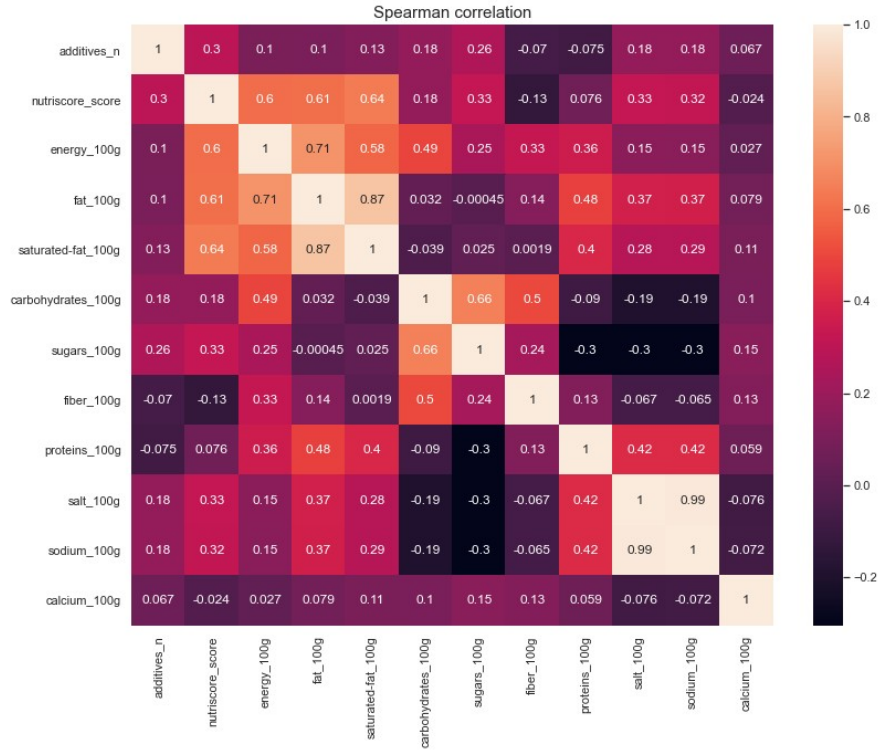
III. Analyse Exploratoire

Par rapport à la nutriscore

```
Kruskal-Wallis test :
additives_n------------------------------------- "H0 rejected"
Statistics =  63833.46564435494 p =  0.0
nutriscore_score-------------------------------- "H0 rejected"
Statistics =  611995.6152171498 p =  0.0
energy_100g------------------------------------- "H0 rejected"
Statistics =  183435.82900968104 p =  0.0
fat_100g---------------------------------------- "H0 rejected"
Statistics =  186387.3206482209 p =  0.0
saturated-fat_100g------------------------------ "H0 rejected"
Statistics =  213796.23453821873 p =  0.0
carbohydrates_100g------------------------------ "H0 rejected"
Statistics =  21601.75171535672 p =  0.0
sugars_100g------------------------------------- "H0 rejected"
Statistics =  75307.09429935899 p =  0.0
fiber_100g-------------------------------------- "H0 rejected"
Statistics =  27027.85955150427 p =  0.0
proteins_100g----------------------------------- "H0 rejected"
Statistics =  12786.49985013412 p =  0.0
salt_100g--------------------------------------- "H0 rejected"
Statistics =  80838.00890757923 p =  0.0
sodium_100g------------------------------------- "H0 rejected"
Statistics =  78687.06840527106 p =  0.0
calcium_100g------------------------------------ "H0 rejected"
Statistics =  3228.4398951513003 p =  0.0
```

III. Analyse Exploratoire



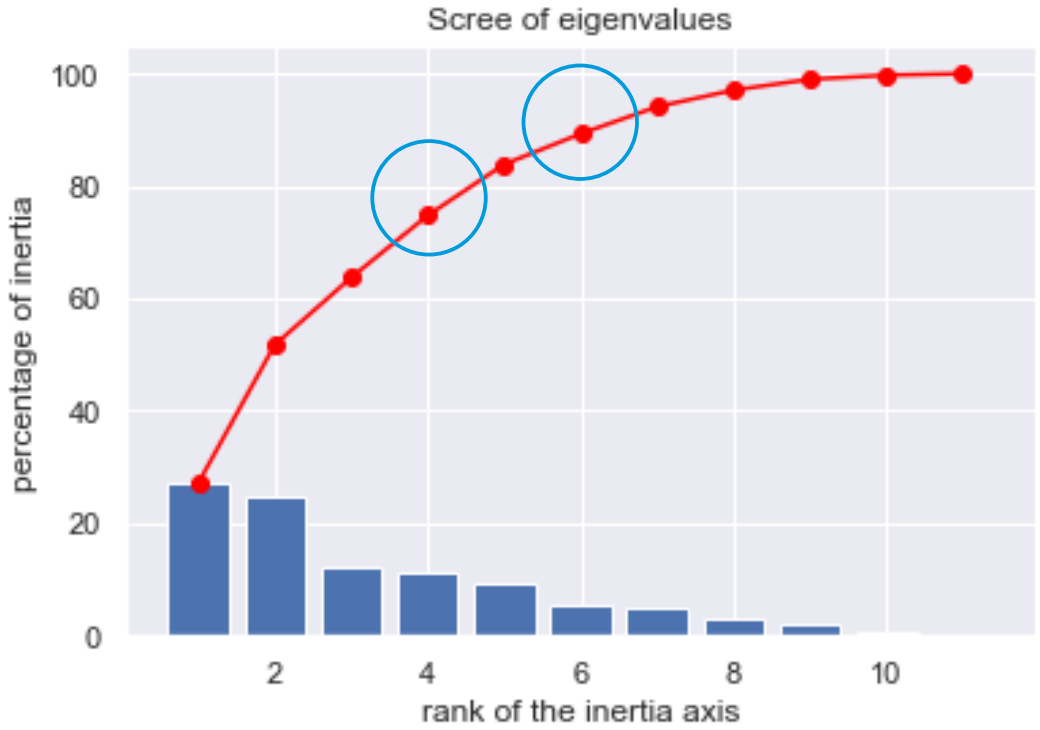


III. Analyse Exploratoire

- L'Analyse en Composantes Principales permet de dégager rapidement les principales tendances de votre échantillon, en diminuant le nombre de variables nécessaires à la représentation de vos données tout en perdant le moins d'informations possible

III. Analyse Exploratoire

Avec 11 composants



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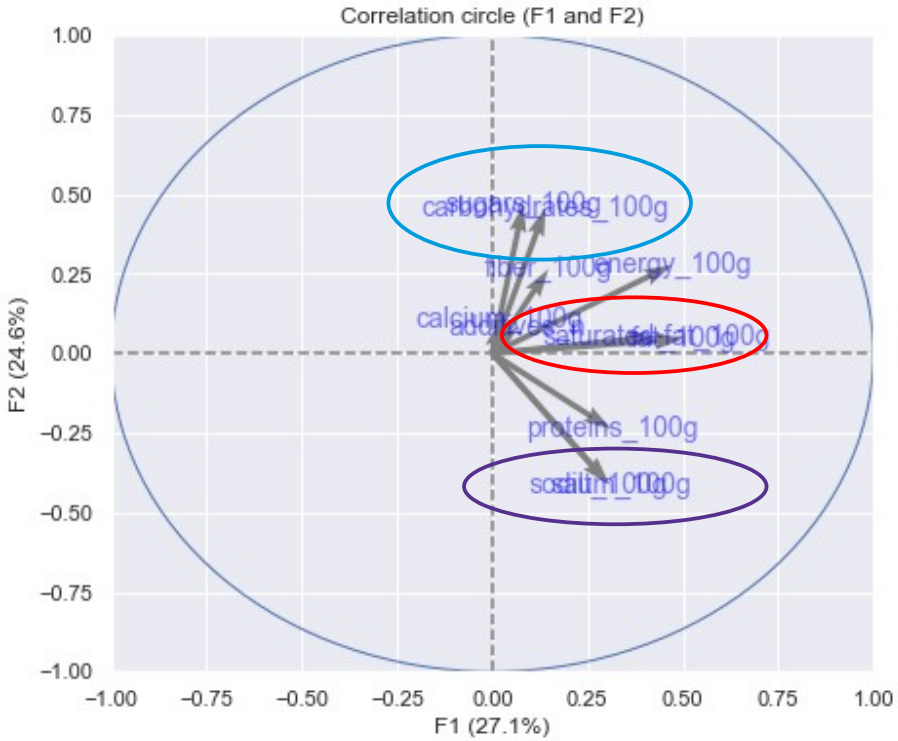
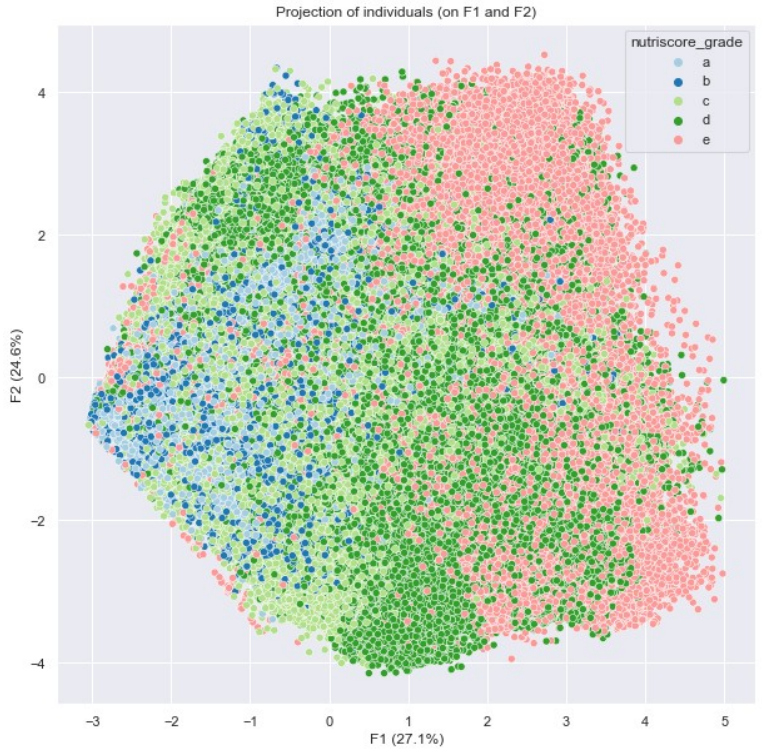
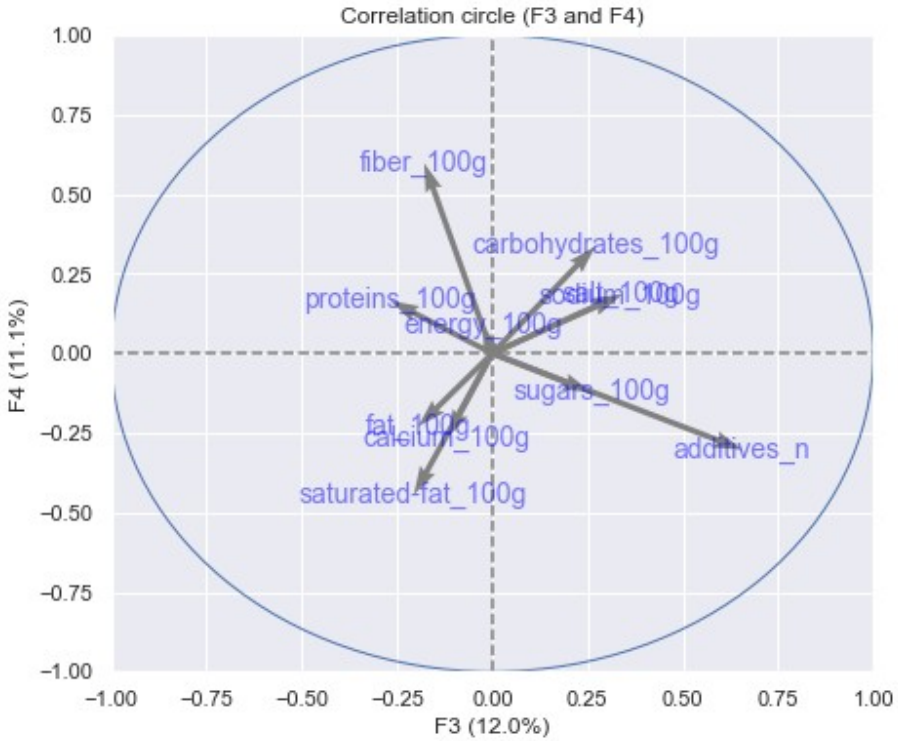
Avec 11 composants

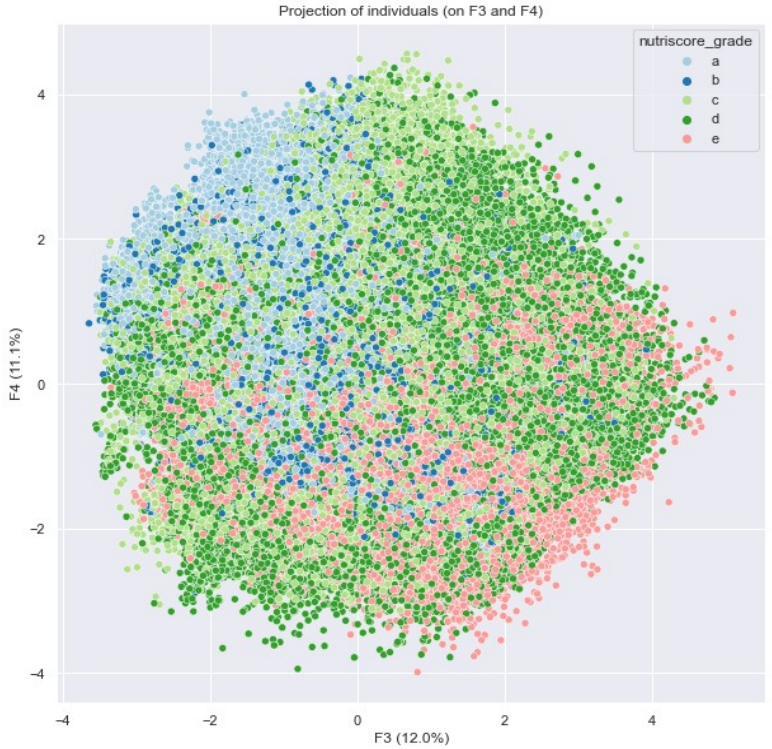




III. Analyse Exploratoire

Avec 11 composants





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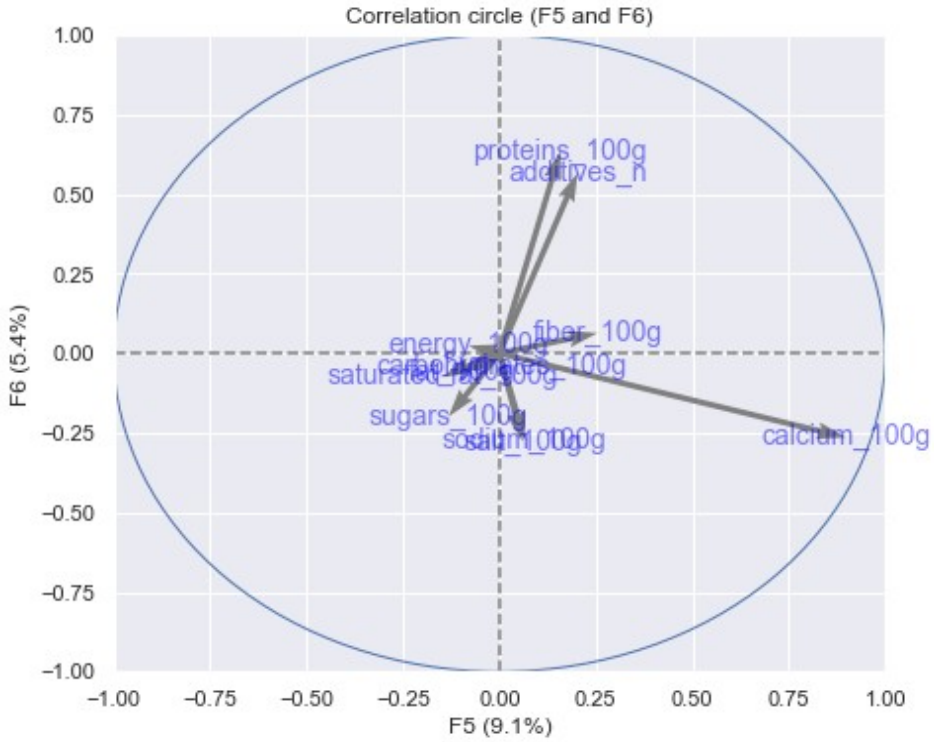
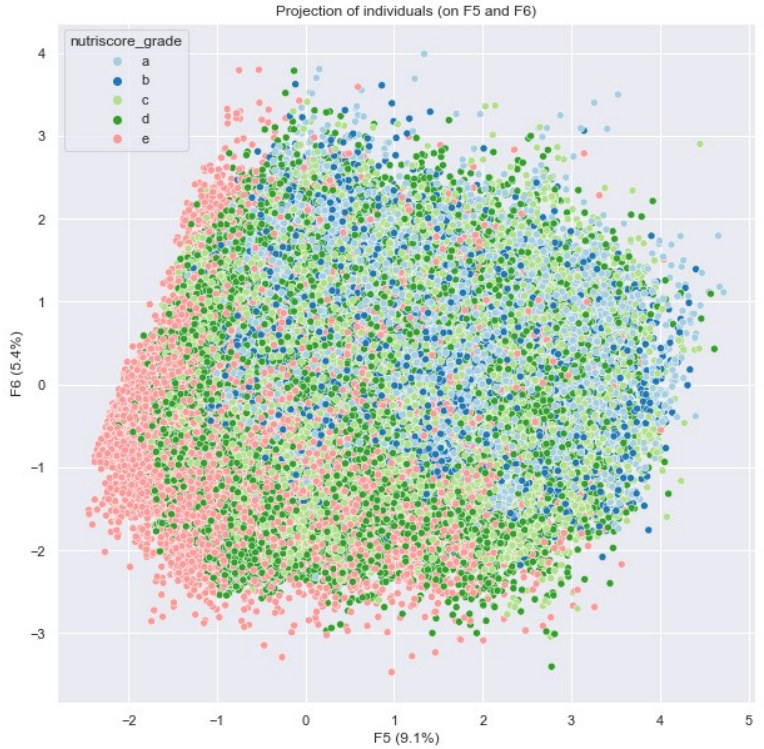
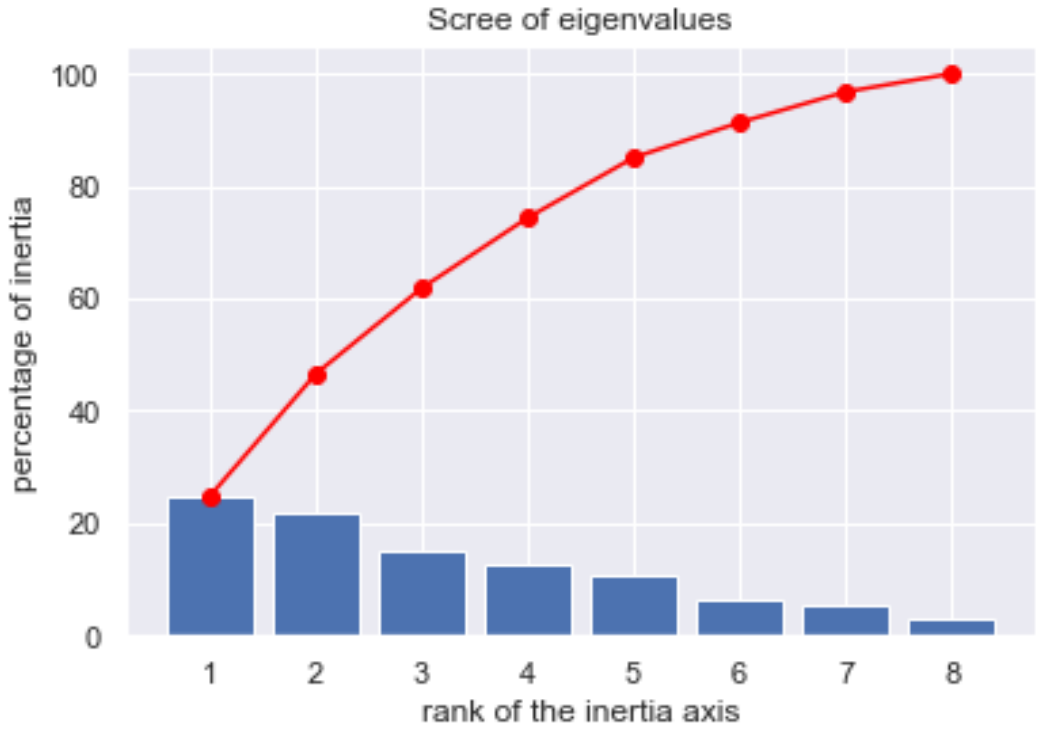
Avec 11 composants





III. Analyse Exploratoire

Avec 8 composants



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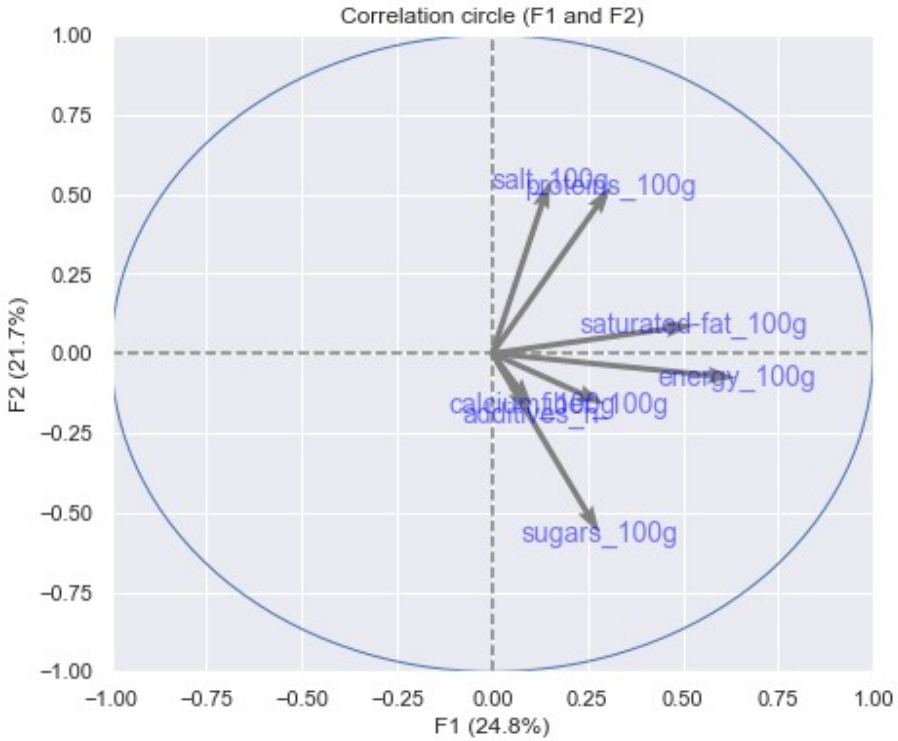

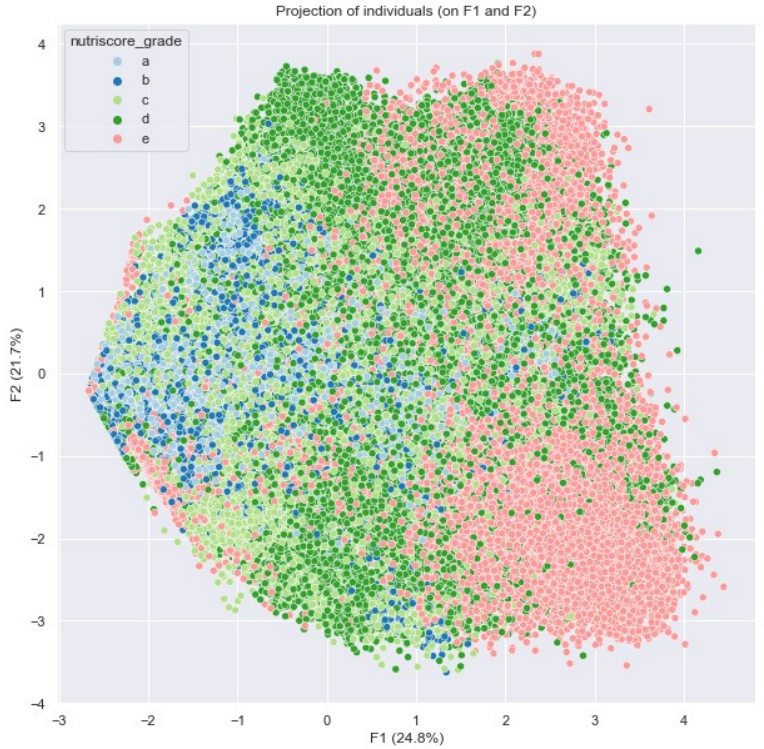

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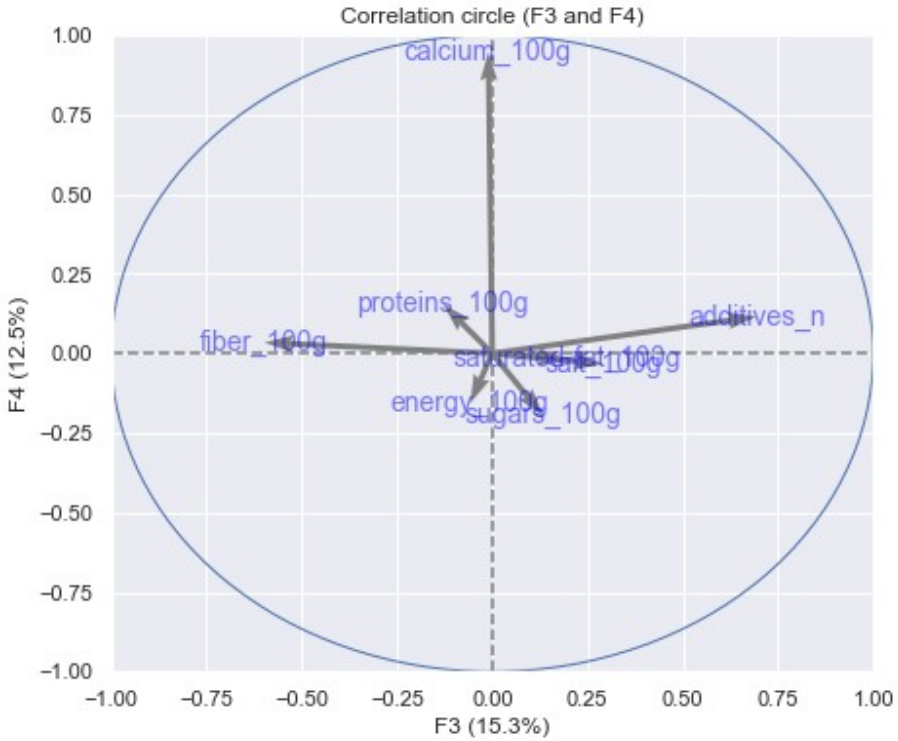

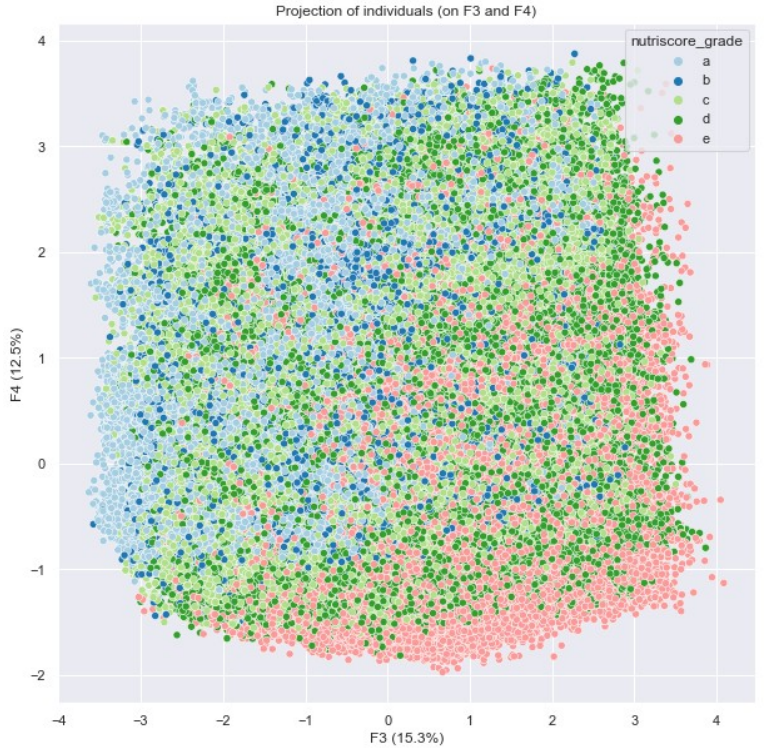

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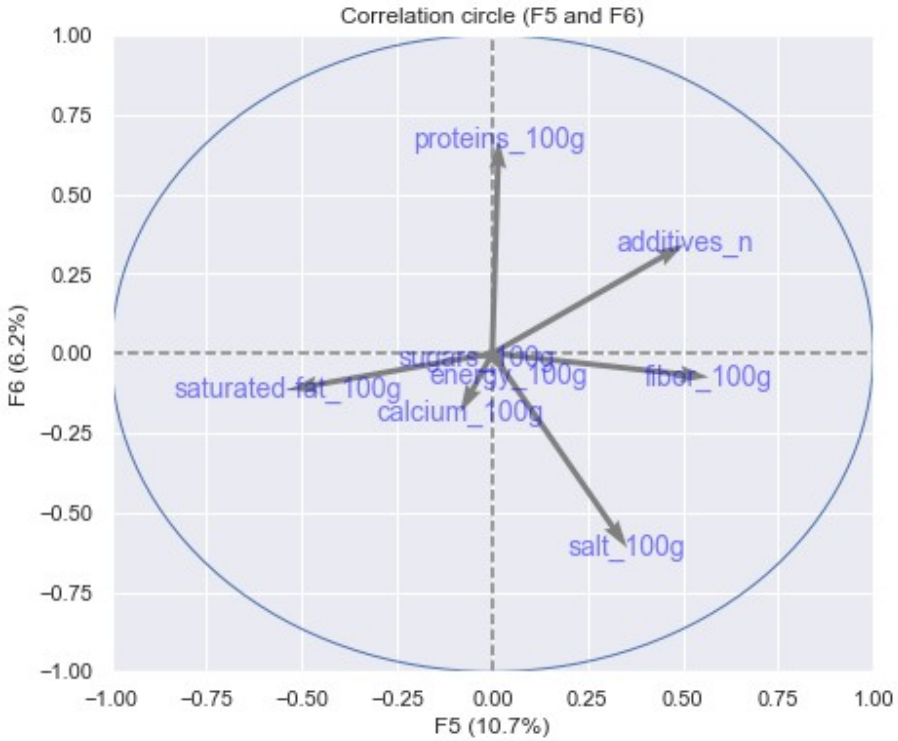
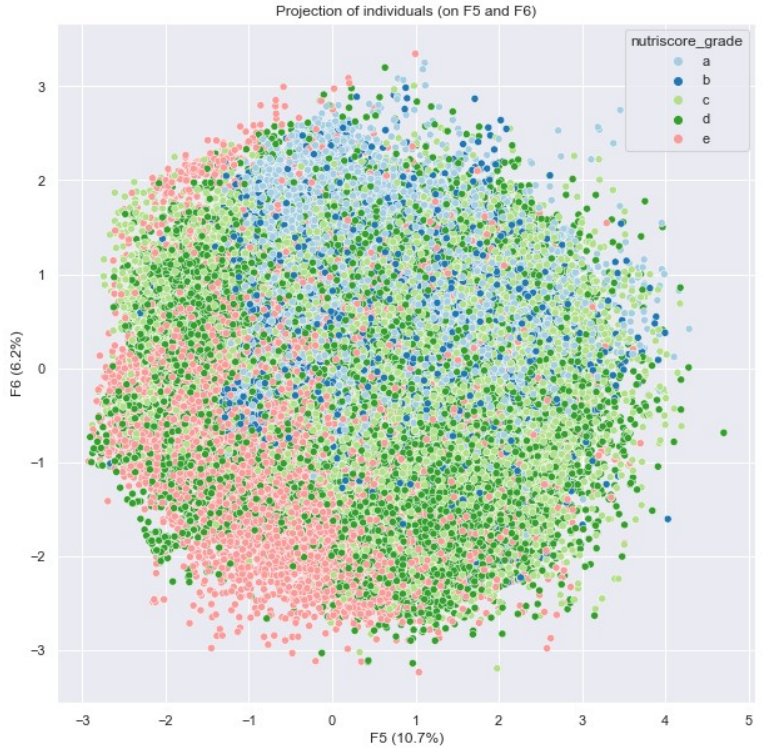
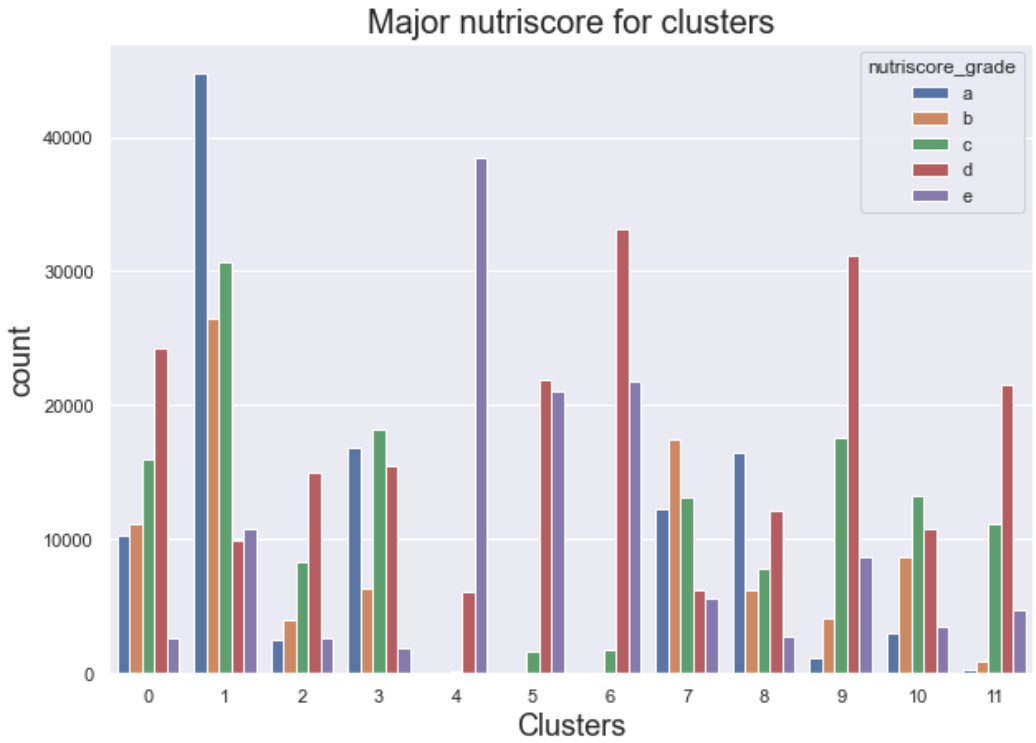
Avec 8 composants





IV. Faits Pertinents

K-means



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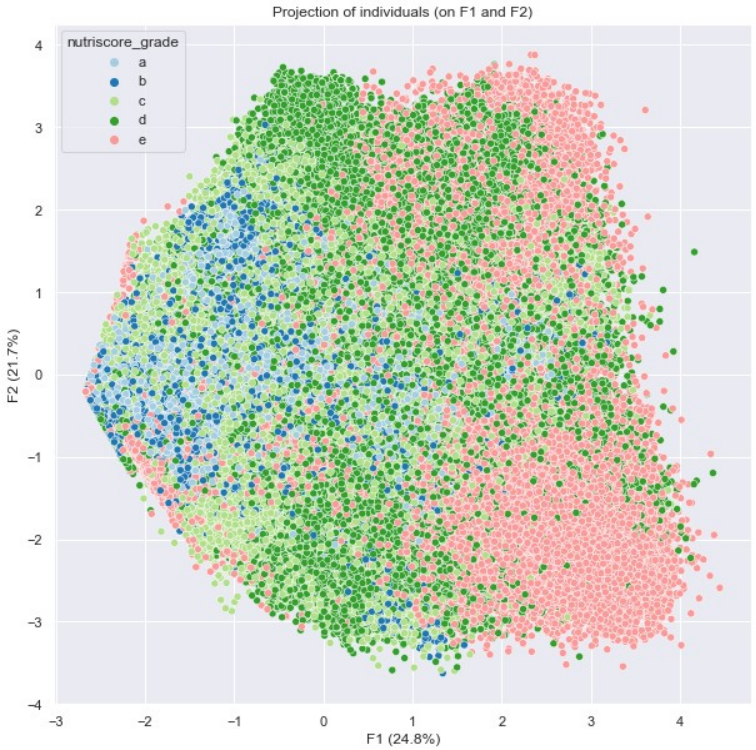
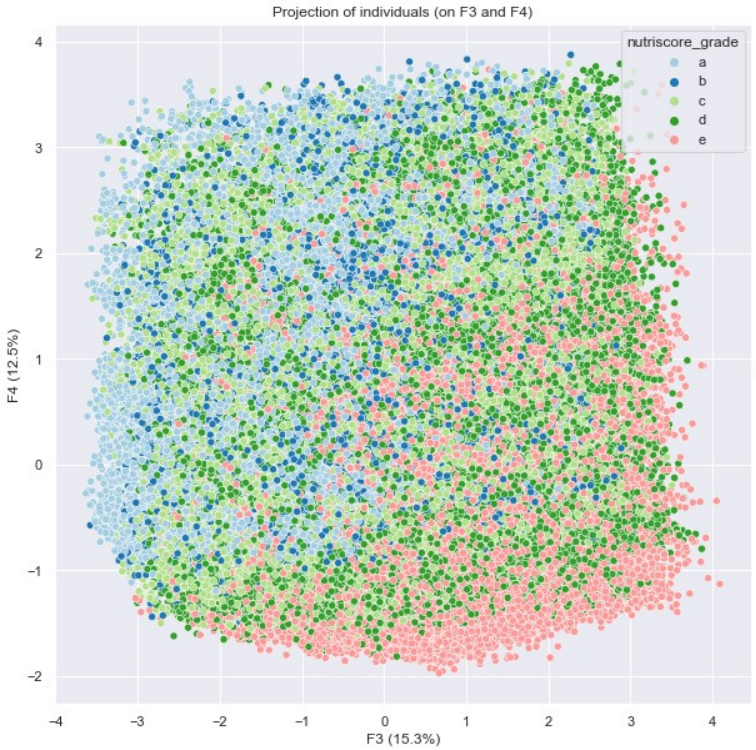
K-means



- Cluster 0 : hams, meats, chicken, salmons, seafood → D, C, B, A
- Cluster 1 : beverages, sauces, vegetables, olive oils → A, C, B
- Cluster 2 : desserts, breads, pizzas → D, C
- Cluster 3 : snacks, cereals → C, A, D
- Cluster 4 : chocolates, biscuits, snacks → E
- Cluster 5 : biscuits, cakes, confectioneries → D, E
- Cluster 6 : cheeses → D, E
- Cluster 7 : yogurts, beverages, milks → B, C, A
- Cluster 8 : snacks, pastas, rices → A, D
- Cluster 9 : sauces, snacks, breads → D, C
- Cluster 10 : sauces, desserts, beverages, breads, snacks → C, D, B
- Cluster 11 : confectioneries, snacks, candies, jams → D, C

IV. Faits Pertinents

K-means



- Cluster 0 : hams, meats, chicken, salmons, seafood → D, C, B, A
- Cluster 1 : beverages, sauces, vegetables, olive oils → A, C, B
- Cluster 2 : desserts, breads, pizzas → D, C
- Cluster 3 : snacks, cereals → C, A, D
- Cluster 4 : chocolates, biscuits, snacks → E
- Cluster 5 : biscuits, cakes, confectioneries → D, E
- Cluster 6 : cheeses → D, E
- Cluster 7 : yogurts, beverages, milks → B, C, A
- Cluster 8 : snacks, pastas, rices → A, D
- Cluster 9 : sauces, snacks, breads → D, C
- Cluster 10 : sauces, desserts, beverages, breads, snacks → C, D, B
- Cluster 11 : confectioneries, snacks, candies, jams → D, C

IV. Faits Pertinents

K-means

- Cluster 0 : hams, meats, chicken, salmons, seafood → D, C, B, A
- Cluster 1 : beverages, sauces, vegetables, olive oils → A, C, B
- Cluster 2 : desserts, breads, pizzas → D, C
- Cluster 3 : snacks, cereals → C, A, D
- Cluster 4 : chocolates, biscuits, snacks → E
- Cluster 5 : biscuits, cakes, confectioneries → D, E
- Cluster 6 : cheeses → D, E
- Cluster 7 : yogurts, beverages, milks → B, C, A
- Cluster 8 : snacks, pastas, rices → A, D
- Cluster 9 : sauces, snacks, breads → D, C
- Cluster 10 : sauces, desserts, beverages, breads, snacks → C, D, B
- Cluster 11 : confectioneries, snacks, candies, jams → D, C

IV. Faits Pertinents

	code	product_name	brands	categories_en	countries_en	ingredients_text	additives_n	nutriscore_score	nutriscore_grade
371395	3274616130353	Shiitakes	Saveur ASIATIQUE	Plant-based foods and beverages,Plant-based fo...	France	Shiitoké (lentinus edodes) Produit sujet à des...	0.0	-14.0	a
179913	05012343	Asperge Blanches des sables des Landes	Priméale	Plant-based foods and beverages,Plant-based fo...	France	Asperges blanches fraîches des sables des Landes.	0.0	-15.0	a
45580	0036632008817	Blended greek yogurt	NaN	Dairies,Fermented foods,Fermented milk product...	United States	Cultured grade a non fat milk, chicory root fi...	4.0	-9.0	a
362287	3263859883713	Fonds artichauts	Leader Price	Plant-based foods and beverages,Plant-based fo...	France	Fonds d'artichauts.	0.0	-15.0	a
209148	0734020610160	Crunchies	NaN	Snacks	United States	Strawberries	0.0	-1.0	a
243142	0854995003481	Flavored bar	NaN	Snacks	United States	WHOLE GRAIN BARLEY FLAKES[caret] (22%), INULIN...	4.0	-3.0	a
235167	0846548063837	Walnuts	Cibo Vita Inc	Plant-based foods and beverages,Plant-based fo...	United States	Natural shelled walnuts.	0.0	0.0	b
4240	0011110856616	Private selection, edamame, unshelled tender s...	Private Selection	Plant-based foods and beverages,Plant-based fo...	United States	Edamame (soybean in pod)	0.0	-14.0	a
25806	0021140260932	Winn-dixie, crowder peas	Winn-Dixie, Winn-Dixie Stores Inc.	Plant-based foods and beverages,Plant-based fo...	United States	Crowder peas, water.	0.0	-14.0	a

26		Fèves à la purée de sésame	California Garden	Plant-based foods and beverages,Plant-based fo...	France	fèves (65%), eau (28,06%), pâte de sésame (15%...	2.0	-9.0	a
30		Signature edamame with asian seasoning	Pictsweet	Plant-based foods and beverages,Plant-based fo...	United States	Edamame (soybeans), maltodextrin, salt, soy sa...	4.0	-12.0	a
188947	0665072630151	100% natural fruit pulp for juice & smoothie	NaN	Plant-based foods and beverages,Plant-based fo...	United States	Tamarind	0.0	-6.0	a

IV. Faits Pertinents

- Application sur un produit sélectionné de manière random :

	product_name	brands	main_category_en	nutriscore_grade	Clusters
261405	Isabar	Isagenix	Cereal bars	c	3

- nutriscore_grade prédit par Knn algorithme :

```
array(['d'], dtype=object)
```

V. Synthèse

- Les variables sont influentes sur le nutriscore.
- Il est possible de classer les produits par ses composants.
- Il faudra faire une classification à partir des données textuelles et visuelles pour de meilleur résultat.
- Les premiers classements avec les composants semblent cohérents.