SEGMENTATION DES CLIENTS DU SITE E-COMMERCE OLIST

PROJET N°5
PARCOURS « DATA SCIENTIST »

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SOUTENANCE DE PROJET

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Plan de la présentation

I. Présentation de la problématique

II. Préparation des données et exploration

III. Pistes de modélisations

IV. Présentation du modèle final

Rappel de la problématique

- Mission de consultant pour Olist, site de e-commerce brésilien
- solution de vente sur les marketplaces en ligne

OBJECTIFS:

- Fournir aux équipes d'e-commerce une segmentation des clients pour les campagnes de communication
- Comprendre les différents types d'utilisateurs
- Fournir une description actionnable de la segmentation
- Analyser la stabilité au cours du temps des segments (dans le but d'établir un contrat de maintenance)

II – PRÉPARATION DU JEU DE DONNÉES

Cleaning
Feature engineering
Exploration

Customers

- customer_id
- customer_unique_id
- customer_zip_code_prefix
- customer_city
- customer_state

Geolocation

- geolocation_zip_code_prefix
- geolocation_lat
- geolocation_lng
- geolocation_city
- geolocation_state

Orders

- order_id
- customer_id
- order_status
- order_purchase_timestamp
- order_approved_at
- order_delivered_carrier_date
- order_delivered_customer_date
- order_estimated_delivery_date

Order Items

- order_id
- order_item_id
- product_id
- seller_id
- shipping_limit_date
- price
- freight_value

Order Payments

- order_id
- payment_sequential
- payment_type
- payment_installments
- payment_value

Order Reviews

- review_id
- order_id
- review_score
- review_comment_title
- review_comment_message
- review_creation_date
- review_answer_timestamp

Products

- product_id
- product_category_name
- product_name_lenght
- product_description_lenght
- product_photos_qty
- product_weight_g
- product_lenght_cm
- product_height_cm
- product_width_cm

Sellers

- seller_id
- seller_zip_code_prefix
- seller_city
- seller_state

Product Category Name Translation

- product_category_name
- product_category_name_english

Inspection de l’intégrité des données et mesures curatives

1- Renommer "customer_zip_code_prefix" et "geolocation_zip_code_prefix" pour pouvoir merger les deux dataset.

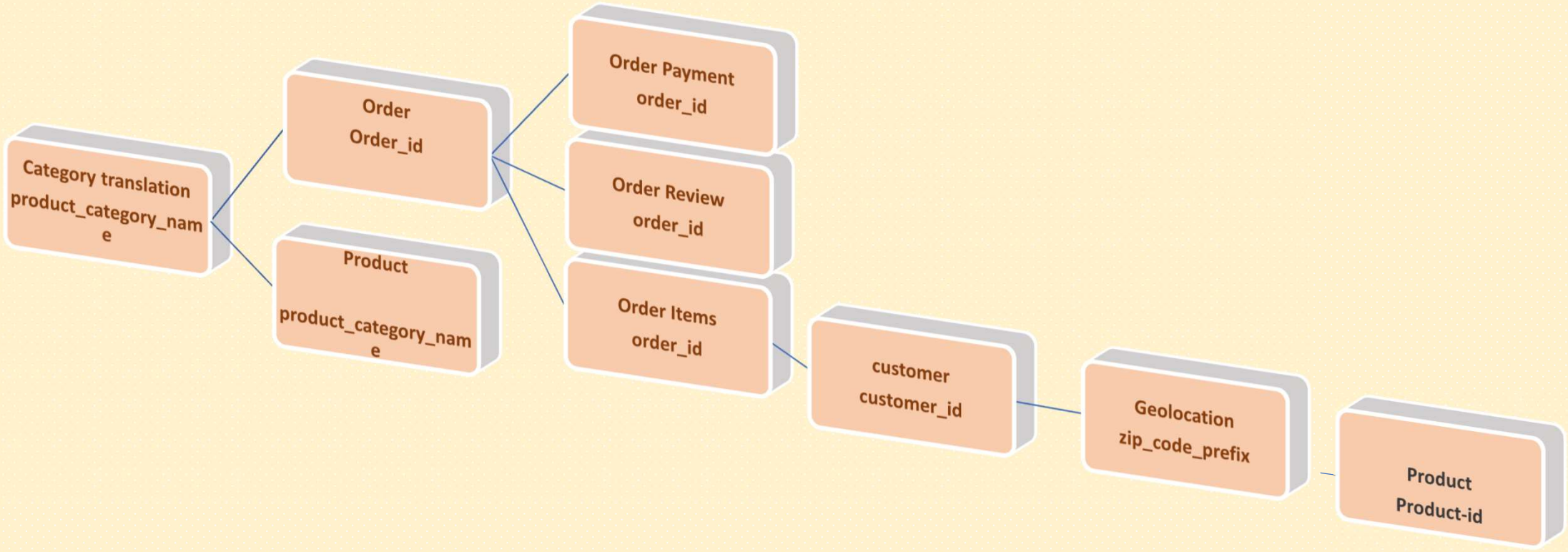
2- Suppression des lignes dupliquées :

- La présence de lignes dupliquées dans la Table de géolocalisation

3- La présence de valeurs manquantes ?

- Table des commandes
- Table des évaluations
- table des produits

Jointures des tables

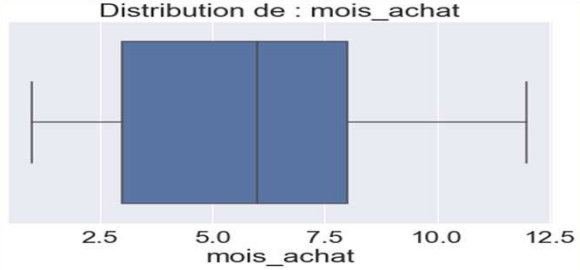


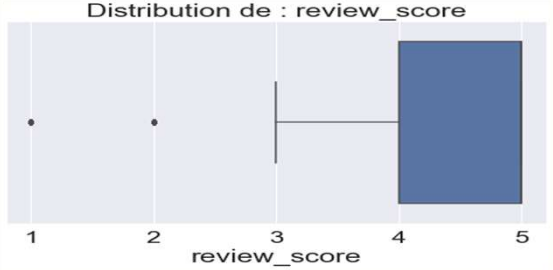
Quelques Modifications pendant les jointures des tables

- Suppression des variables inutiles comme "product_photos_qty,
- Création de variable "order_delivered" à la place de " order_status‘’
- Modification des types de données en datetime pour les colonnes temporelles
- Création des variables comme :
  - l’heure d’achat,
  - jour de la semaine d’achat,
  - mois_achat

Principales étapes du nettoyage après la jointure des tables

- **Suppression des lignes contenant des valeurs manquantes**
- **Suppression des lignes dupliquées**
- **Traitement des valeurs aberrantes**



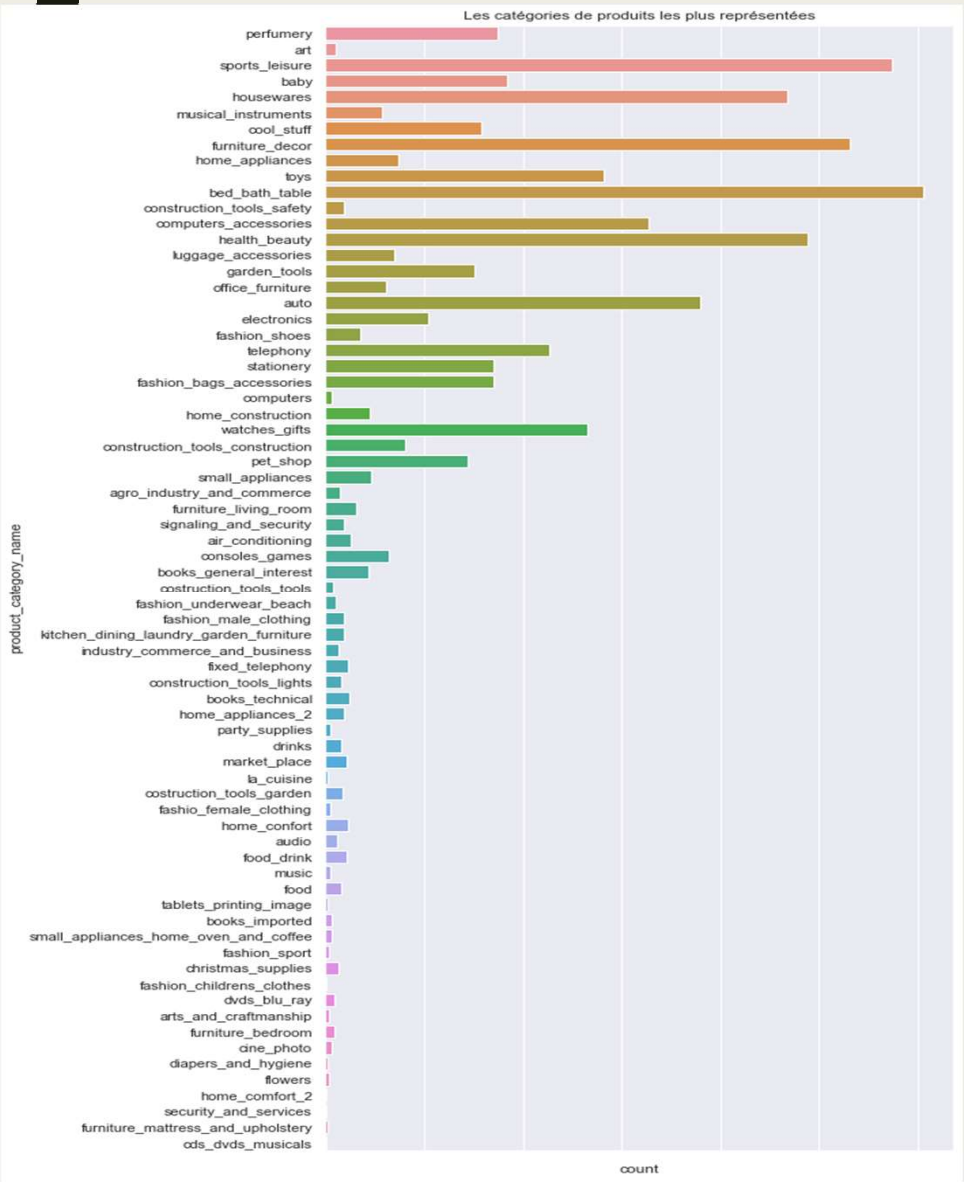


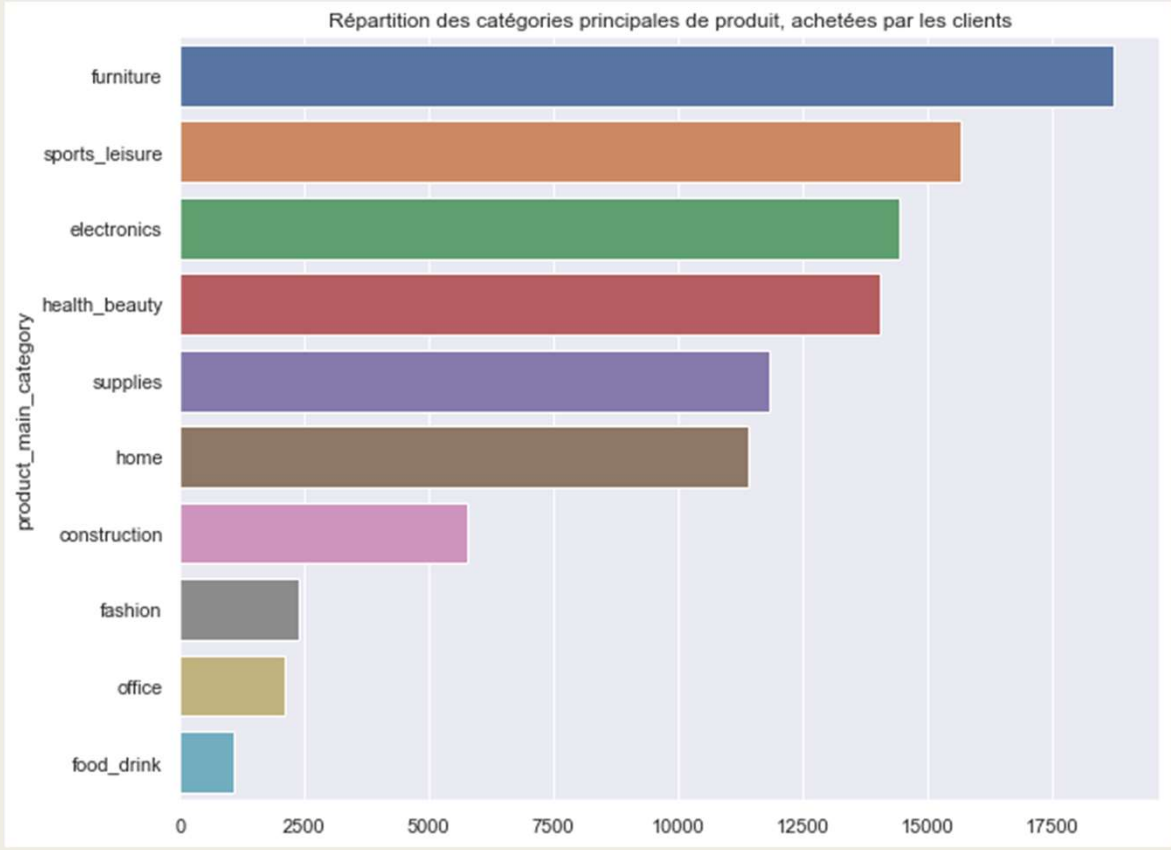
  - ***Isolation forest***
  - ***suppression de ligne : payment_installments ==0***

Feature engineering

- **Réduction du nombre de catégories de produits (de 71 à 10)**
- **Suppression de 'geolocation_state' et 'geolocation_city'**
- **Création de nouvelles features :**
  - ***paid_credit_card***
  - ***first_order***
  - ***last_order***
  - ***Récence (date de la dernière commande) (R)***
  - ***Fréquence des commandes (F)***
  - ***Montant de la commande sur une période donnée(M)***
  - ***Distance Haversine entre l'état du client (moyenne des latitudes et longitudes de l'état) et le siège de Olist :***
  - ***Etc***
- ***Assemblage dans une table unique avec l'index l'id client***

Exploration





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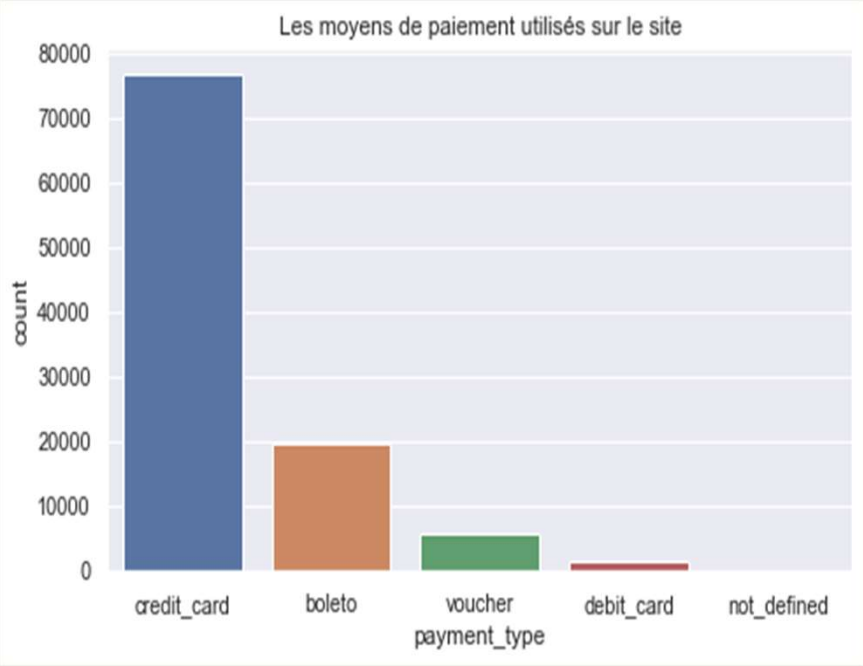

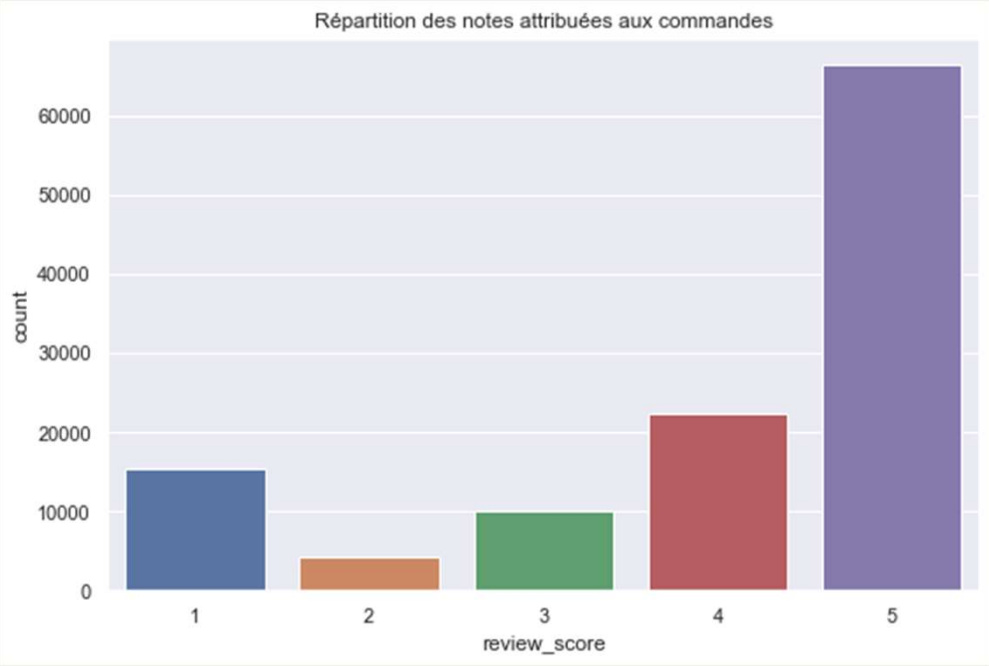

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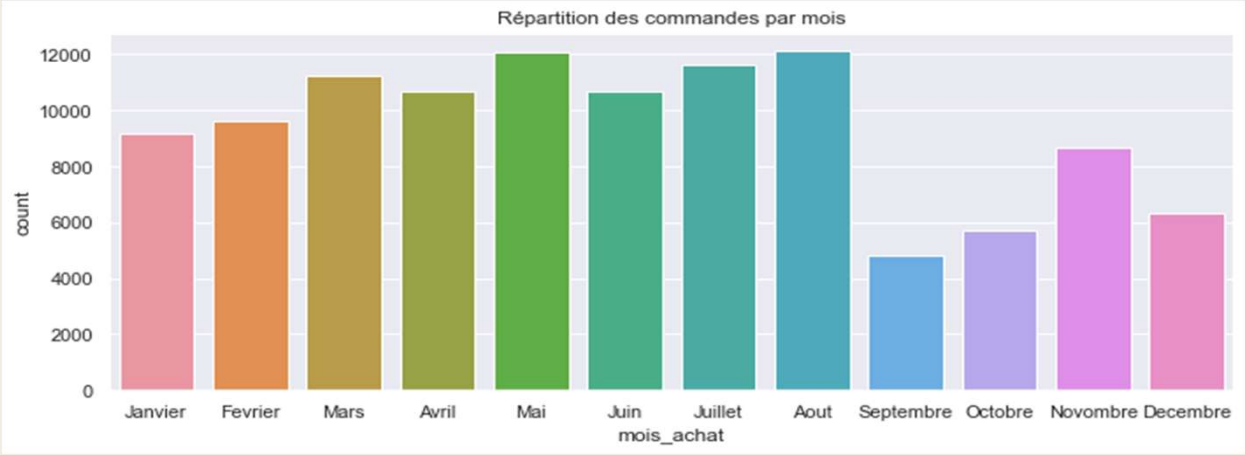

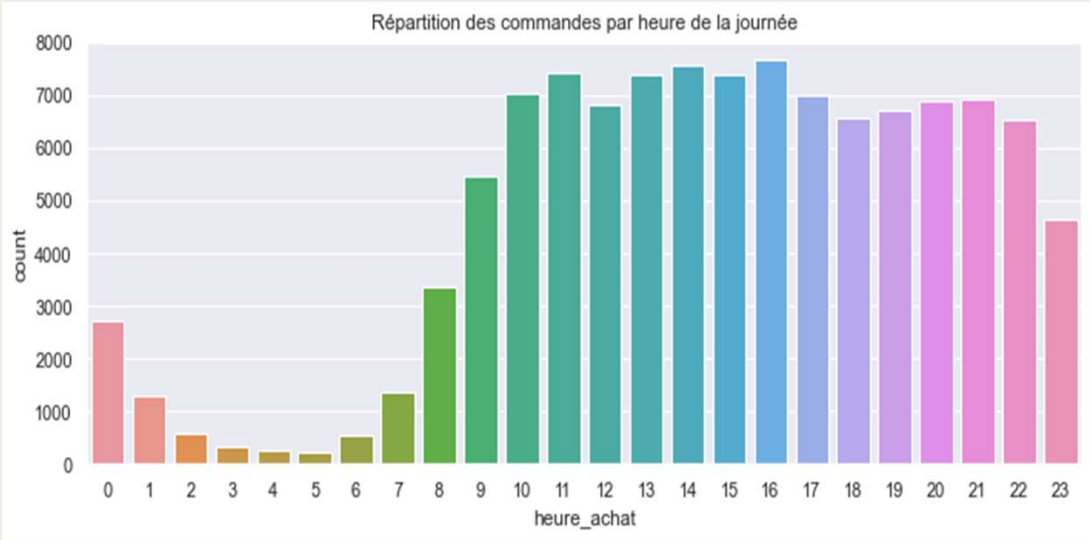

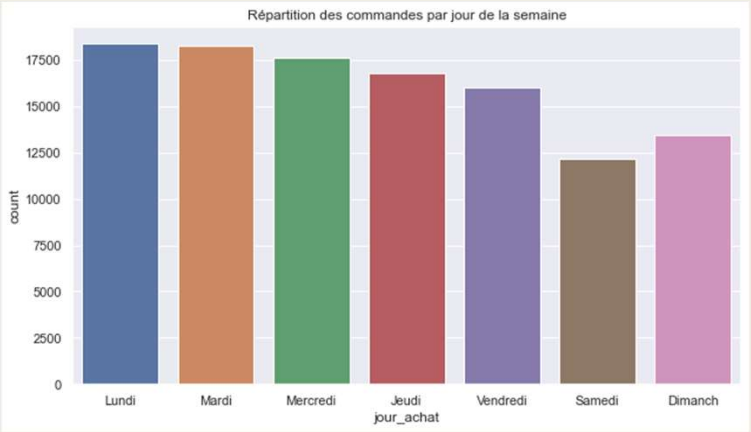

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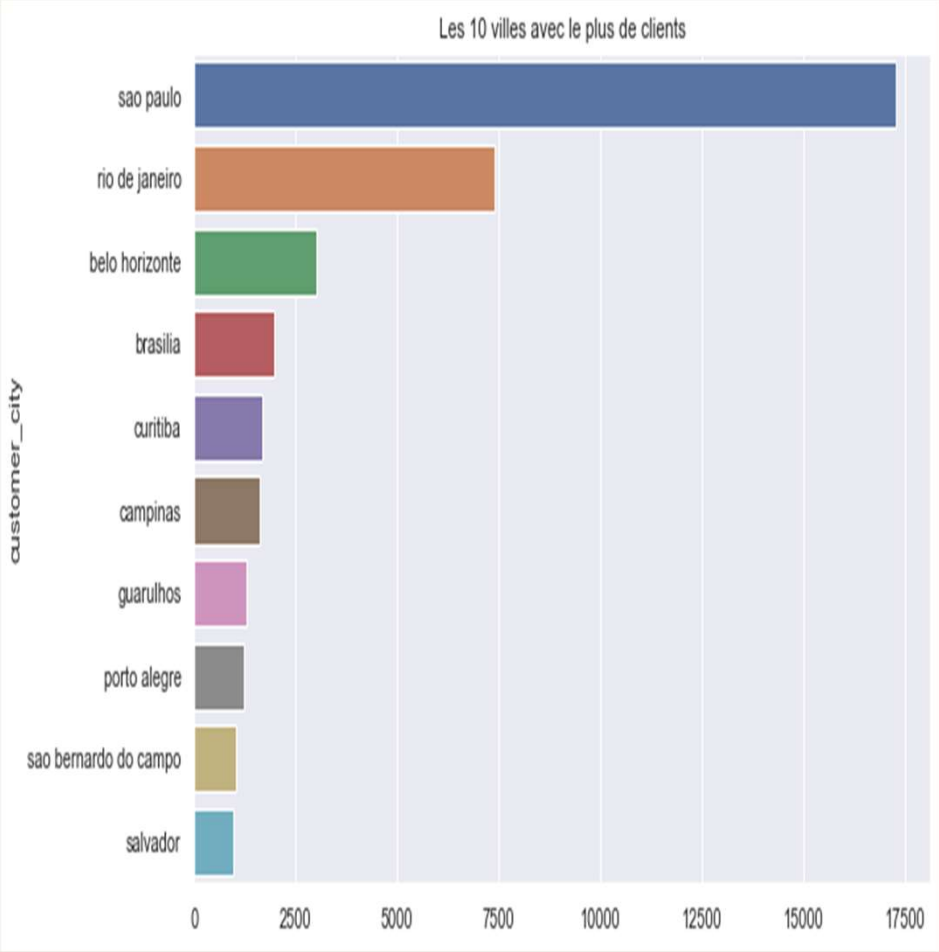
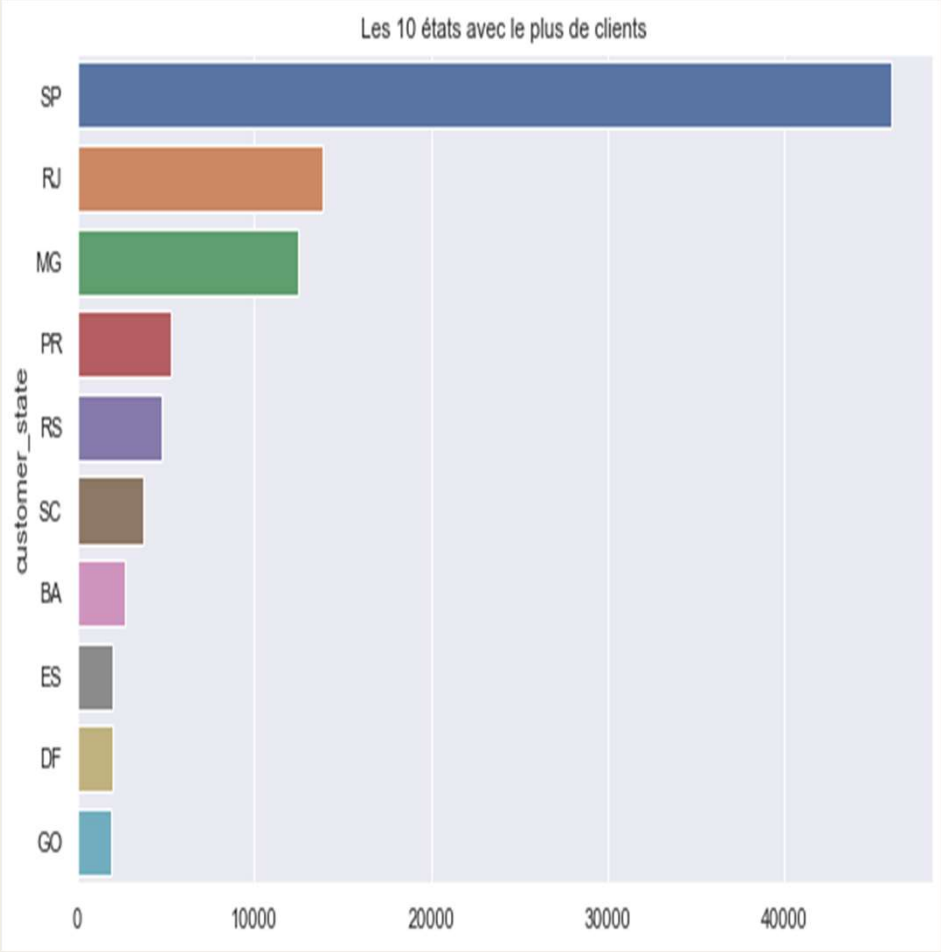
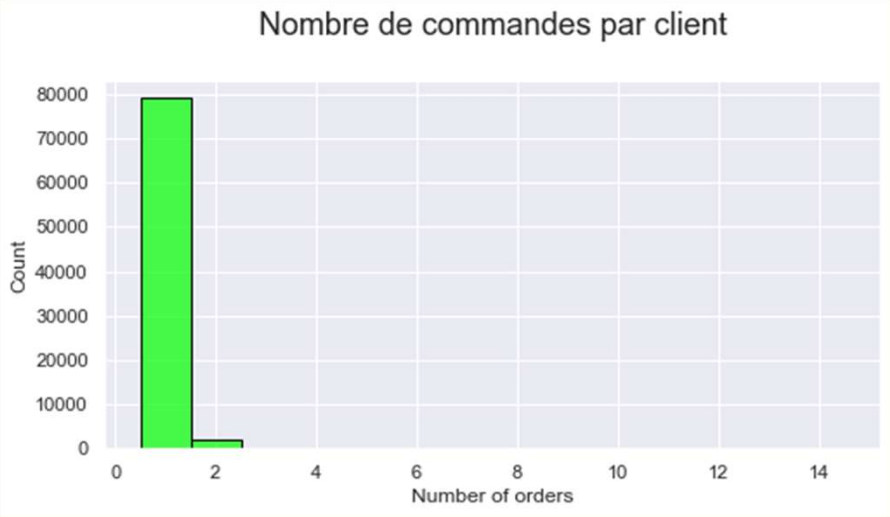
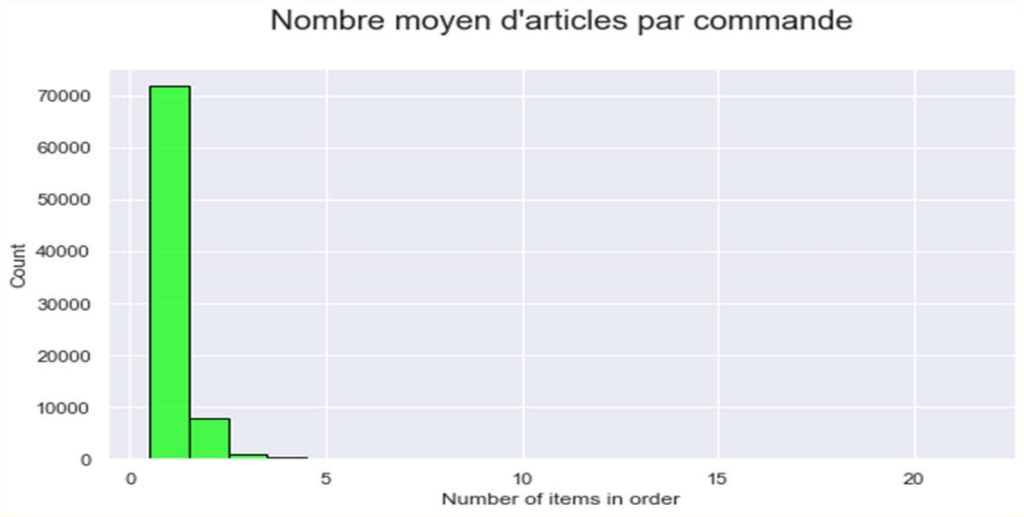




Exploration

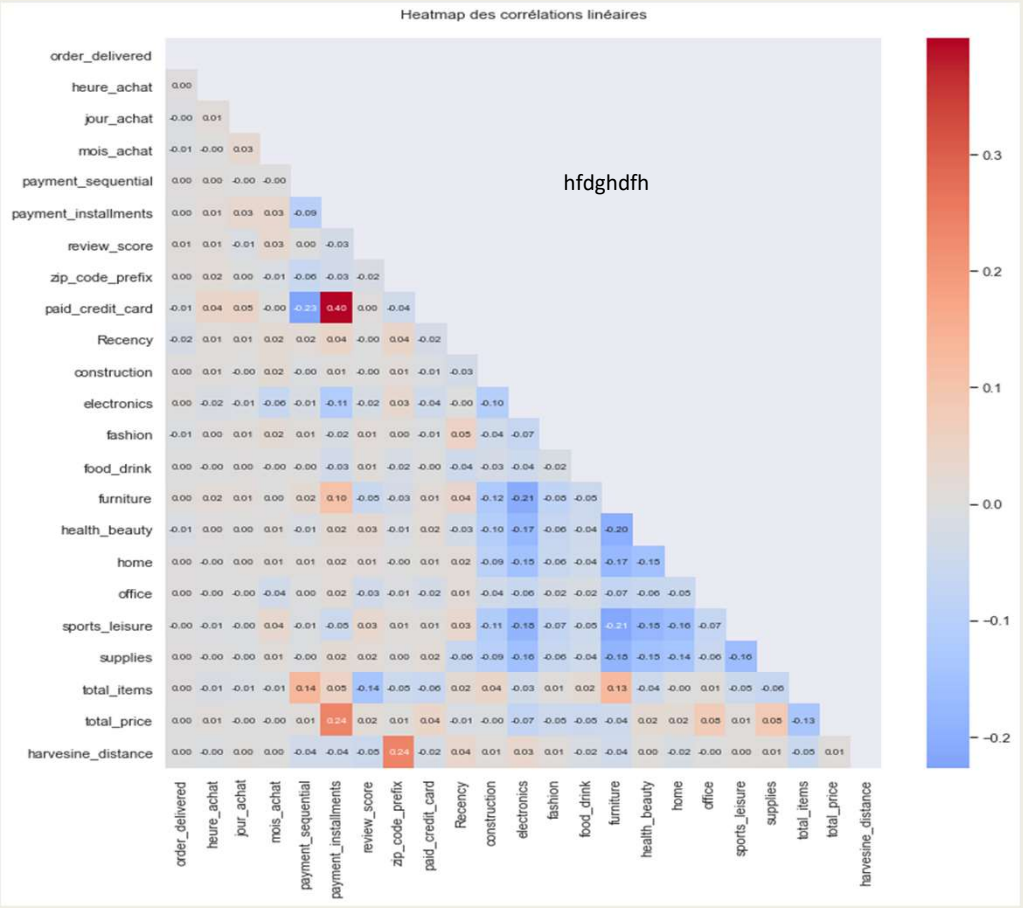
- Récence (R)- nombre de jours écoulés depuis le dernier achat
- Fréquence (F)

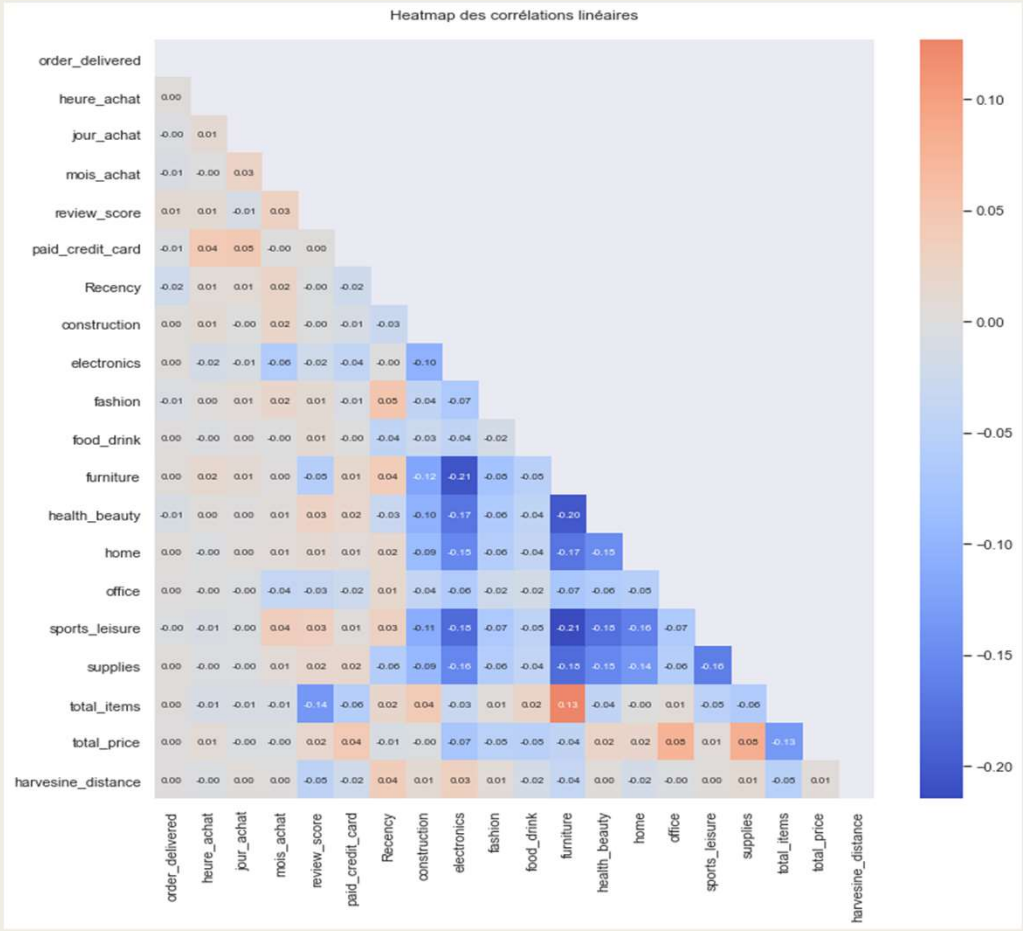




- Montant :
  - total_price = price + freight_value

Exploration





- **Suppression des variables corrélées: « payment_installments », «payment_sequential », « zip_code_prefix »**

Jeu final

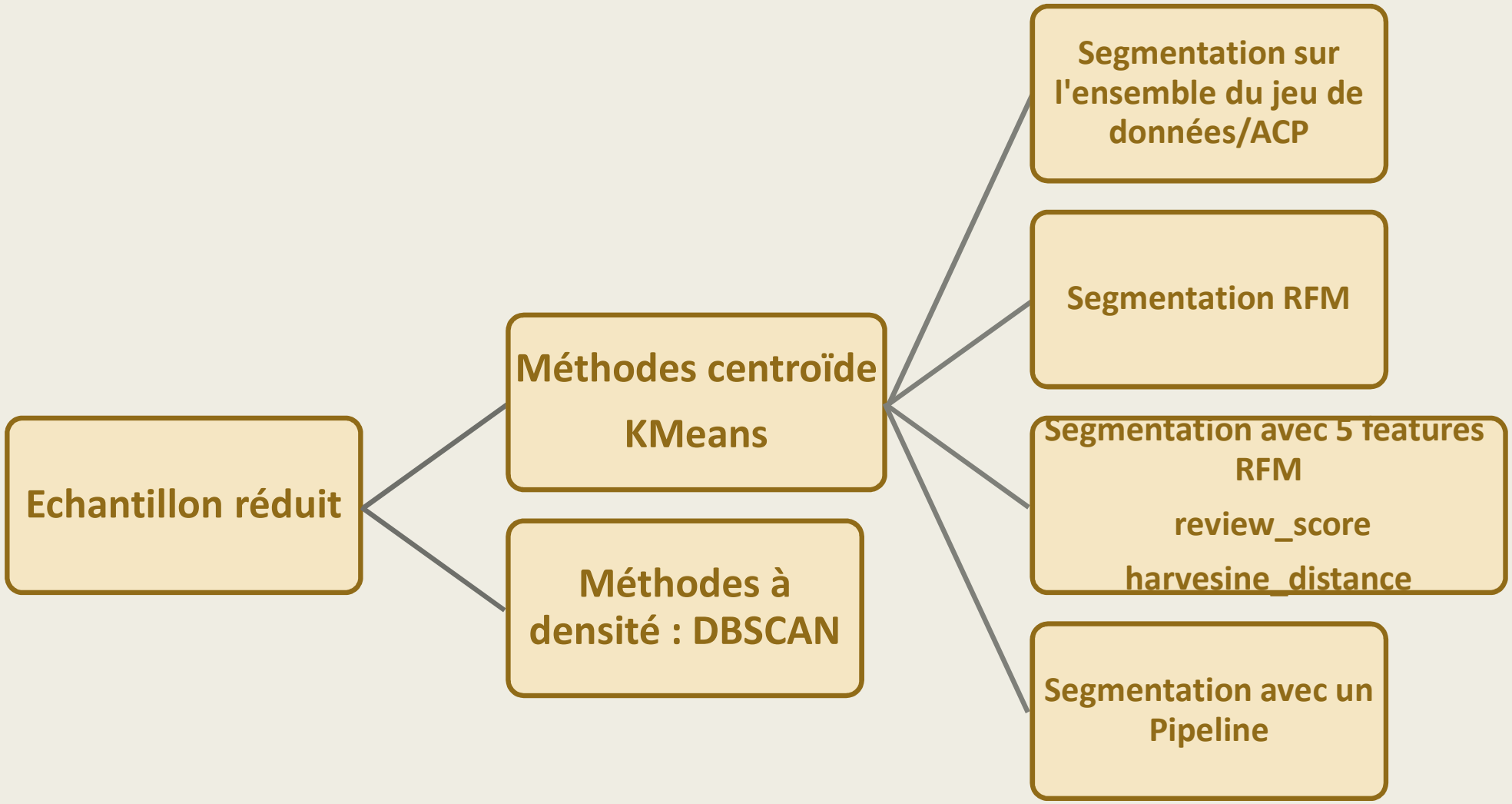
- **97445 lignes**
- **31 colonnes**

Essais des différentes approches de modélisation

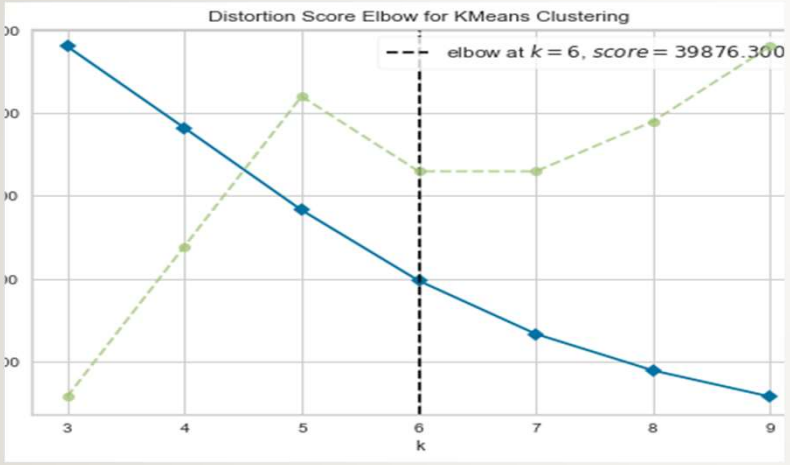
Préparation des données : Finalisation

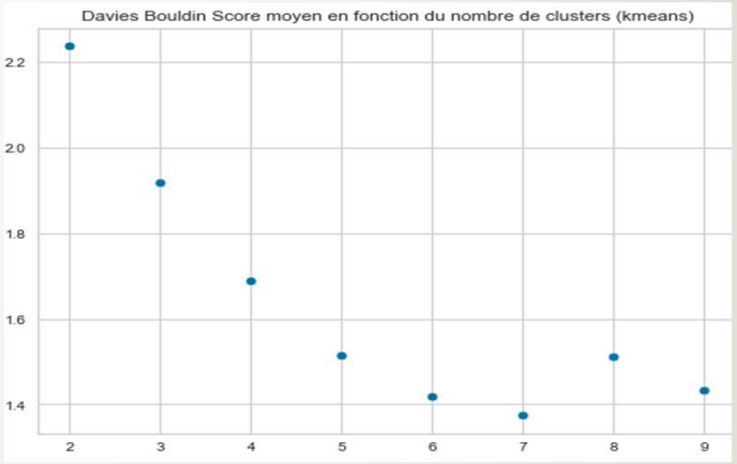
- ❑ Suppression des features non adaptées comme « product_id »
- ❑ Normalisation
- ❑ Sélection des features pour la segmentation

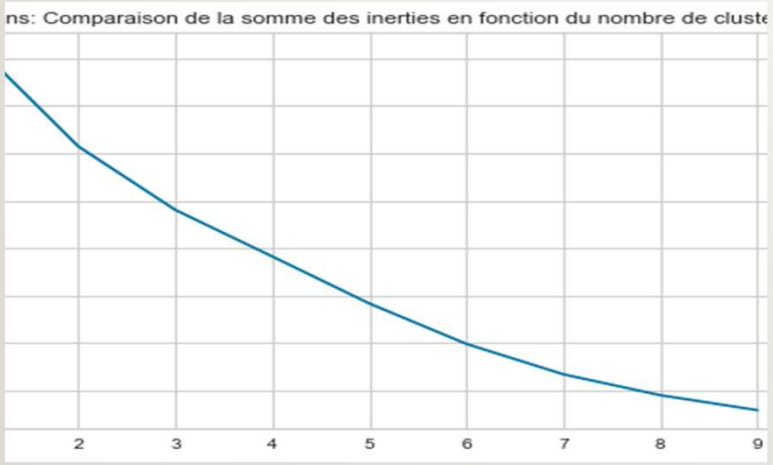
Processus de modélisation

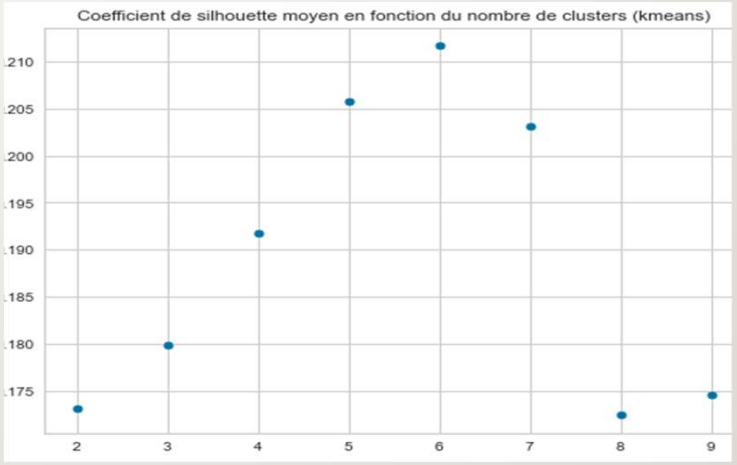


KMeans





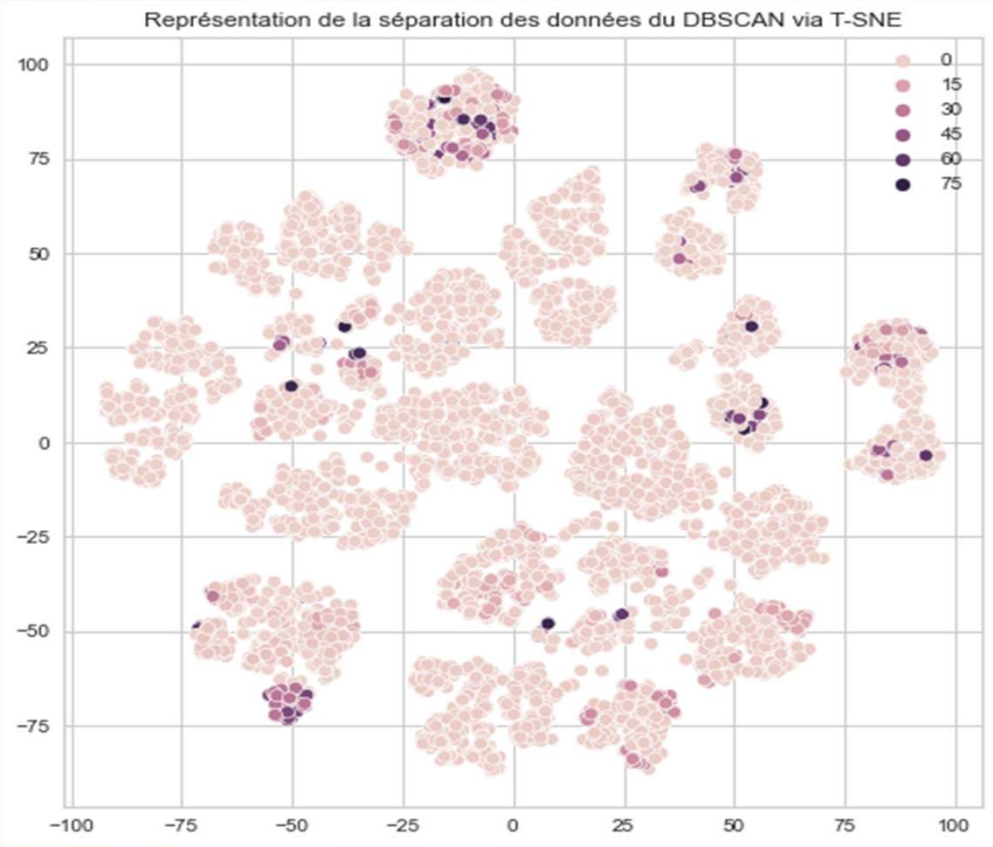




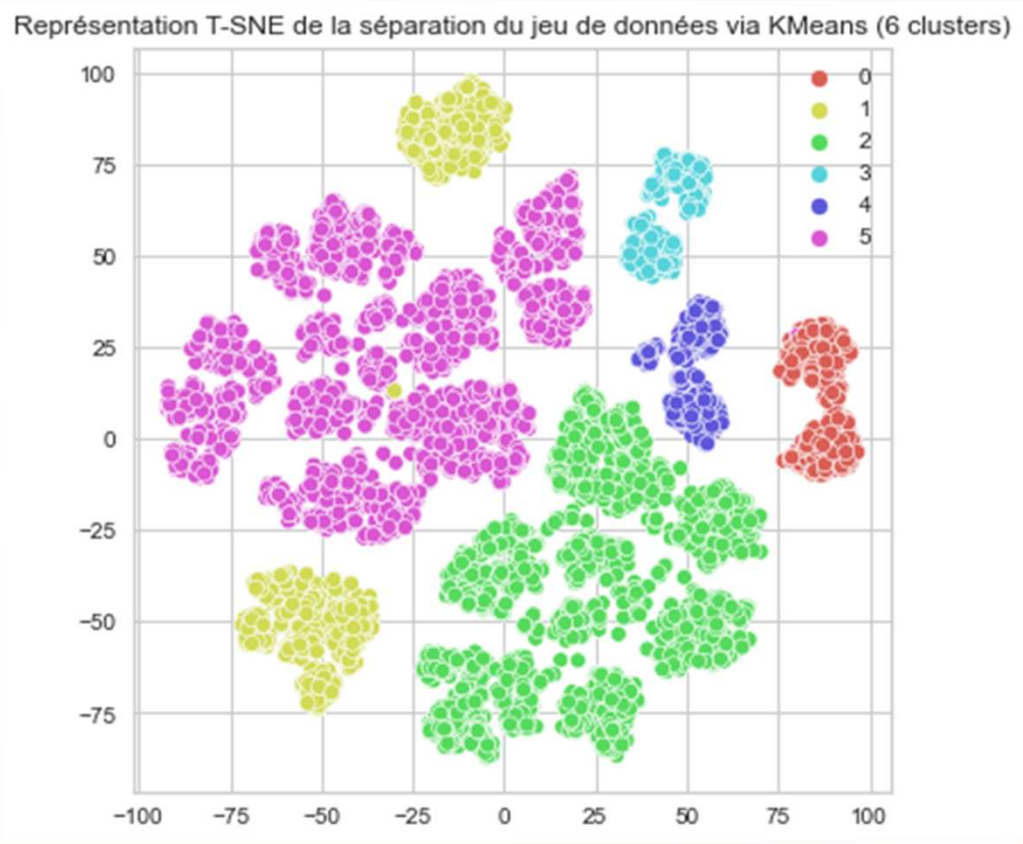
Le Best K

Visualisation via T-SNE

DBSCAN

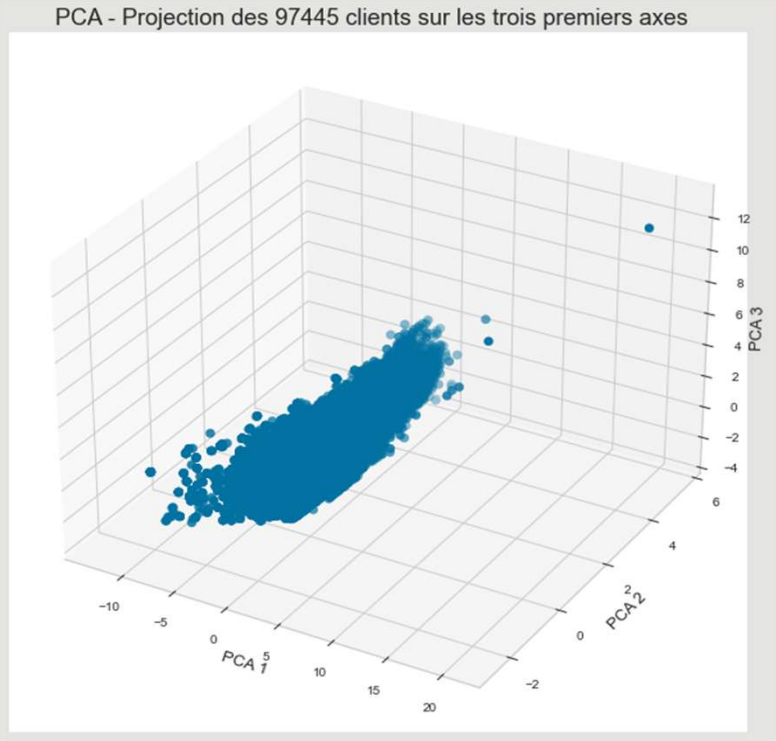


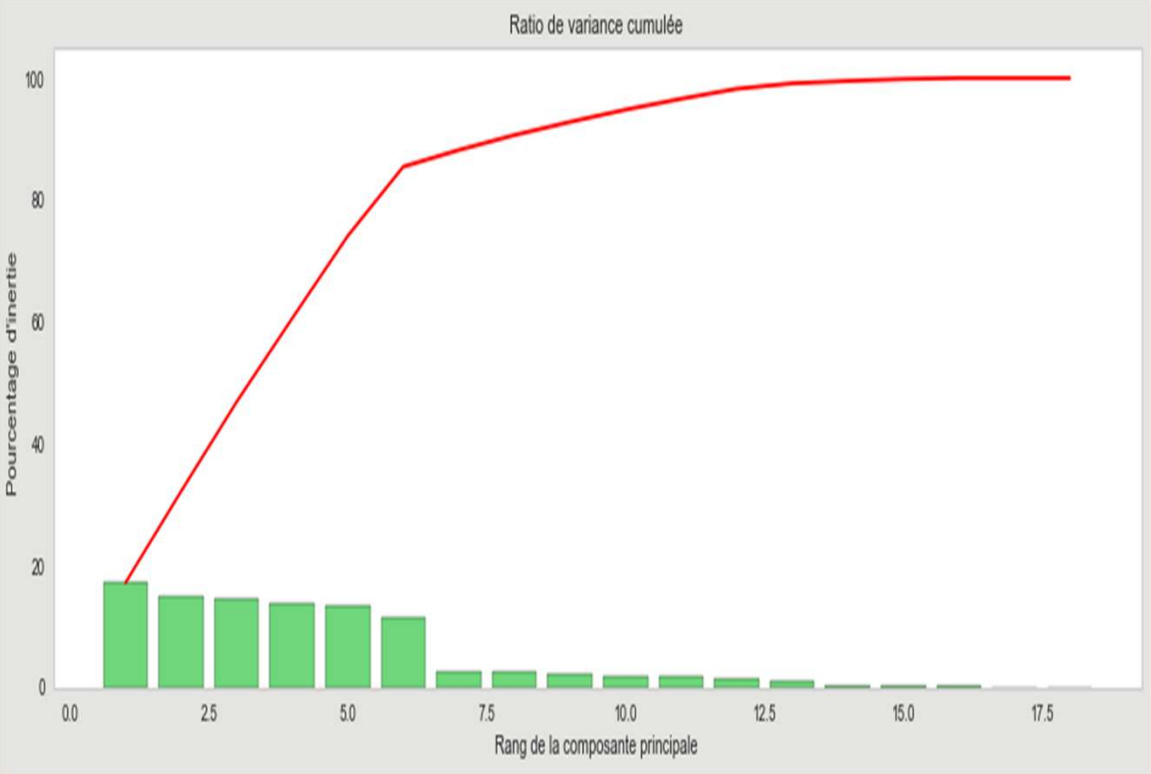
KMeans



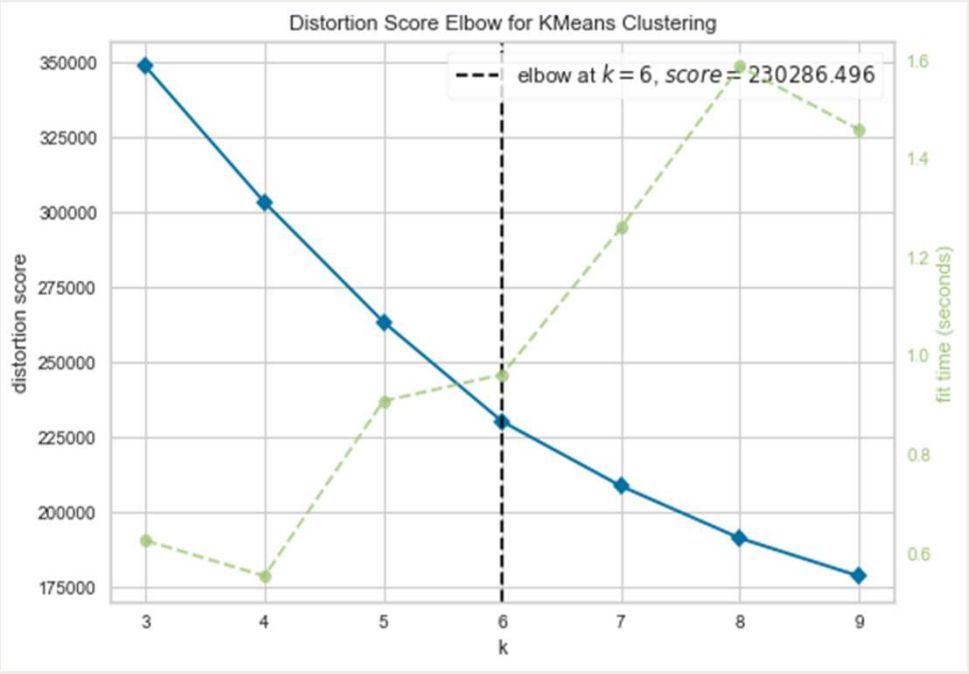
Segmentation sur l'ensemble du jeu de données

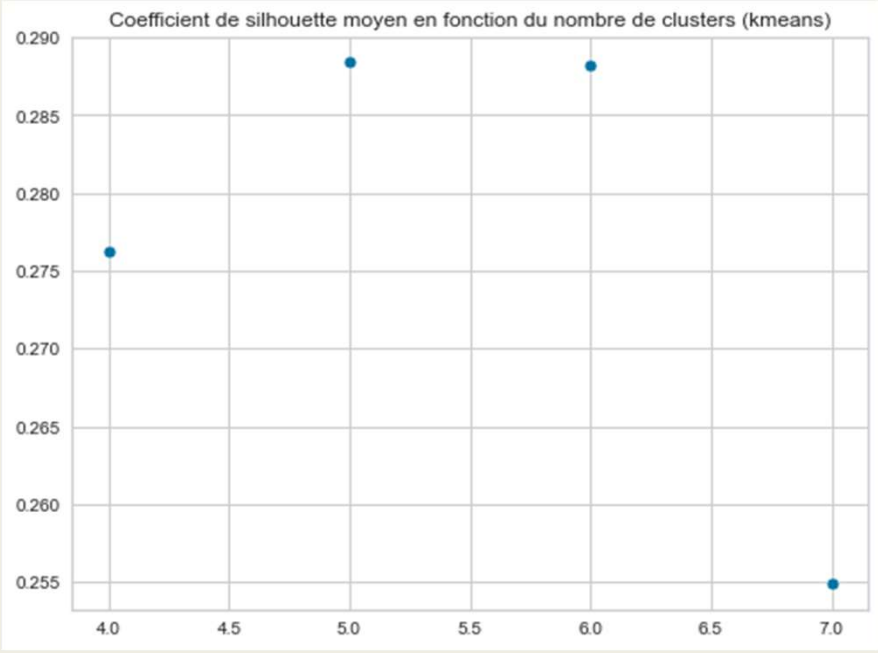
Réduction de dimension par ACP





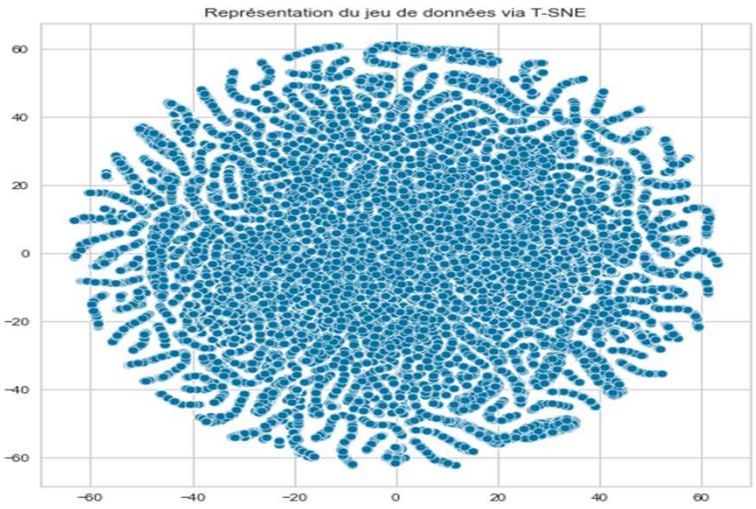
Segmentation sur l'ensemble du jeu de données

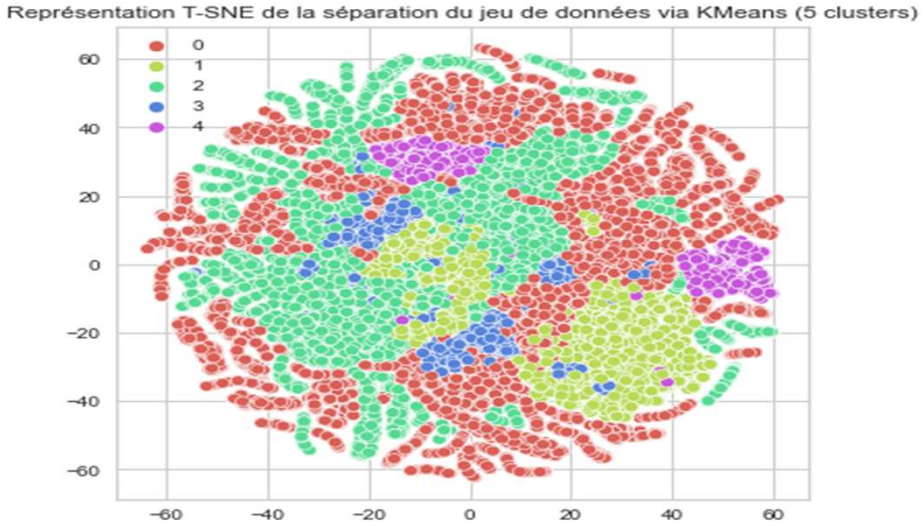


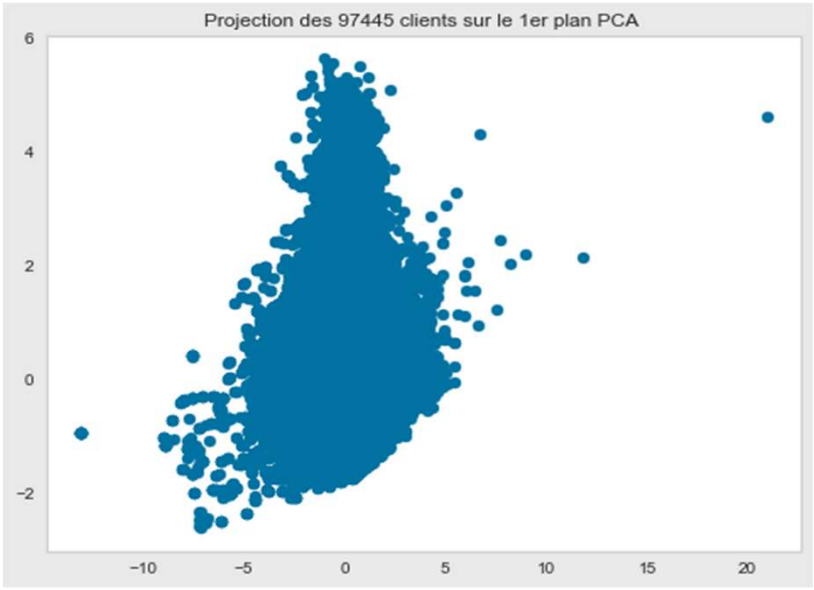


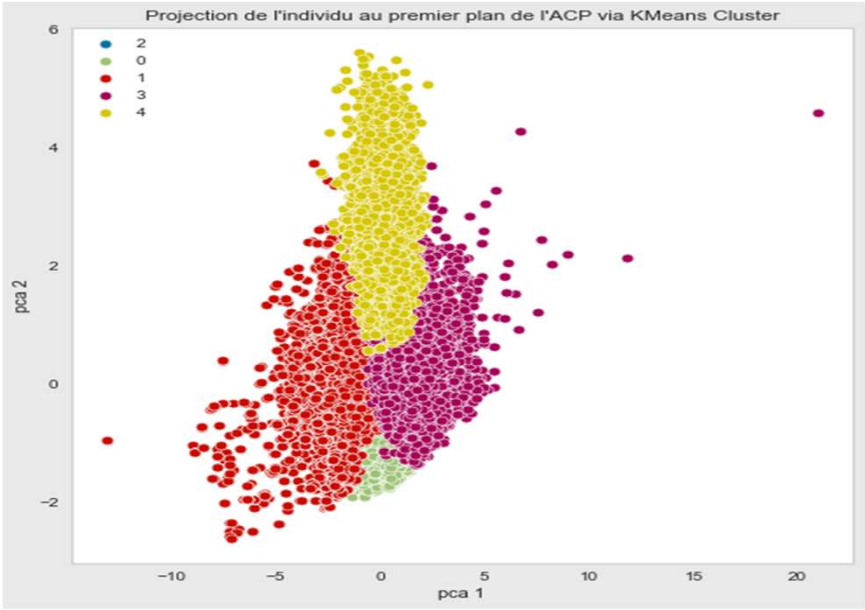
Le Best K

Visualisation

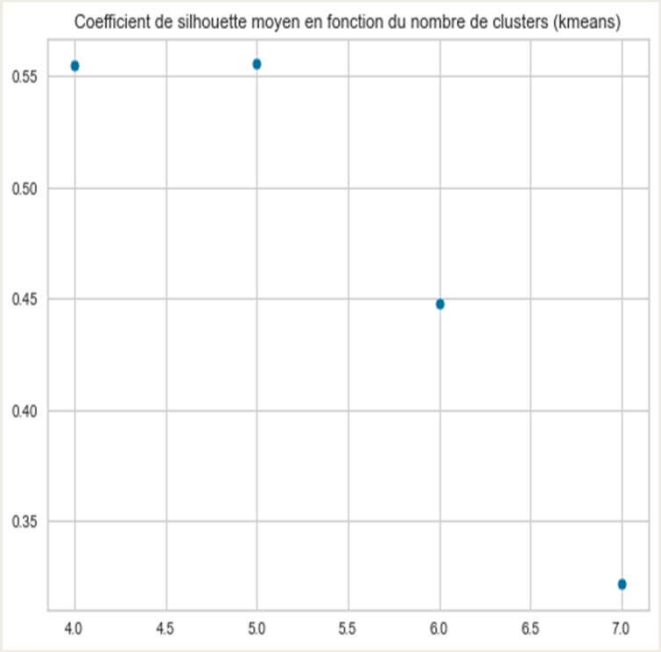


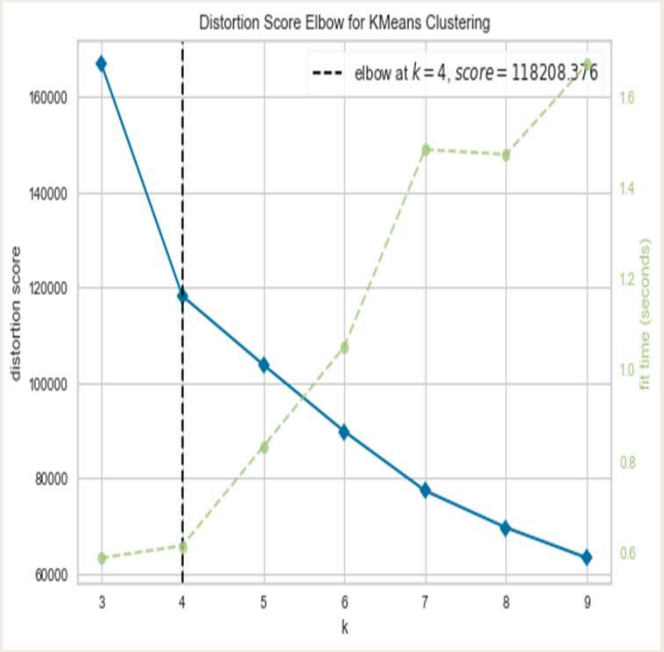


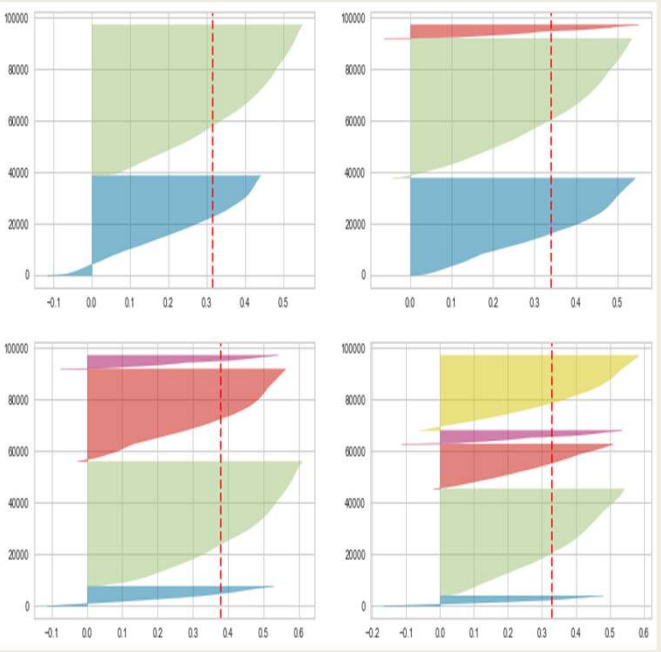




Segmentation RFM

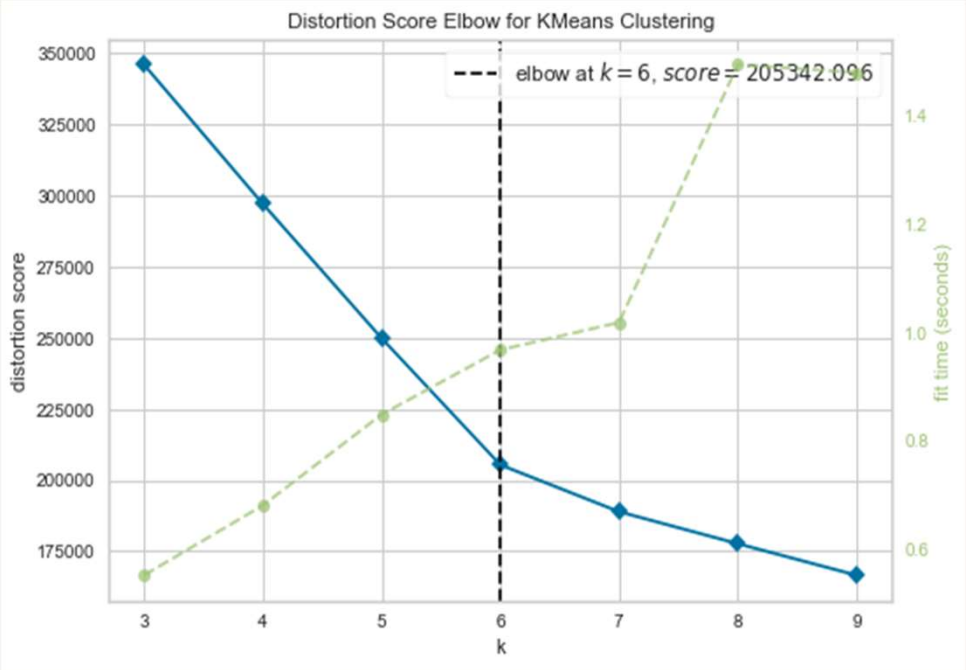


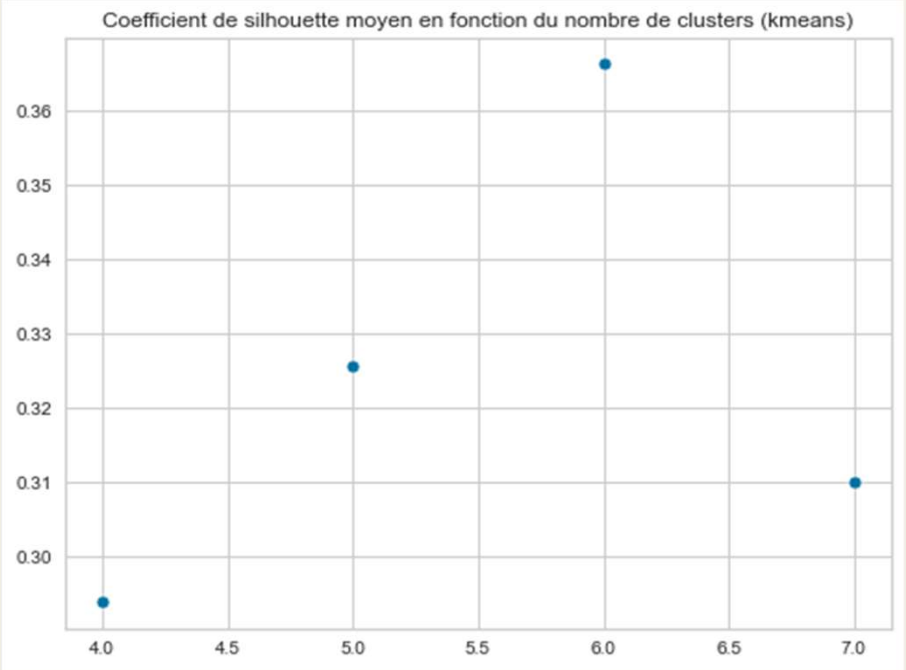




Le Best K

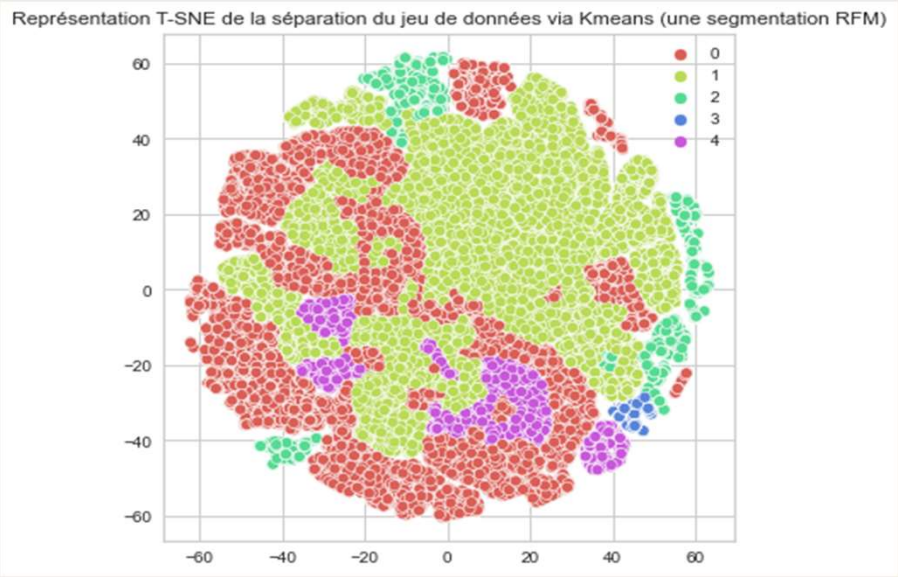
Segmentation avec 5 features
RFM + review_score+harvesine_distance

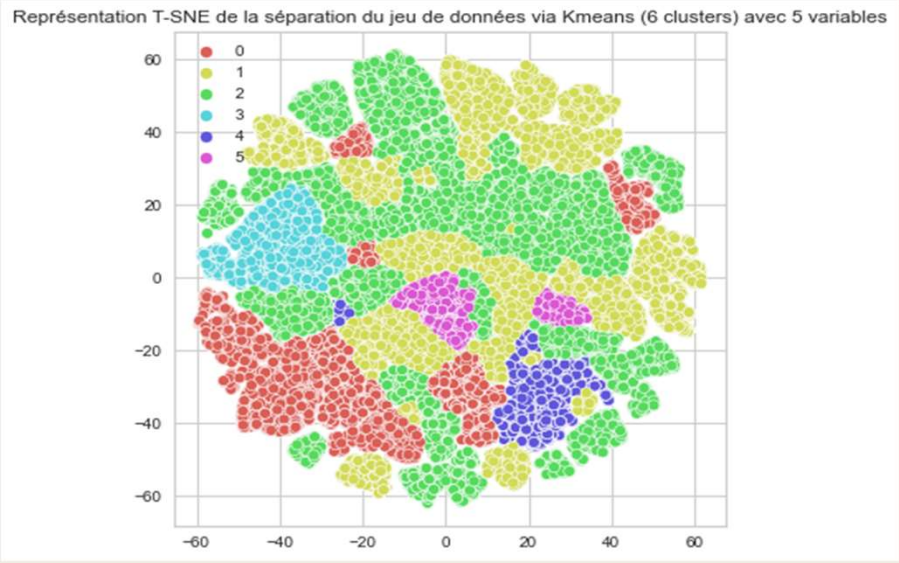




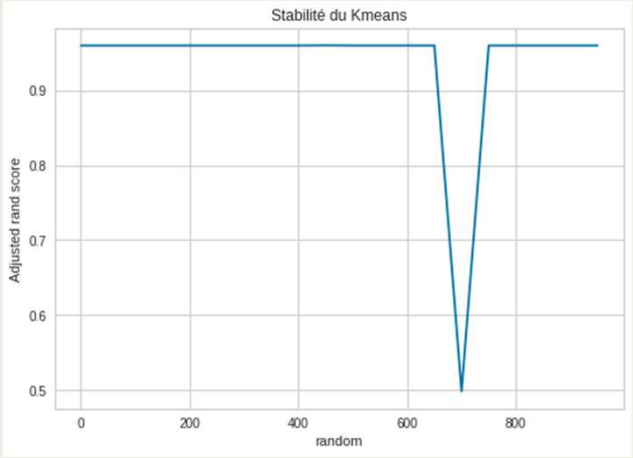
Le Best K

Visualization



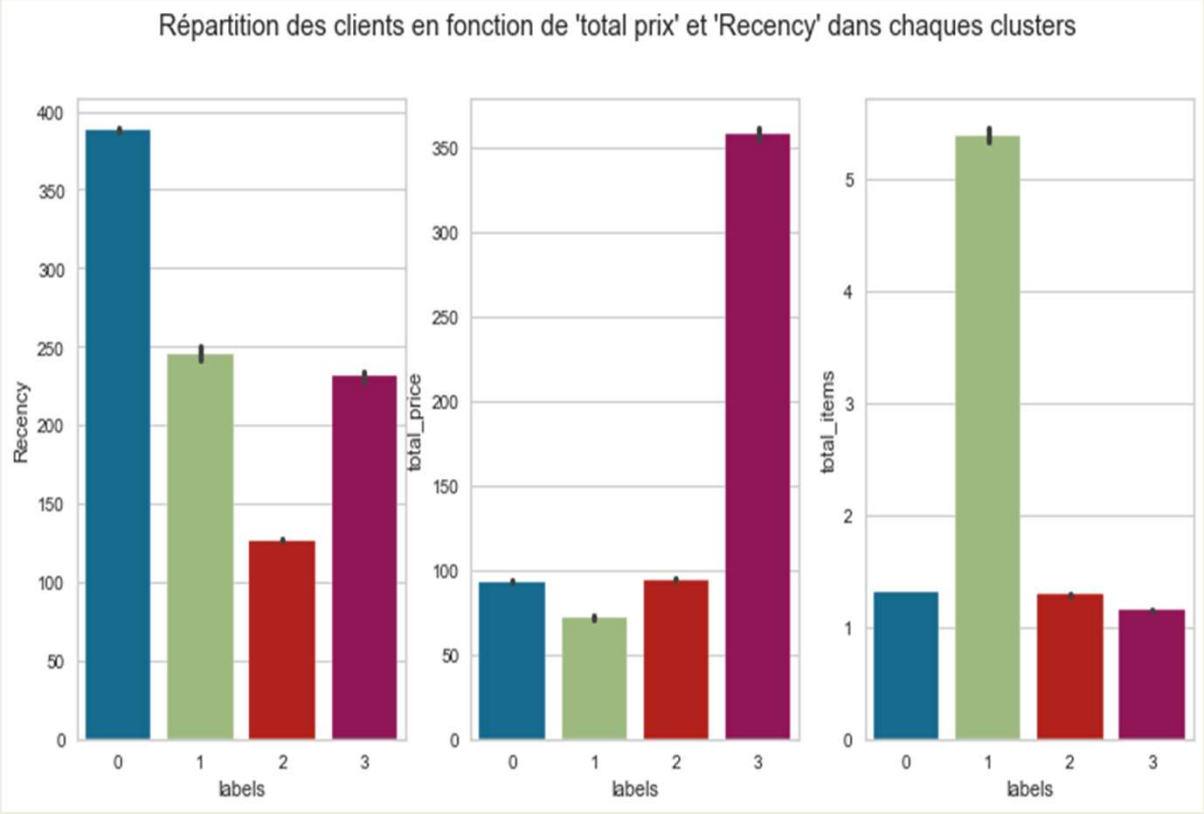


Stabilité du kMeans avec Adjusted_rand



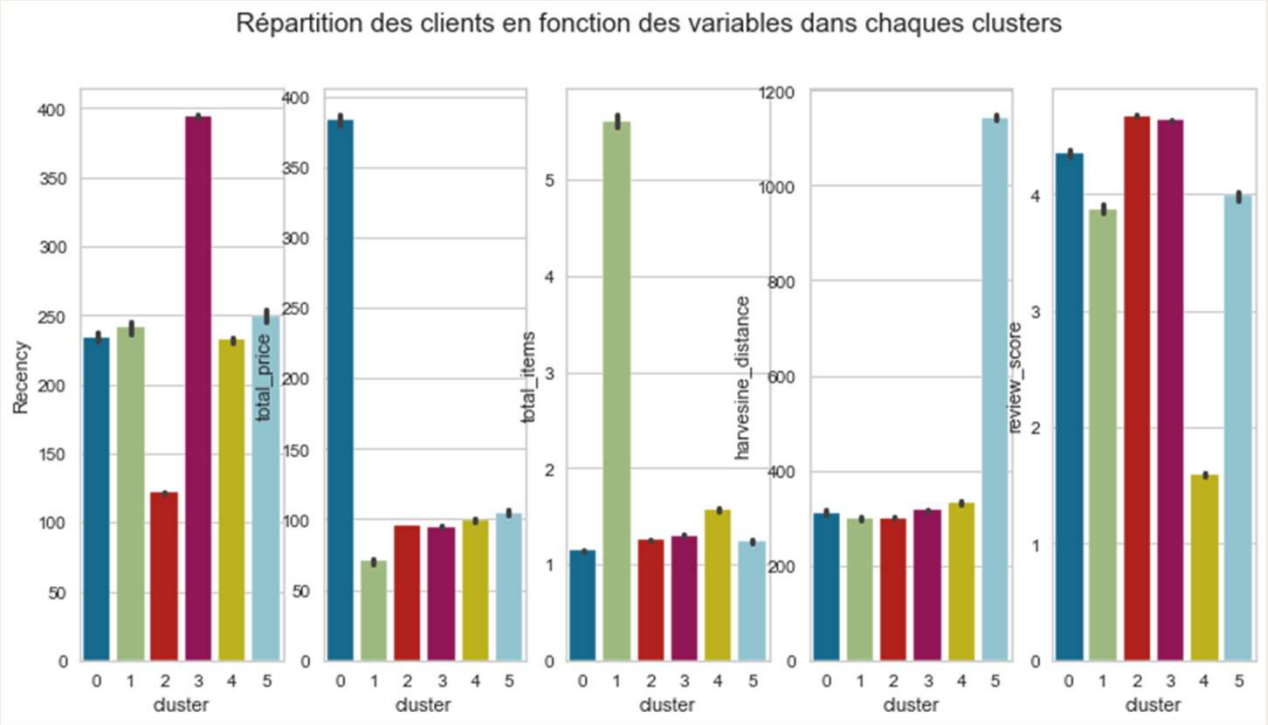
Types des clients

- Les nouveaux clients
- Les clients ayant acheté le plus de produits
- Les clients à reconquérir
- Les clients les plus dépensiers

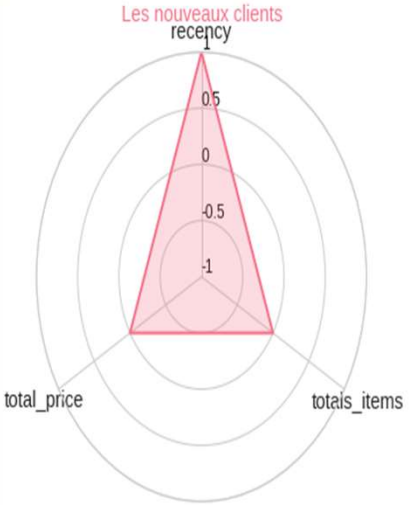


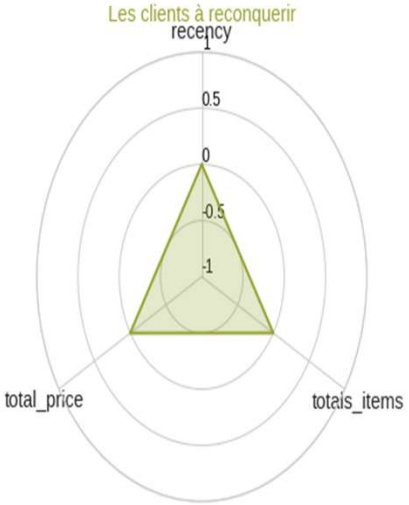
Types des clients

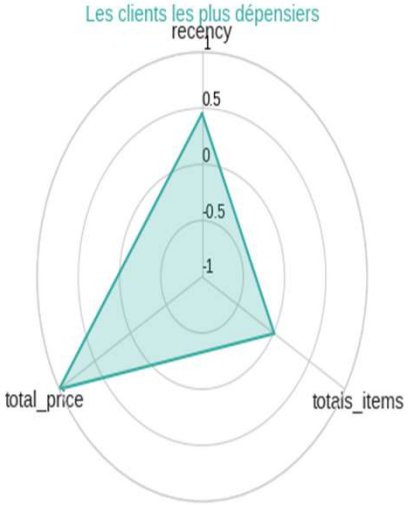
- Les nouveaux clients
- Les clients ayant acheté le plus de produits
- Les clients à potentiel
- Les clients les plus dépensiers
- Les clients insatisfaits
- Les clients les plus loin

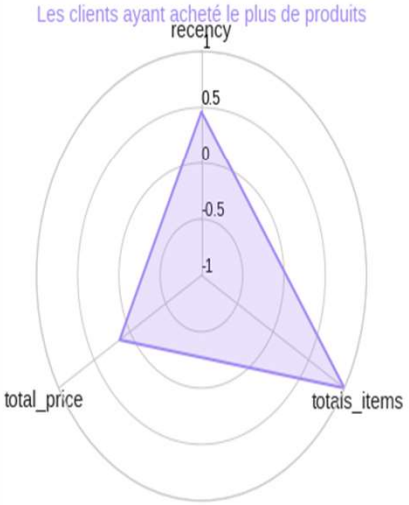


Visualization

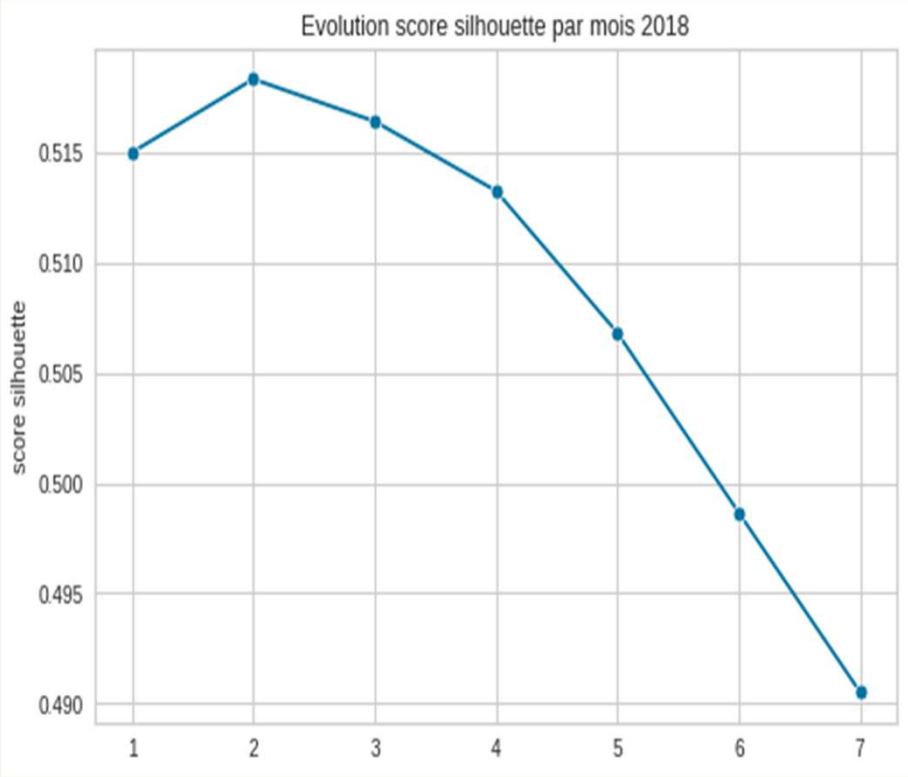


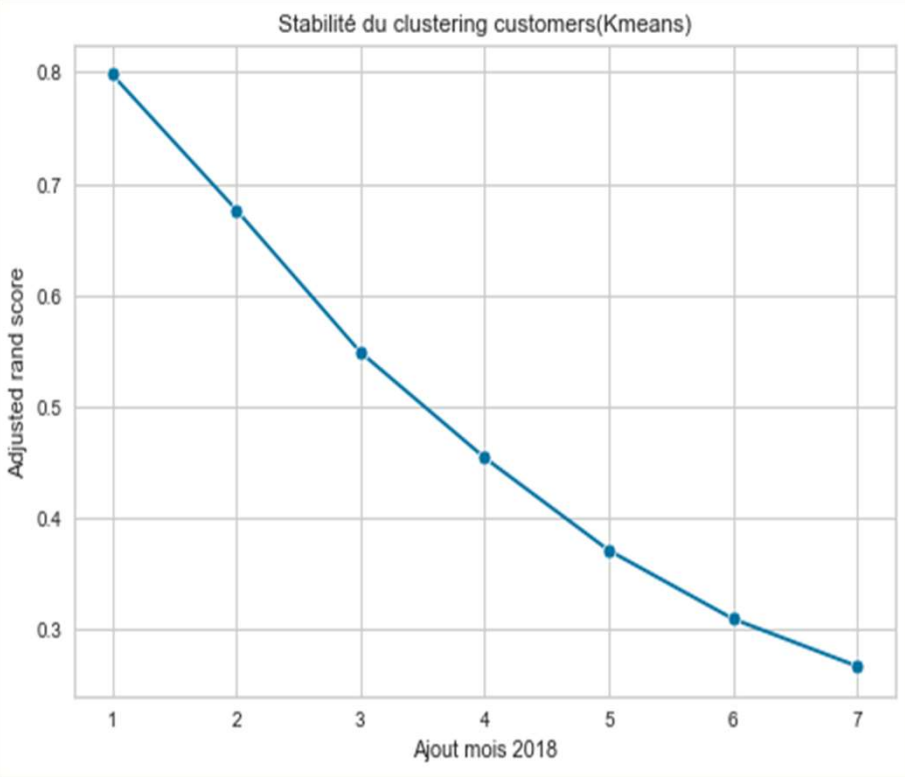






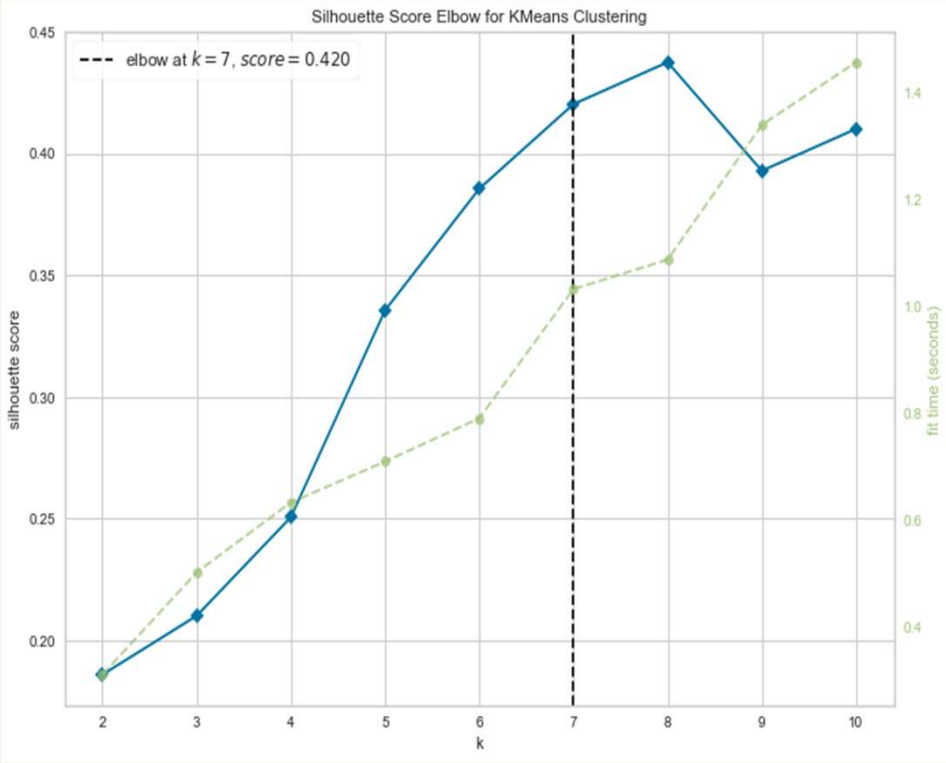
Stabilité temporelle de la segmentation

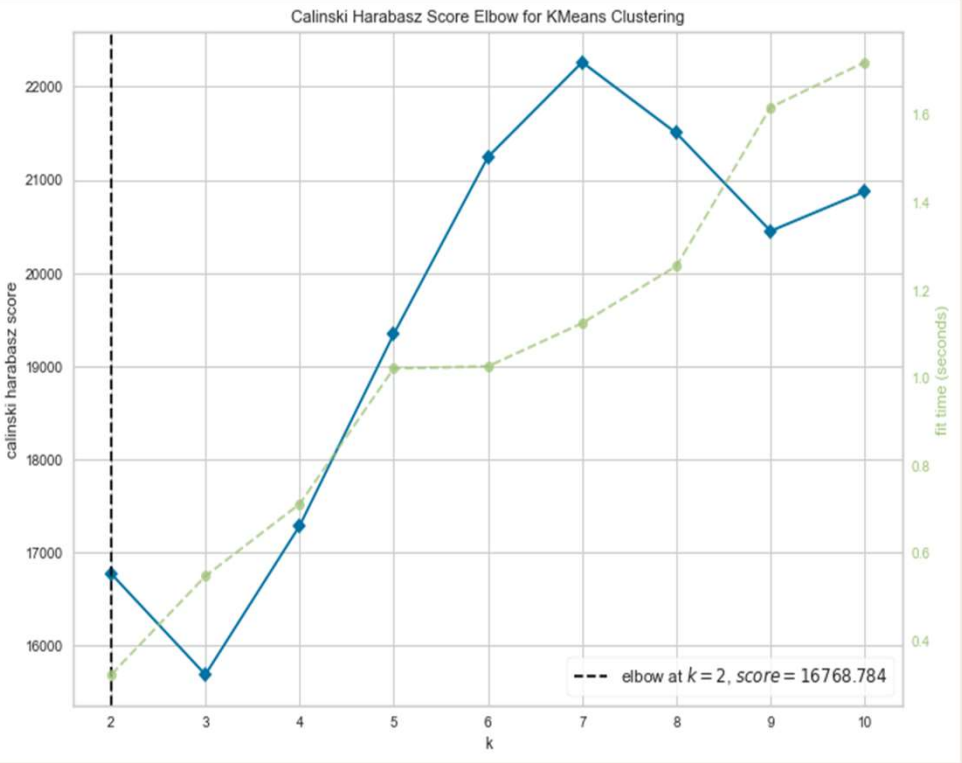




Segmentation avec un Pipeline

Elbow method with different metric





Scores de stabilité à l'initialisation

Iteration	FitTime	Inertia	Homo	ARI	AMI
Iter 0	0.086s	11471	0.918	0.912	0.905
Iter 1	0.065s	12634	0.583	0.481	0.632
Iter 2	0.075s	11645	0.644	0.530	0.638
Iter 3	0.072s	11458	1.000	1.000	1.000
Iter 4	0.056s	11458	1.000	1.000	1.000
Iter 5	0.057s	12634	0.583	0.481	0.632
Iter 6	0.064s	12634	0.583	0.481	0.632
Iter 7	0.051s	13189	0.583	0.459	0.623
Iter 8	0.062s	11472	0.918	0.912	0.905
Iter 9	0.098s	11472	0.920	0.913	0.906

Scores de stabilité à l'initialisation

Iteration	FitTime	Inertia	Homo	ARI	AMI
Iter 0	0.098s	1099	0.512	0.544	0.515
Iter 1	0.083s	1106	0.376	0.414	0.384
Iter 2	0.094s	1099	0.514	0.549	0.517
Iter 3	0.091s	1099	0.512	0.544	0.515
Iter 4	0.087s	1099	0.512	0.543	0.515
Iter 5	0.130s	1099	0.513	0.549	0.517
Iter 6	0.099s	1106	0.375	0.414	0.383
Iter 7	0.118s	1106	0.375	0.413	0.383
Iter 8	0.099s	1106	0.375	0.414	0.383
Iter 9	0.118s	1099	0.513	0.549	0.517

Scores de stabilité à l'initialisation

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