Classifier automatiquement
des biens de consommation

DONNEES TEXTUELLES

DONNEES IMAGES

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Contexte/Données

Traitement données textuelles

Traitement données images

Combinaison textes/images

Conclusion

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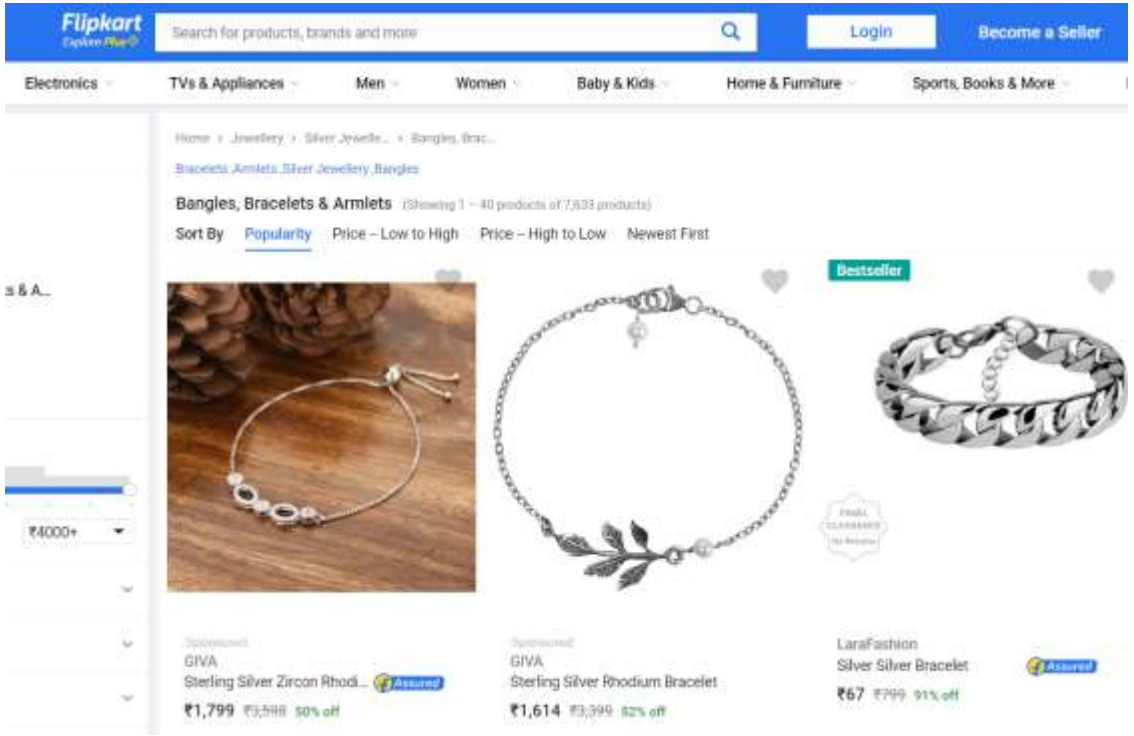
Contexte

Mission:

Effectuer une **faisabilité** d'un moteur de **recommendation (classification)** d'articles basées sur une image et une description du produit dans le but d'une **automatisation** d'une attribution d'un produit à une catégorie fixée pour l'entreprise *Place de marché.*

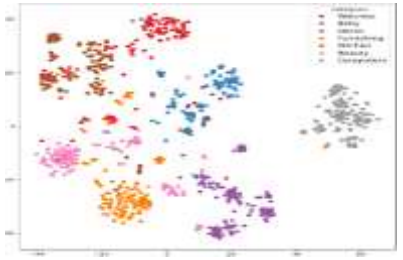


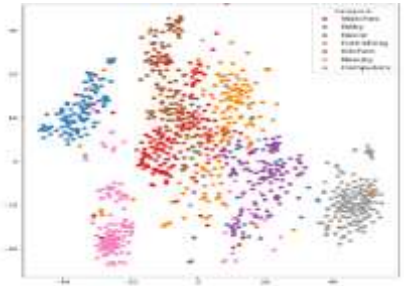
Objectif:

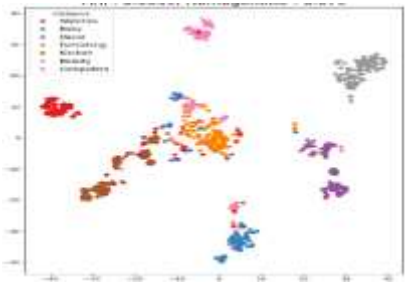
Améliorer la recommendation des utilisateurs
Garantir la catégorie des articles avec précision

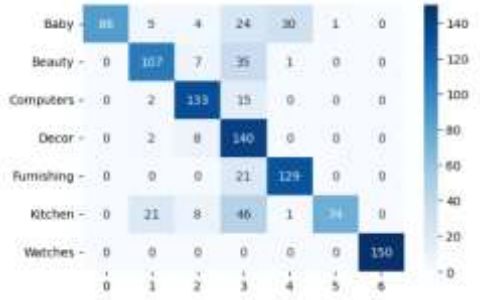
Processus

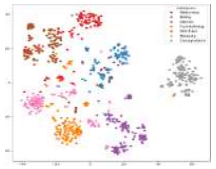
Pré-process	Features extraction	Classification(ACP, TSNE)	Evaluation
Données TEXTES	Bag of Words Word Embeddings Text Embeddings	Apprentissage Non Supervisée KMeans	Evaluation **ARI**, **Accuracy**
Données IMAGES	Bag of features		Interprétation Cluster
Données TEXTES + Données IMAGES	Word Embeddings Bag of features	Apprentissage Supervisée	



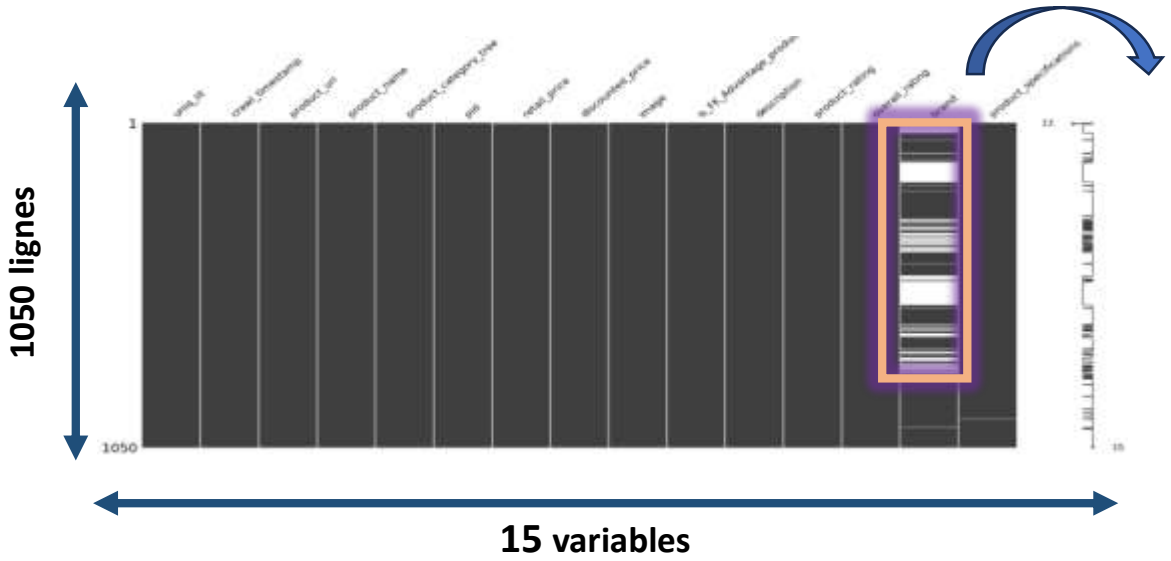








Données



Dataset (site Indien Flipkart)

Environ 2 % de données manquantes

TEXTES

product_name
Giorgio Armani SMOOTH SILK LIP PENCIL 12

Description
Giorgio Armani SMOOTH SILK LIP PENCIL 12 (Soyeux 12) Price: Rs .../...

product_specifications
{"product_specification"=>[{"key"=> .../...

Brand
Giorgio Armani

IMAGE

Exemple

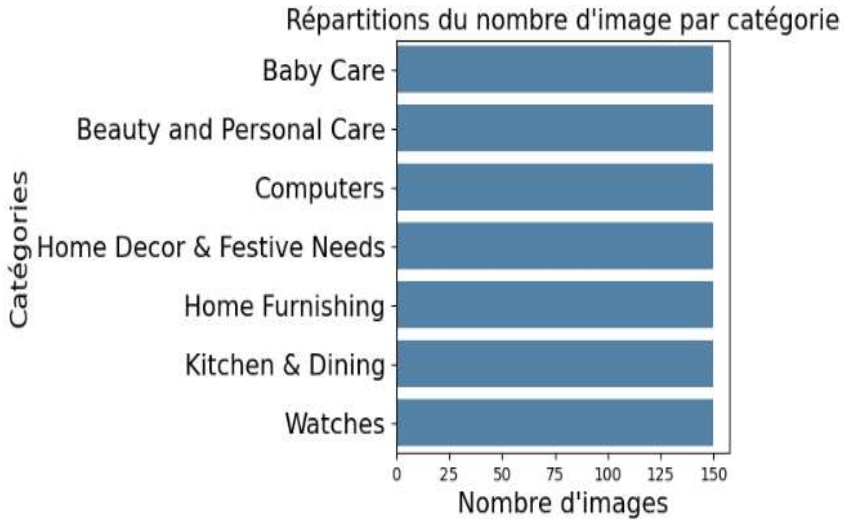
Champ Cible

product_category_tree
"Computers >> Laptop Accessories >> USB Gadgets >> Epresent USB Gadgets"

Données – niveaux de catégories

7 Catégories

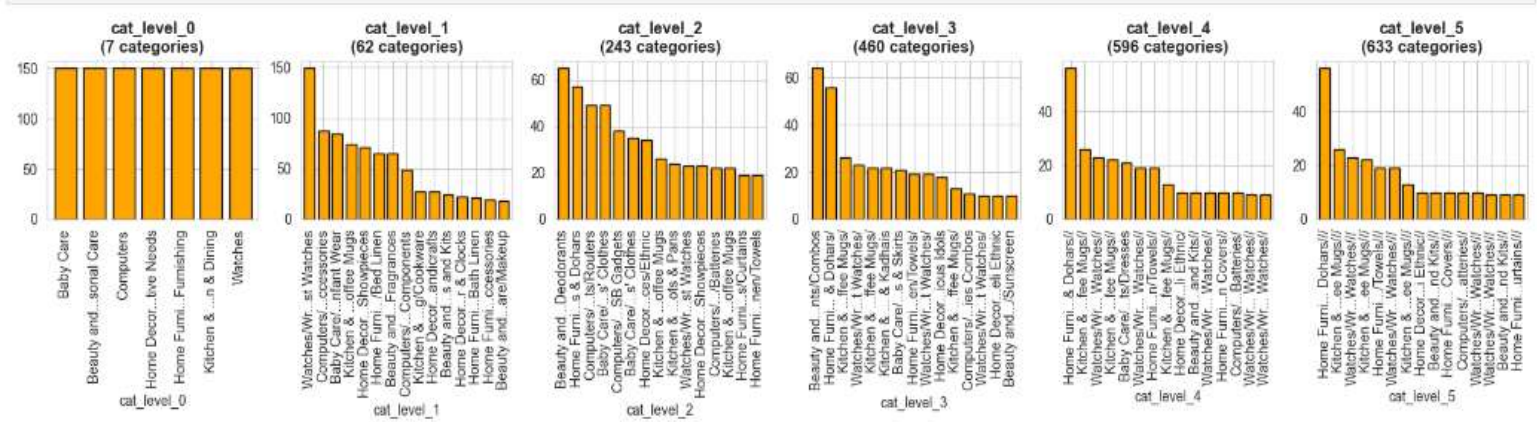
Niveau 0



Sous-niveau (nombre de catégories)

cat_level_0	7
cat_level_1	62
cat_level_2	243
cat_level_3	460
cat_level_4	596
cat_level_5	633
category	7

Représentation graphique des sous-niveaux



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NLP - Processus

Pré-process

Données TEXTES

Variables:
- Description
- product_name
- product_specifications
- Brand

Tokenisation

Normalisation

Racinisation

Lemmatisation

Features extraction

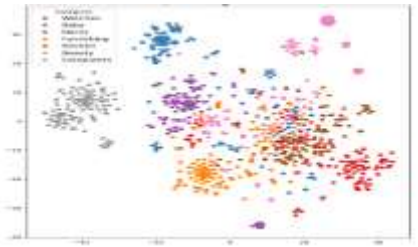
Bag of Words
(Word Embeddings)
CountVectorizer
TfidfVectorizer

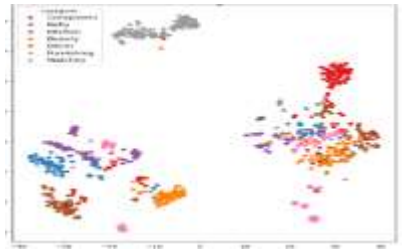
Text Embeddings
Word2Vec

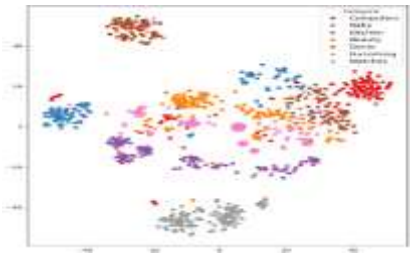
Sentence - Transformers
BERT
USE

Classification(ACP, TSNE)

Apprentissage Non Supervisée KMeans





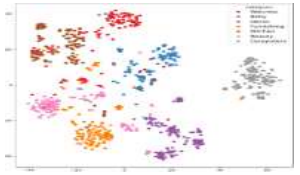


Apprentissage Supervisée

Evaluation

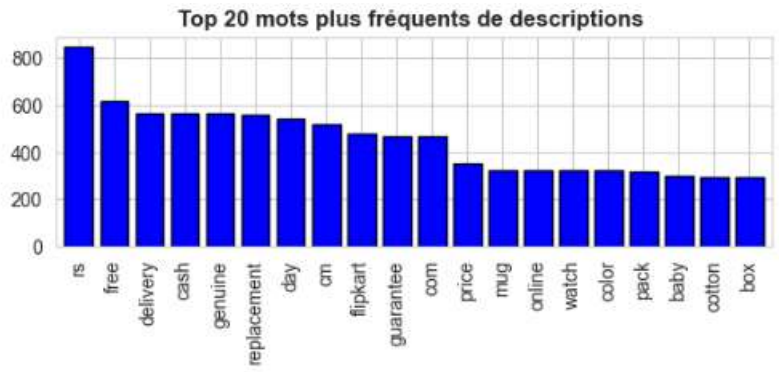
Evaluation **ARI**, **Accuracy**

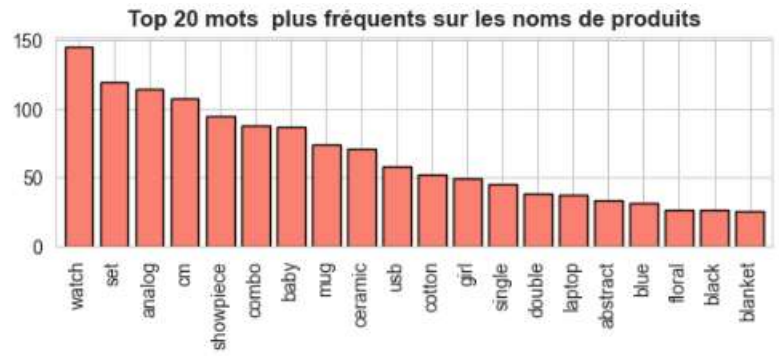
Interprétation Clusters



NLP - Fréquence de mots

Mots les plus fréquents: variables descriptions et produits





Furnishing

Baby

Watch

Decor

Kitchen

Beauty

Computers

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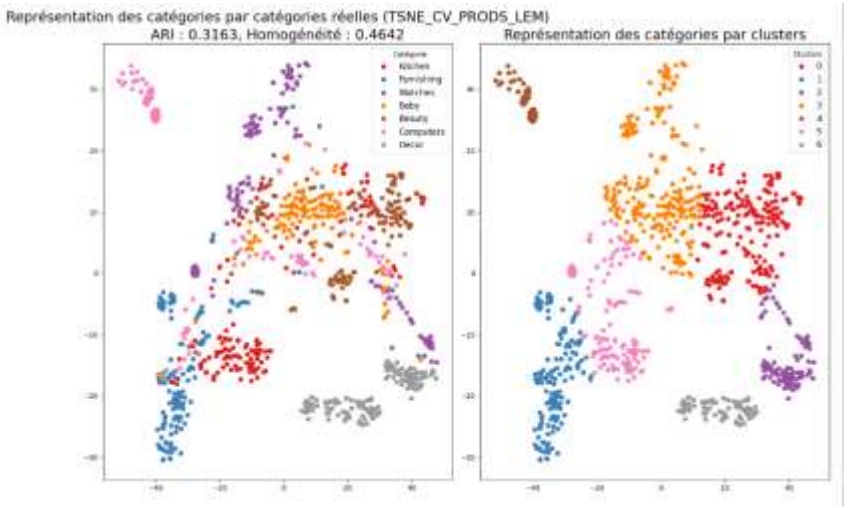
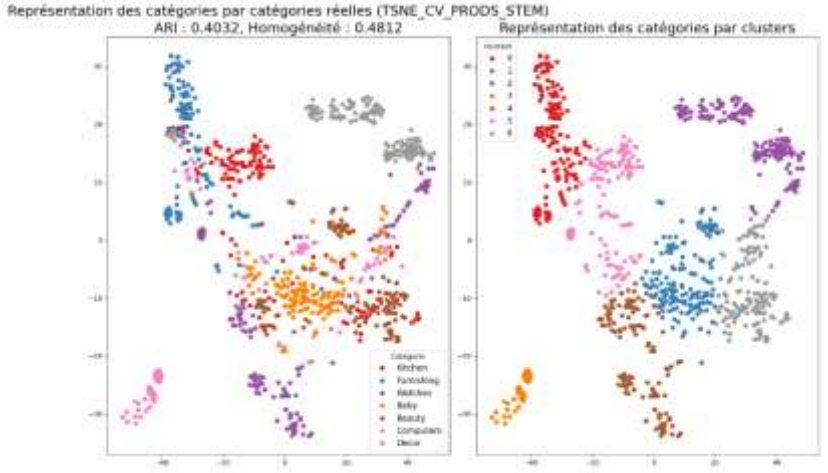
Traitement données textuelles

NLP – Word Embeddings

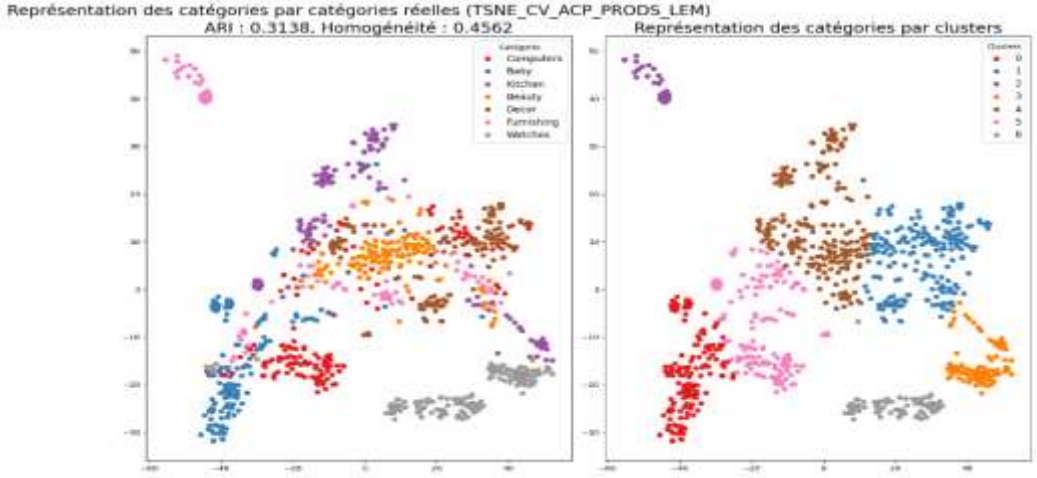
NLP - Réduction de dimension

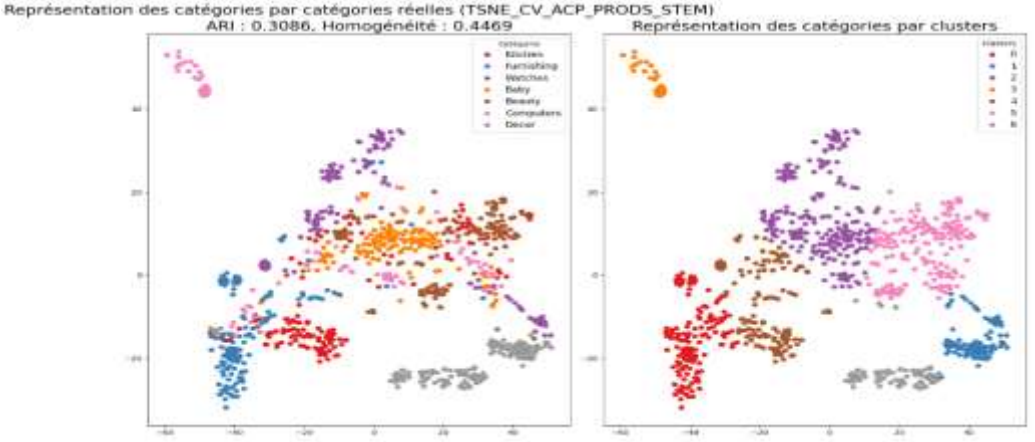
TSNE_CV





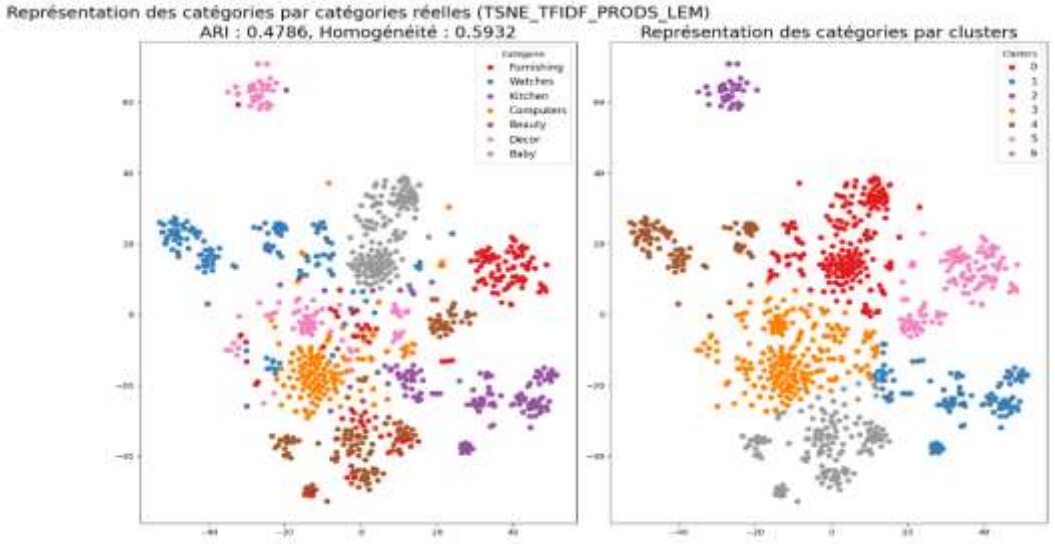
ACP + TSNE_CV

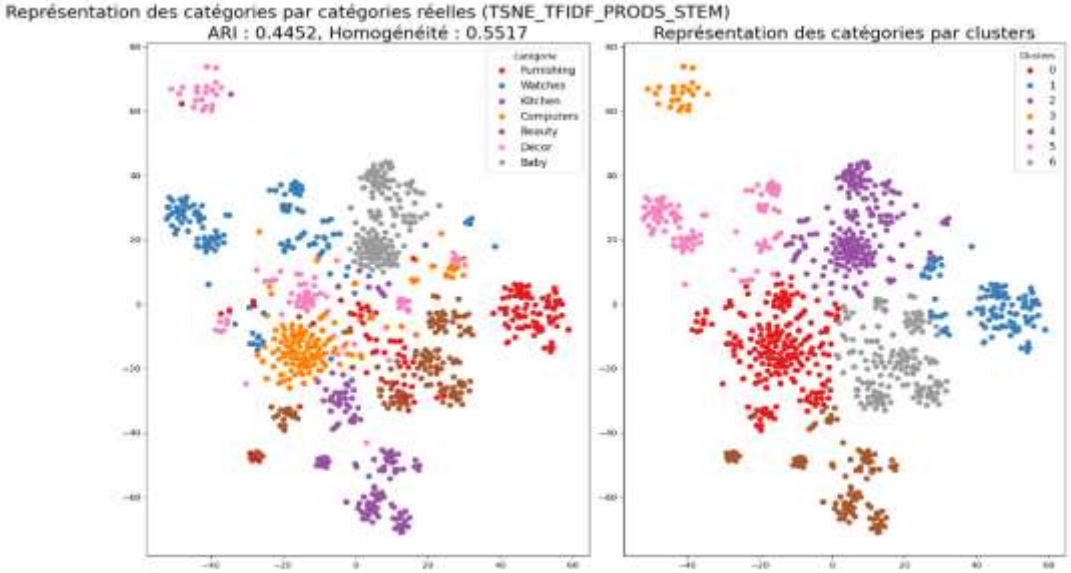




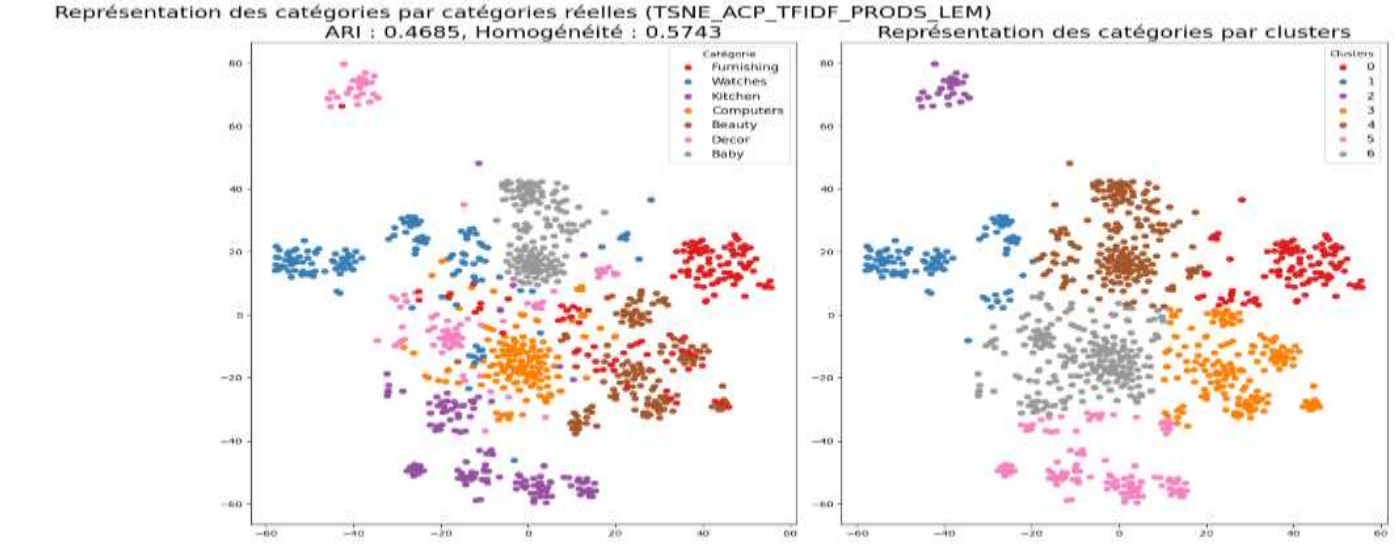
NLP - Réduction de dimension

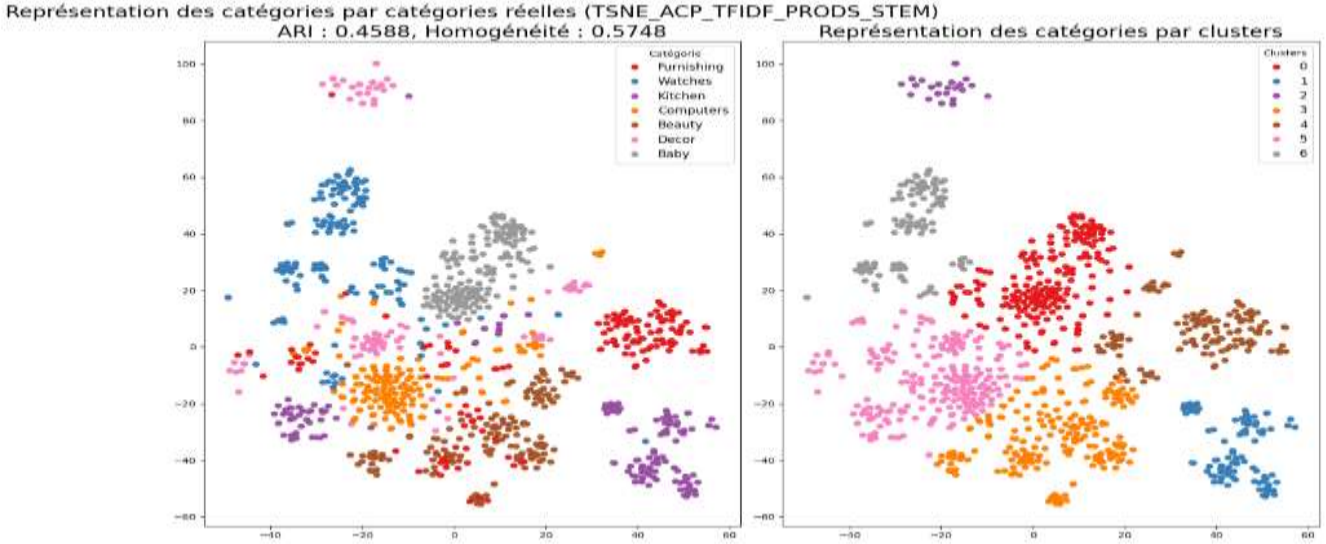
TSNE_TFIDF





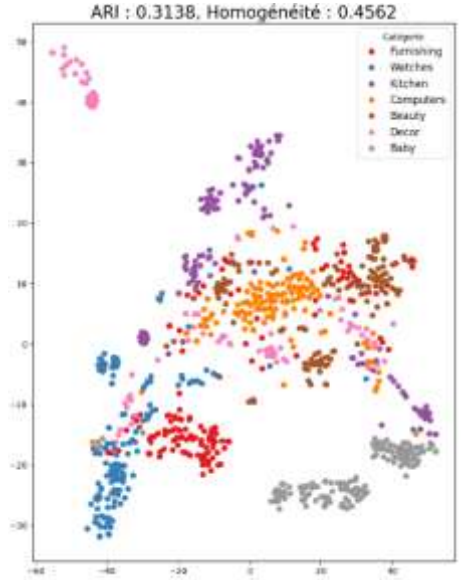
ACP + TSNE_TFIDF





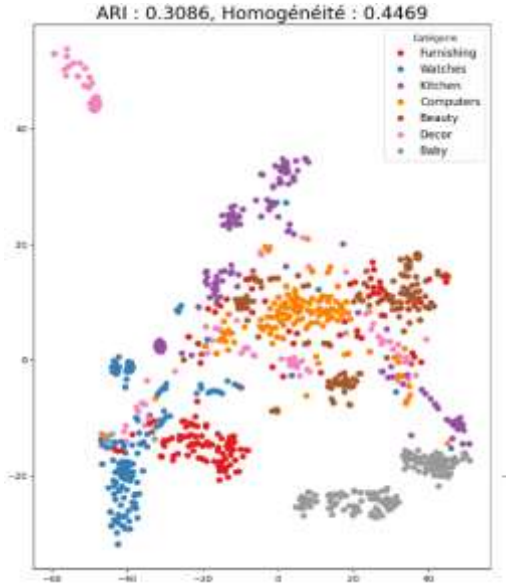
NLP – Classification non supervisée KMeans

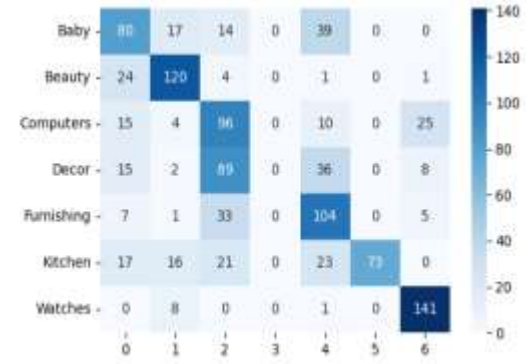
TSNE+ ACP CV PRODS LEM



ARI: 0,31
Accuracy : 0,59

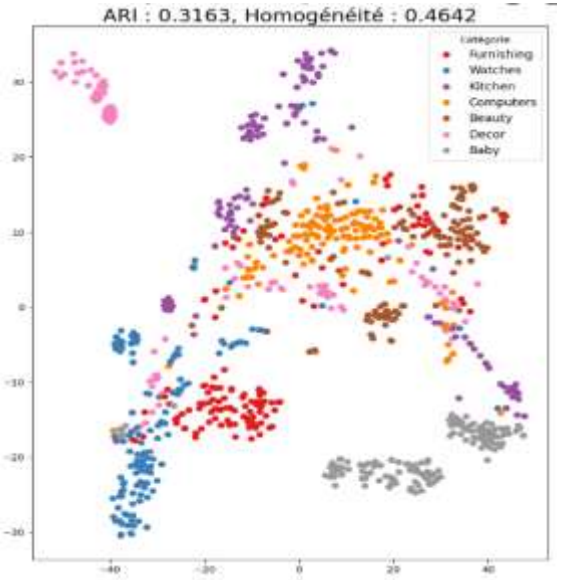
TSNE+ ACP CV PRODS STEM

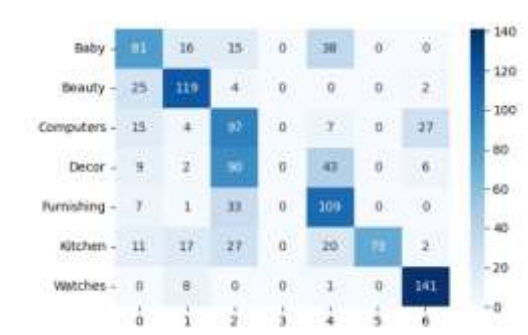




ARI: 0,31
Accuracy : 0,58

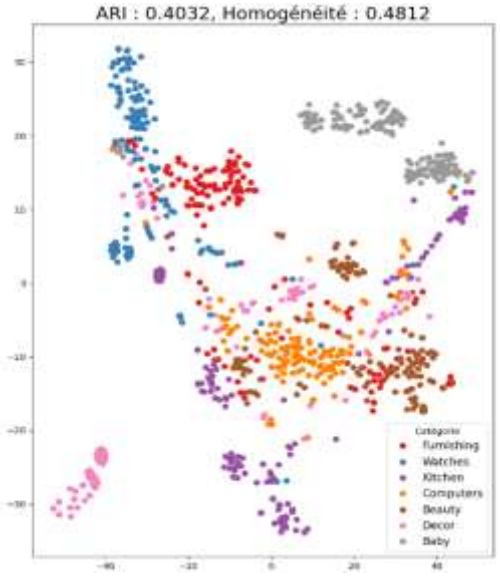
TSNE CV PRODS LEM

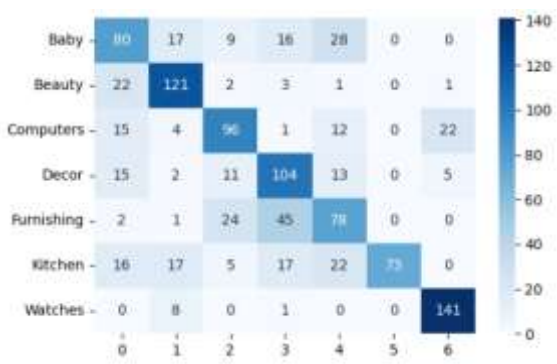




ARI: 0,32
Accuracy : 0,59

TSNE CV PRODS STEM

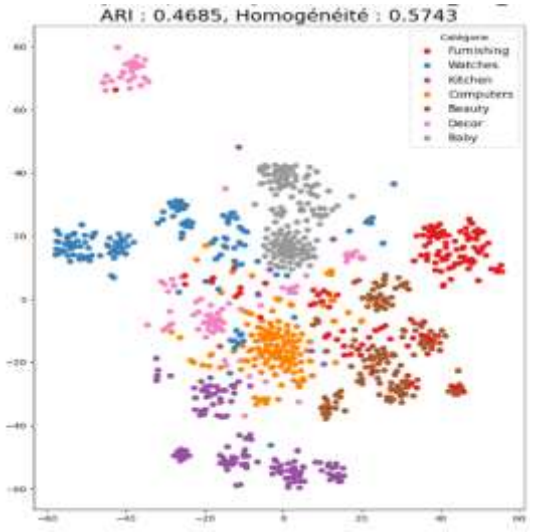


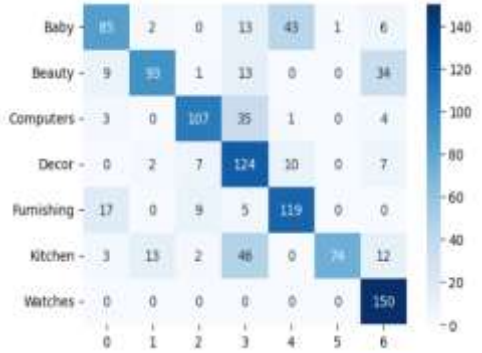


ARI: 0,40
Accuracy : 0,66

NLP – Classification non supervisée KMeans

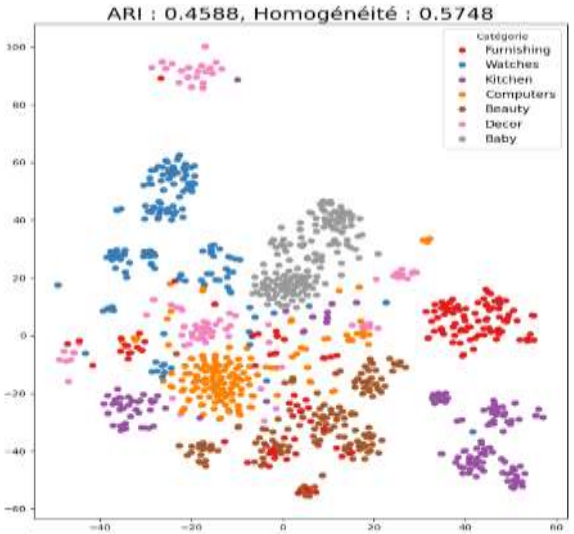
TSNE+ ACP TFIDF PRODS LEM

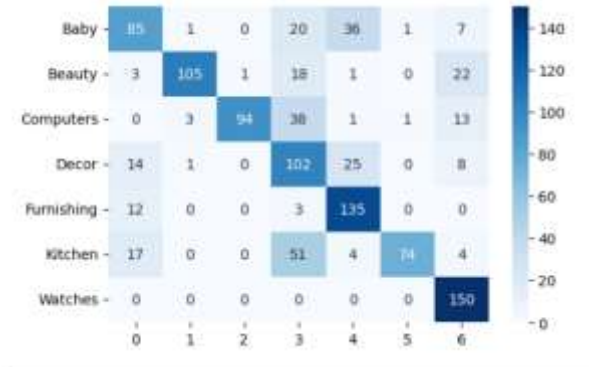




ARI: 0,47
Accuracy : 0,72

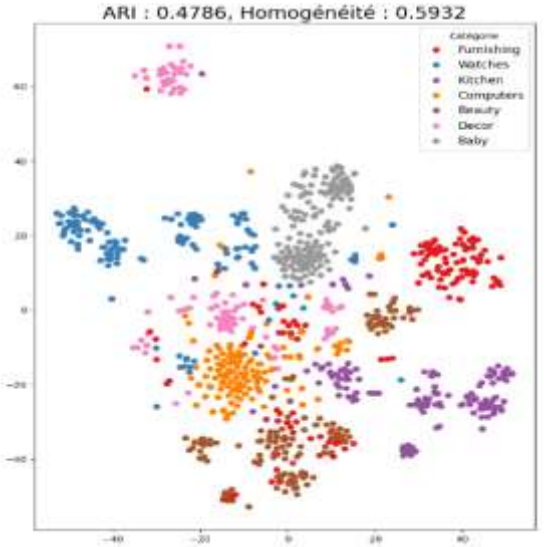
TSNE+ ACP TFIDF PRODS STEM

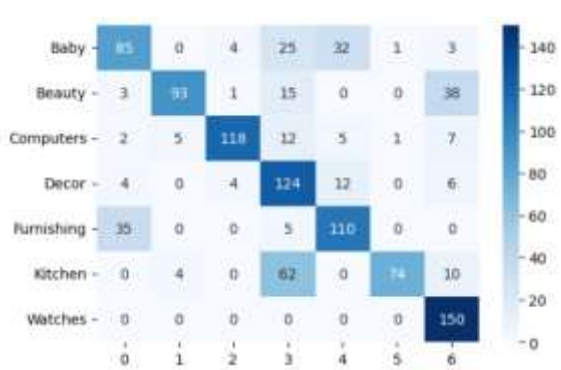




ARI: 0,46
Accuracy : 0,71

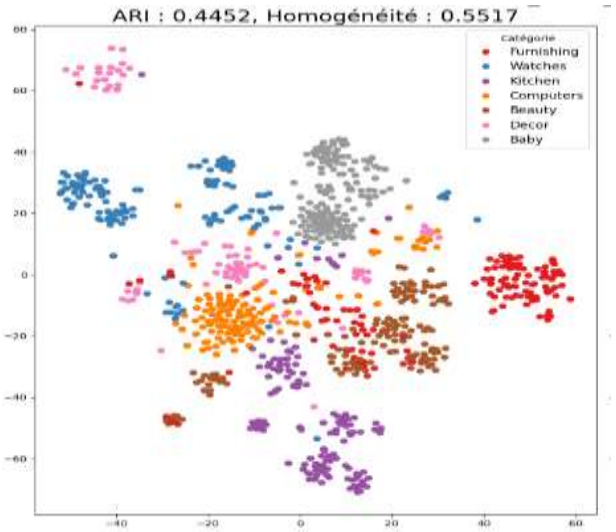
TSNE TFIDF PRODS LEM

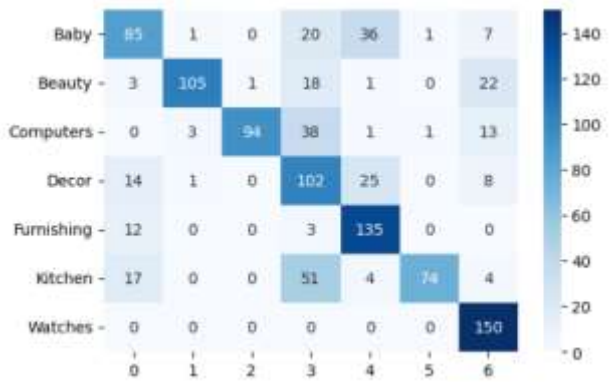




ARI: 0,48
Accuracy : 0,72

TSNE TFIDF PRODS STEM



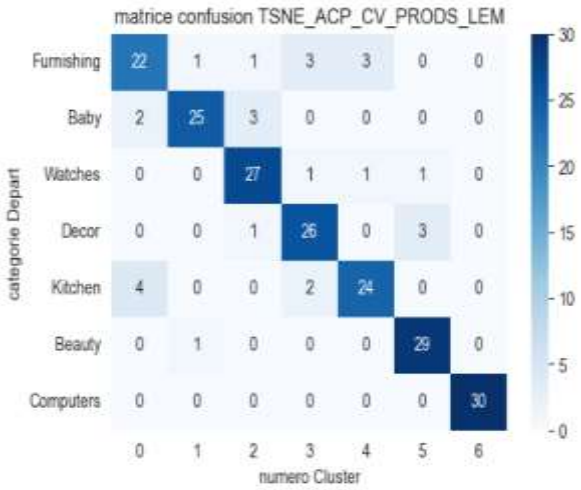


ARI: 0,45
Accuracy : 0,71

NLP – Classification Supervisée

TSNE+ ACP CV PRODS LEM

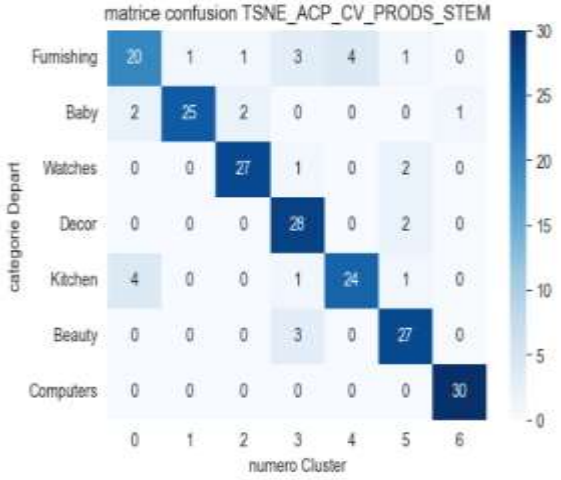
Accuracy de l'algorithme etc : 0.871



Accuracy (Train): 1
Accuracy (Test): 0,87

TSNE+ ACP CV PRODS STEM

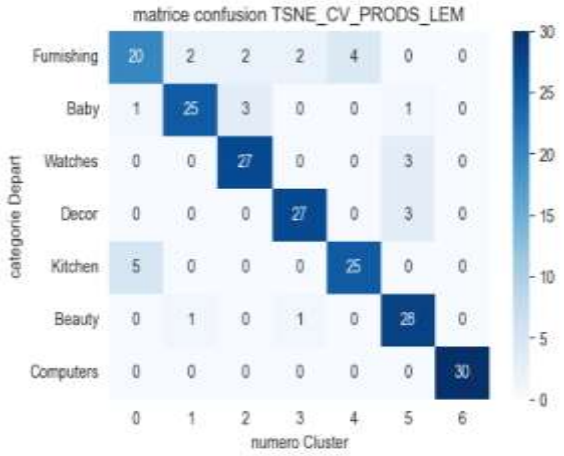
Accuracy de l'algorithme etc : 0.862



Accuracy (Train): 1
Accuracy (Test): 0,86

TSNE CV PRODS LEM

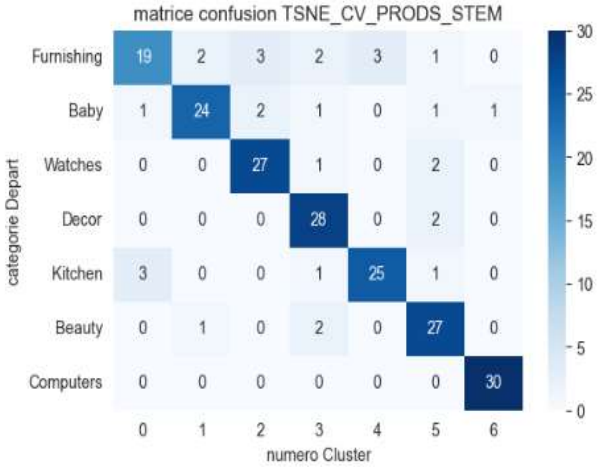
Accuracy de l'algorithme etc : 0.867



Accuracy (Train): 1
Accuracy (Test): 0,87

TSNE CV PRODS STEM

Accuracy de l'algorithme etc : 0.857

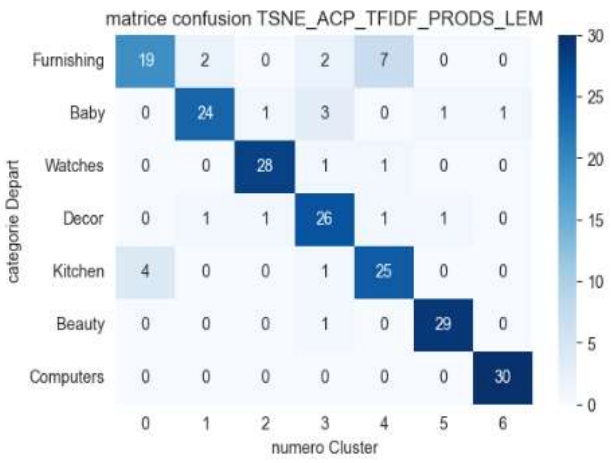


Accuracy (Train): 1
Accuracy (Test): 0,86

NLP – Classification Supervisée

TSNE+ ACP TFIDF PRODS LEM

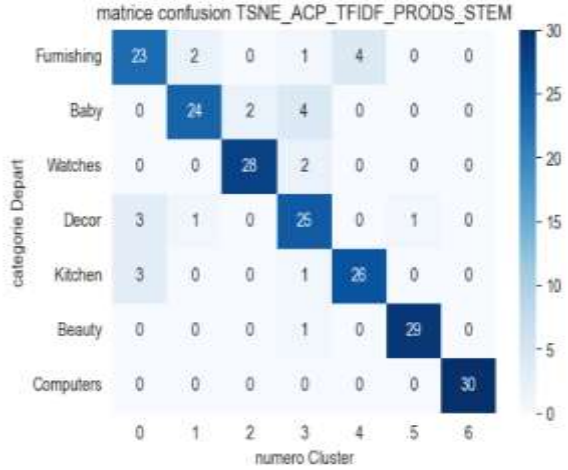
Accuracy de l'algorithme etc : 0.862



Accuracy (Train): 1
Accuracy (Test): 0,86

TSNE+ ACP TFIDF PRODS STEM

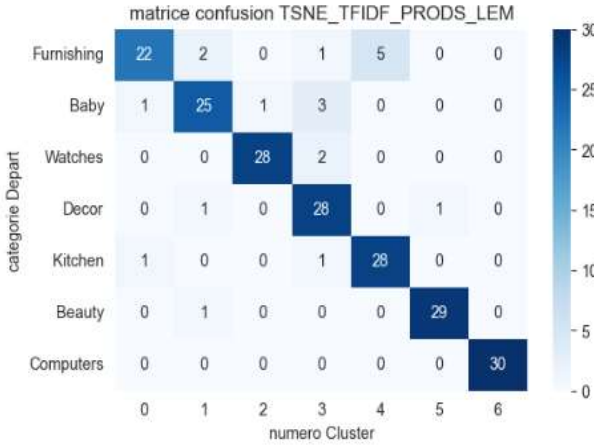
Accuracy de l'algorithme etc : 0.881



Accuracy (Train): 1
Accuracy (Test): 0,88

TSNE TFIDF PRODS LEM

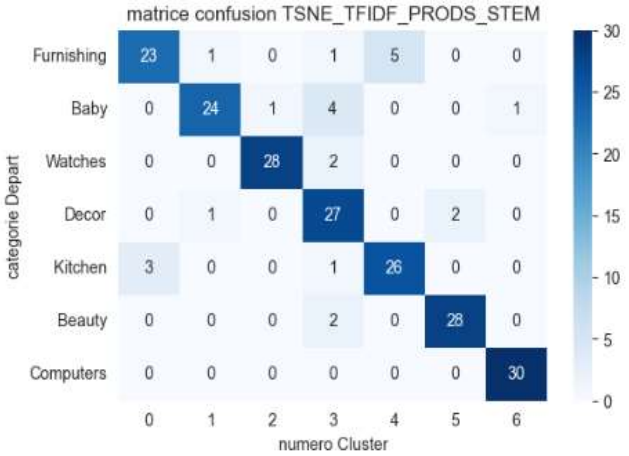
Accuracy de l'algorithme etc : 0.905



Accuracy (Train): 1
Accuracy (Test): 0,91

TSNE TFIDF PRODS STEM

Accuracy de l'algorithme etc : 0.886



Accuracy (Train): 1
Accuracy (Test): 0,89

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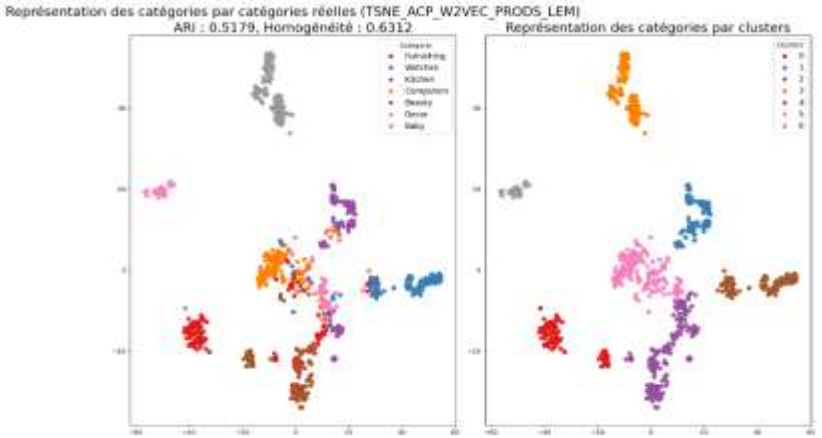
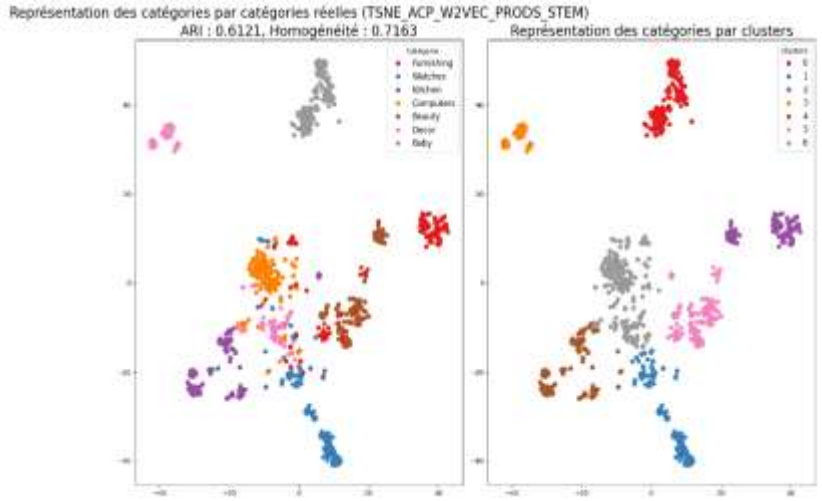
Traitement données textuelles

NLP –Text Embeddings

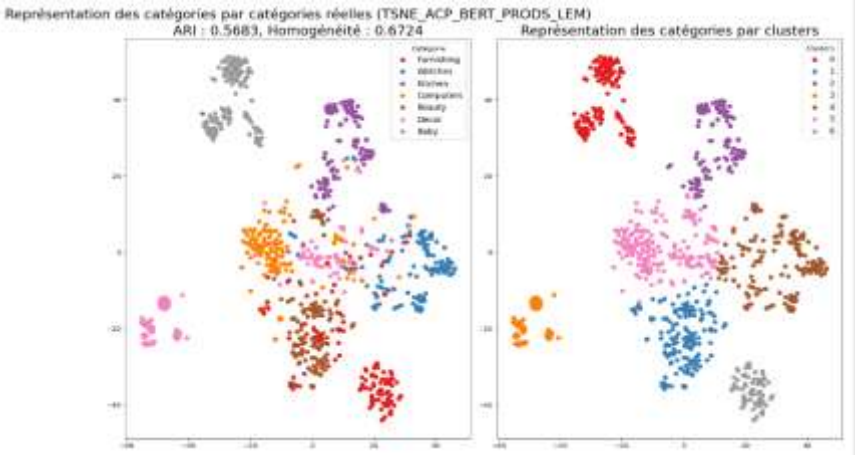
NLP - Réduction de dimension

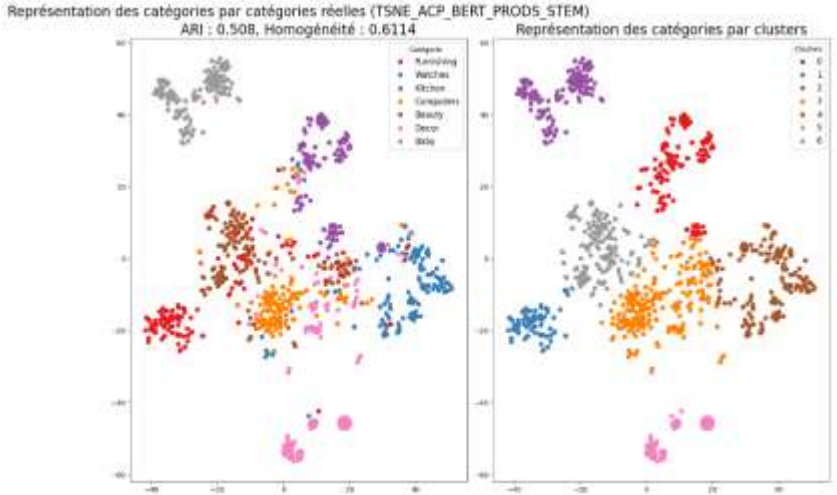
ACP + TSNE_WORD2VEC



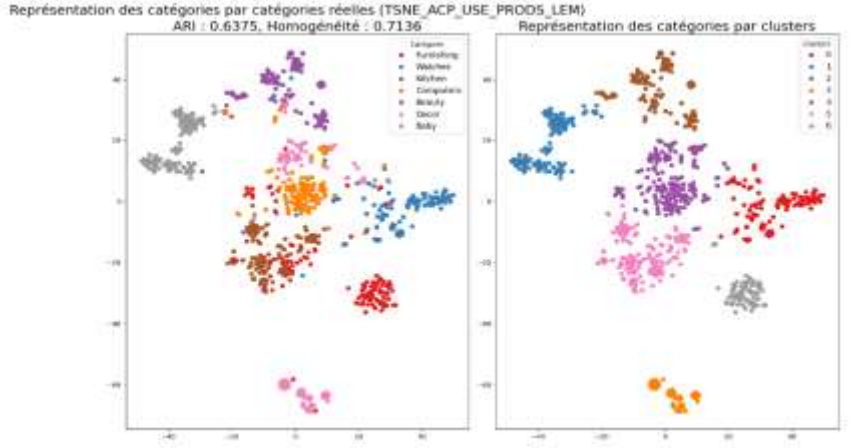


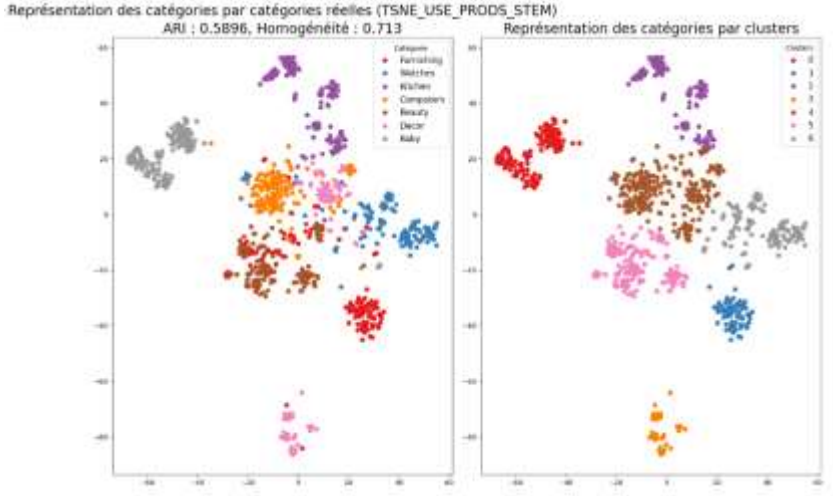
ACP + TSNE_BERT





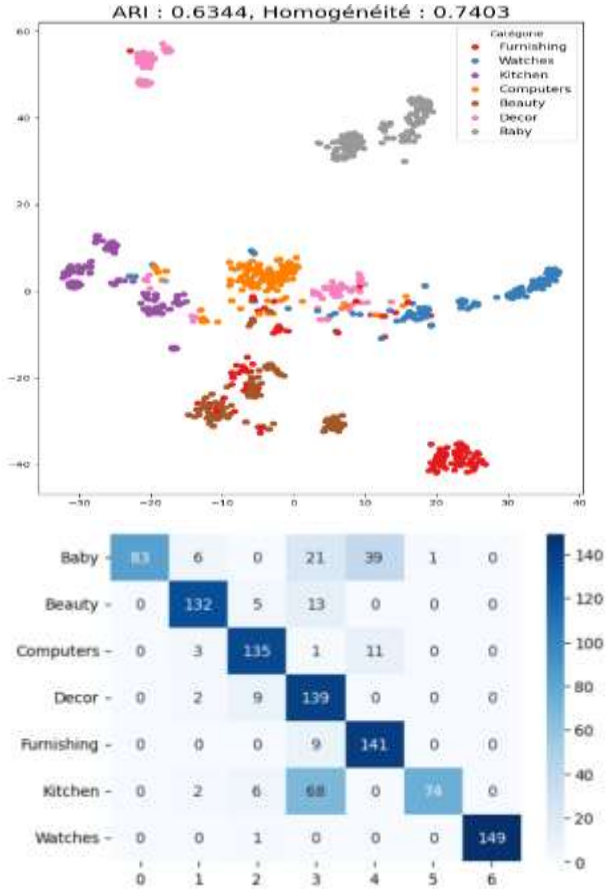
ACP + TSNE_USE





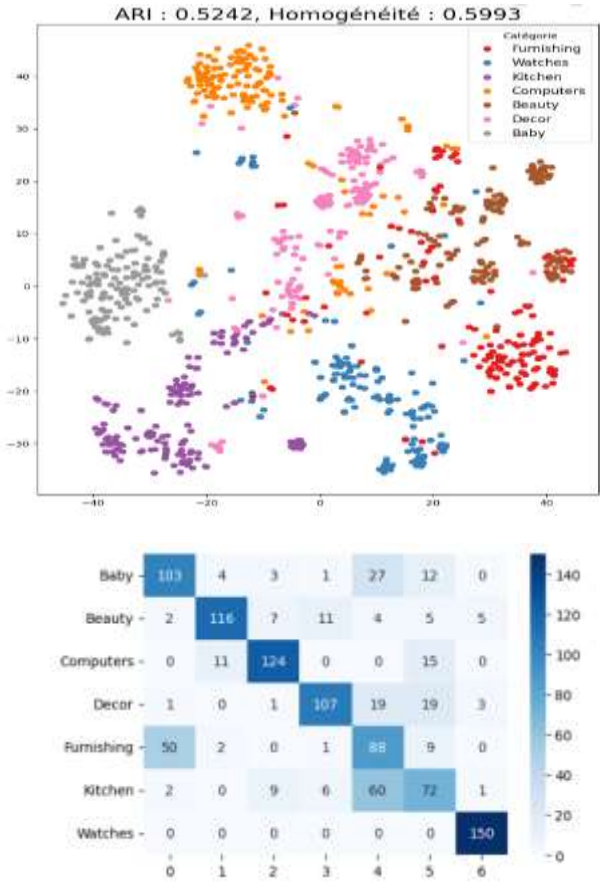
NLP – Classification non supervisée KMeans

ACP + TSNE_WORD2VEC_PROD_ORIG



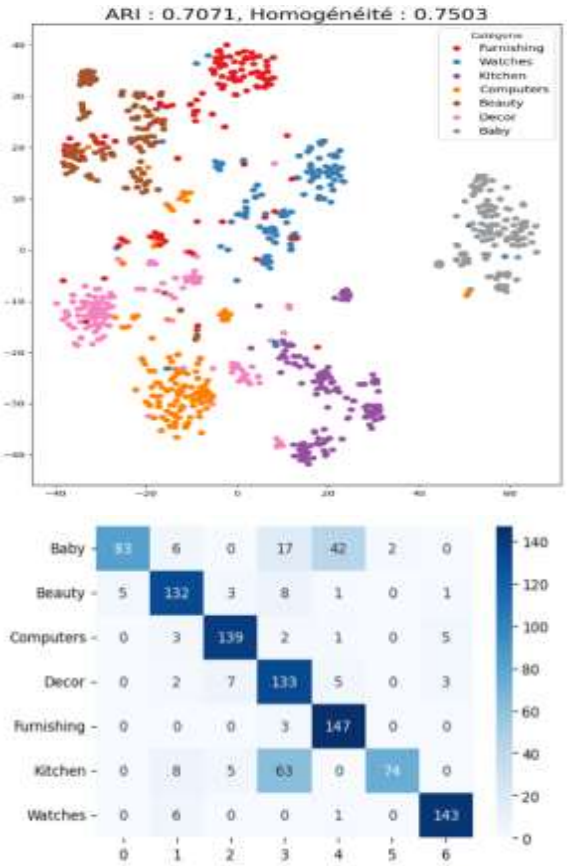
ARI: 0,63
Accuracy : 0,81

ACP + TSNE_BERT_PROD_ORIG



ARI: 0,52
Accuracy : 0,72

ACP + TSNE_USE_PROD_ORIG

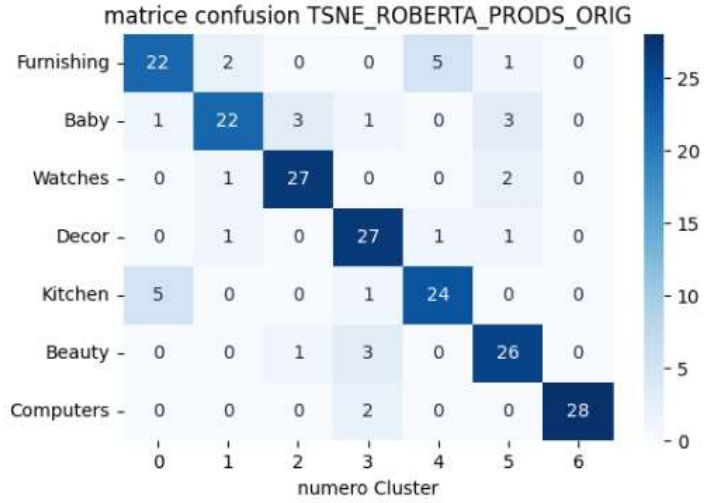


ARI: 0,71
Accuracy : 0,85

NLP – Classification Supervisée

ACP + TSNE_BERT_PRODS_ORIG

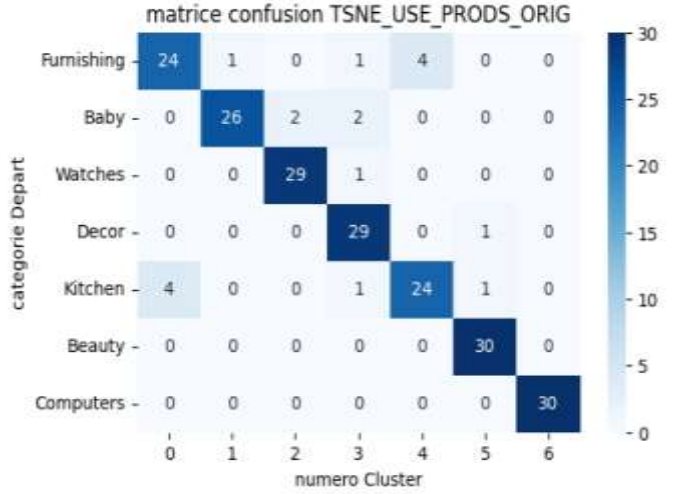
```
Accuracy de l'algorithme etc : 0.838
```



Accuracy (Train): 1
Accuracy (Test): 0,84

ACP + TSNE_USE_PRODS_ORIG

```
Accuracy de l'algorithme etc : 0.914
```



Accuracy (Train): 1
Accuracy (Test): 0,91

Sommaire

Images - Processus

Pré-process	Features extraction	Classification(ACP, TSNE)	Evaluation

Données IMAGES

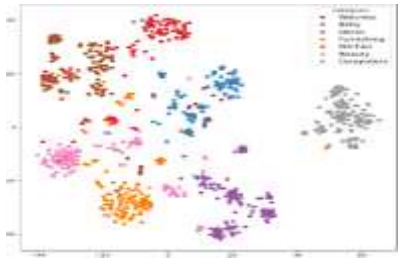
- Originale
- Correction exposition
- Correction contraste
- Conversion niveaux de gris
- Redimensionnement images

Originaux

Bag of Words
SIFT
ORB

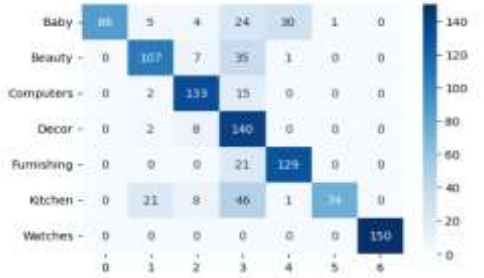
Keras CNN Transfert
VGG16, VGG19
InceptionV3

Apprentissage Non Supervisée KMeans

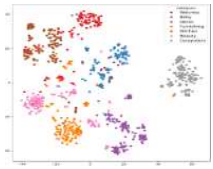


Apprentissage Supervisée

Evaluation **ARI**, **Accuracy**



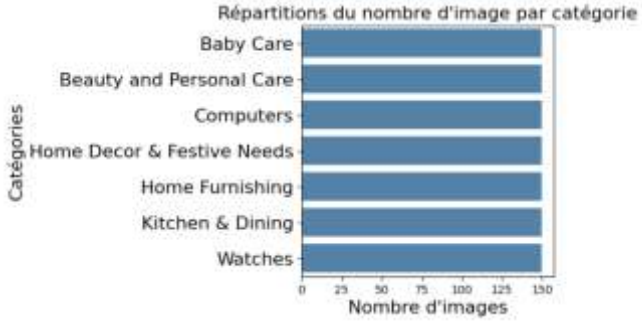
Interprétation Cluster

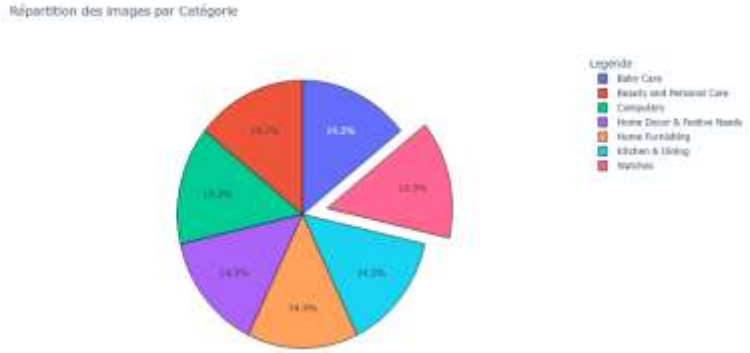


Images – Analyse exploratoire

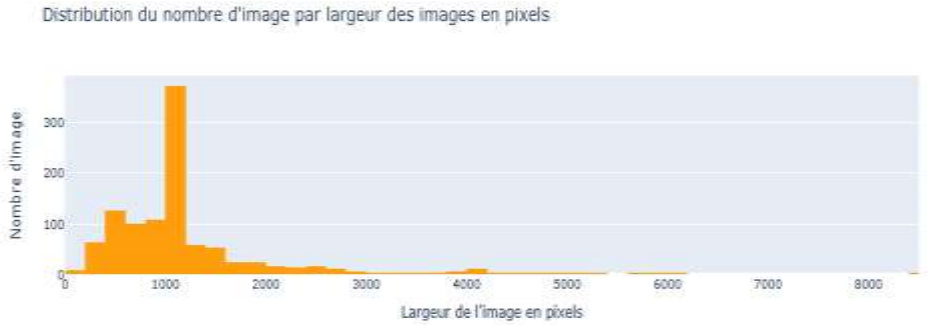
Exemples d'images

Nombre d'images par catégorie





Taille des images

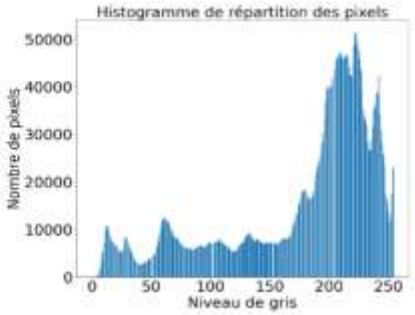


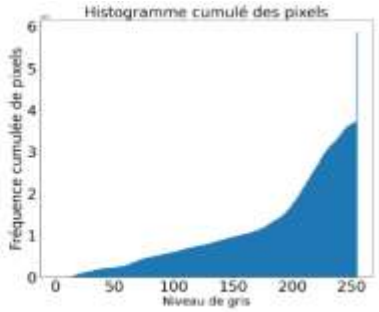
Traitement données images

IMAGES – METHODES CLASSIQUES

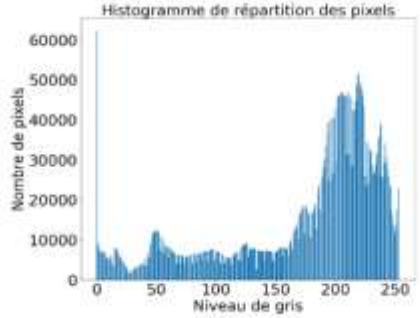
Images – Pré - traitement

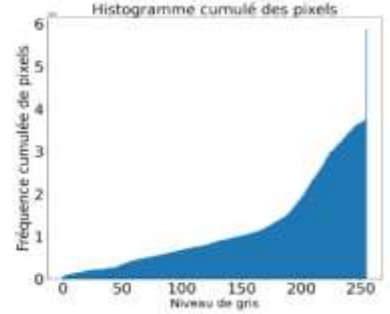
1 - Image originale



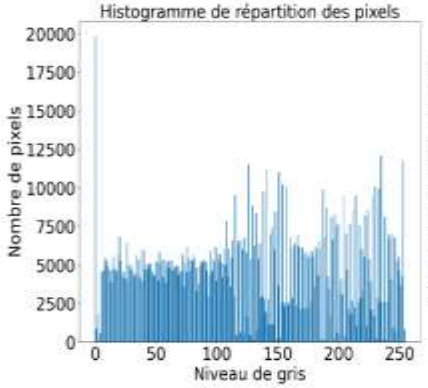


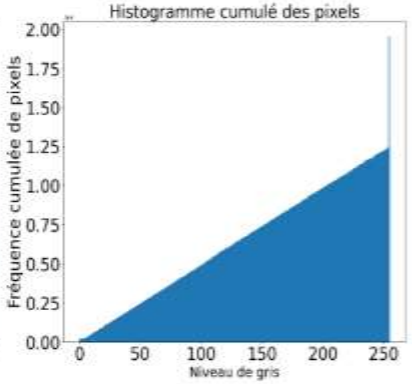
2 – Correction de l'exposition (étirement d'histogramme)



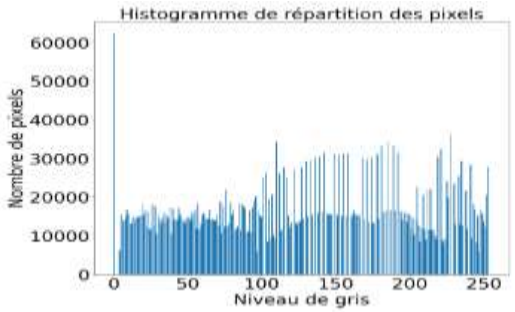


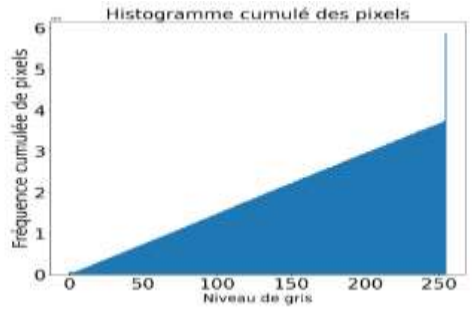
3 – Conversion image en niveaux de gris



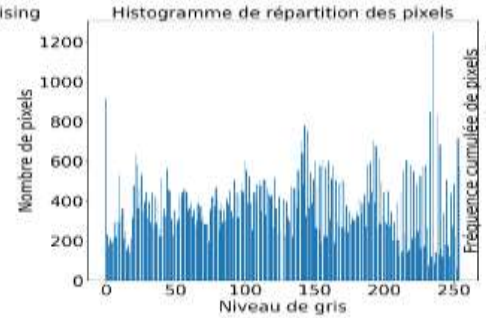


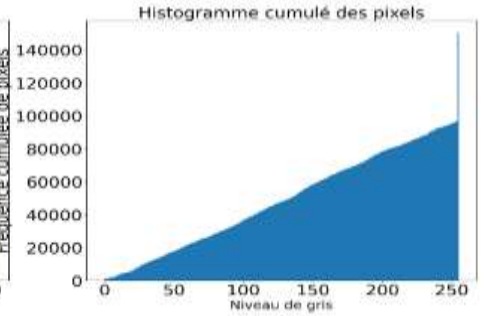
4 – Correction contraste (égalisation histogramme)



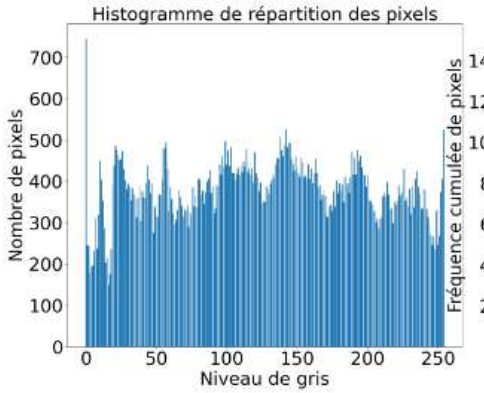


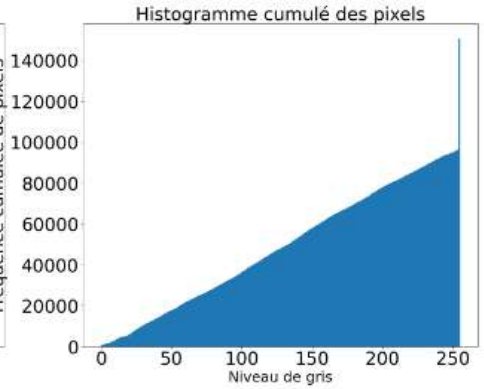
5 – Réduction de bruit (Algo Non-local Means Denoising)





6 – Redimensionnement en 224*224

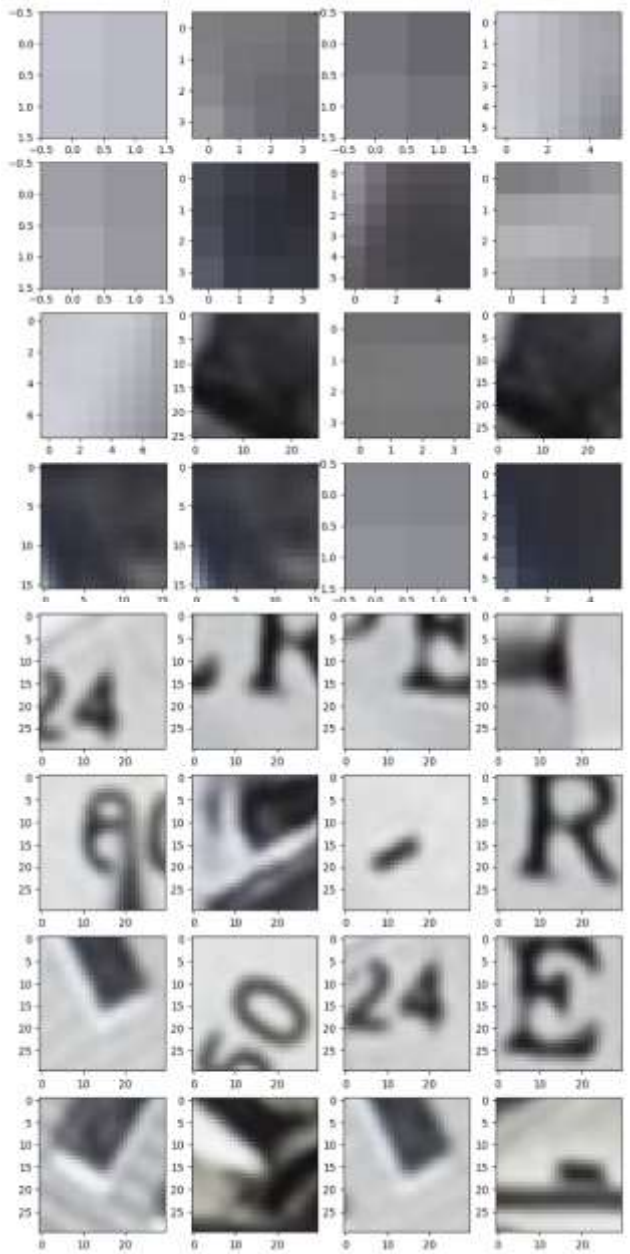


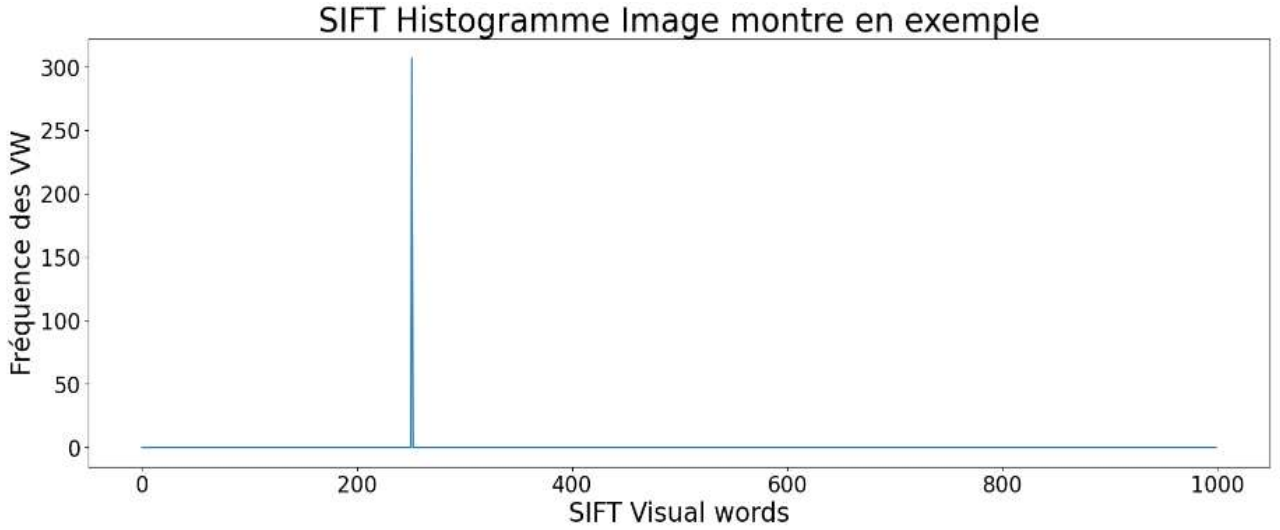


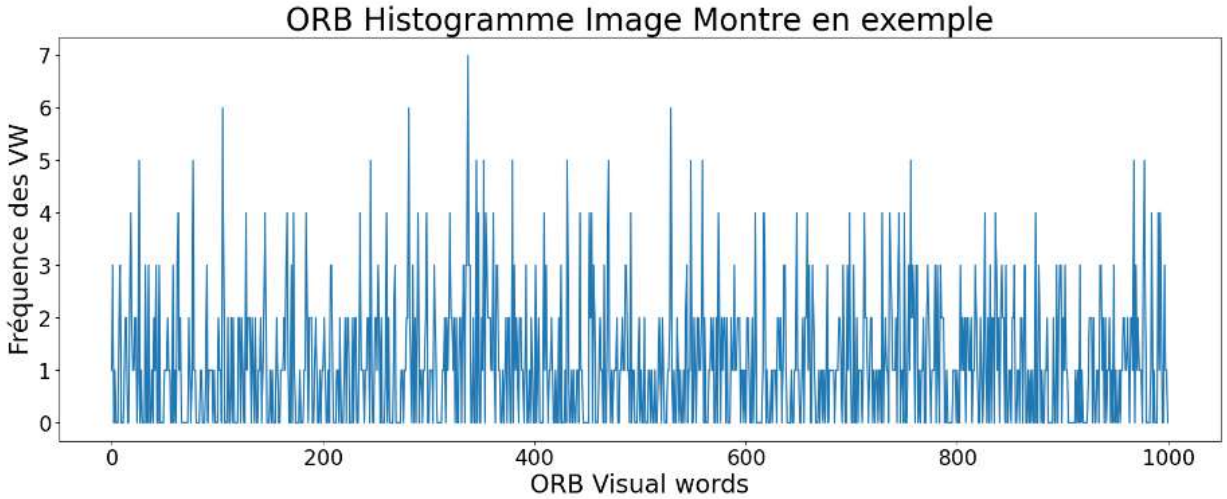
Images – SIFT & ORB Visual Words

SIFT

ORB

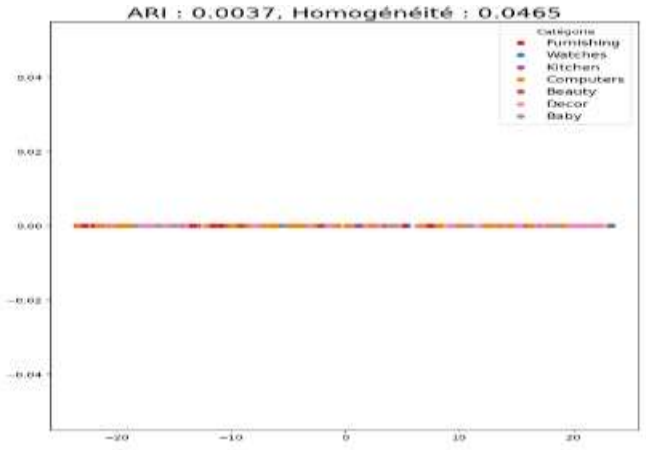


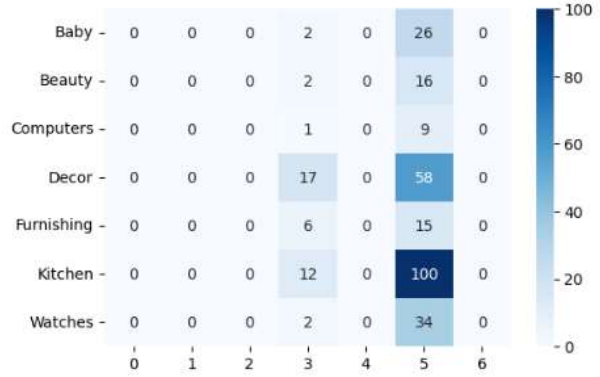




Images – Classification

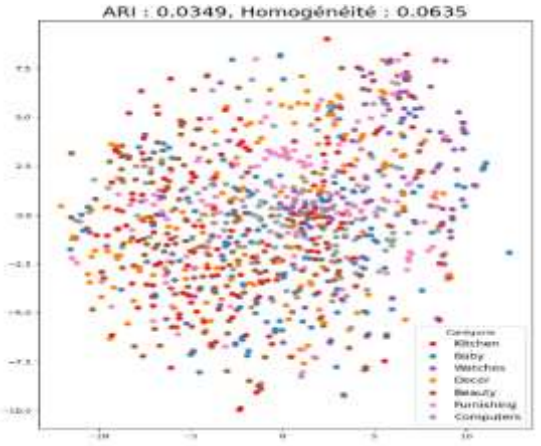
SIFT

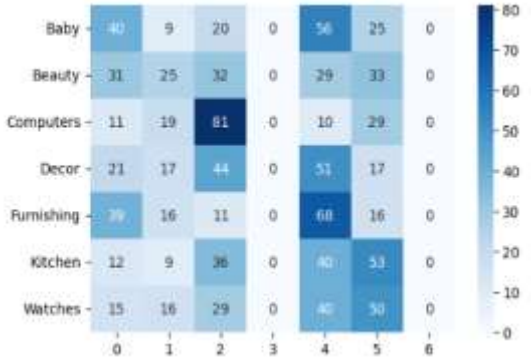




ARI: 0,003
Accuracy: 0,39

ORB





ARI: 0,03
Accuracy: 0,25

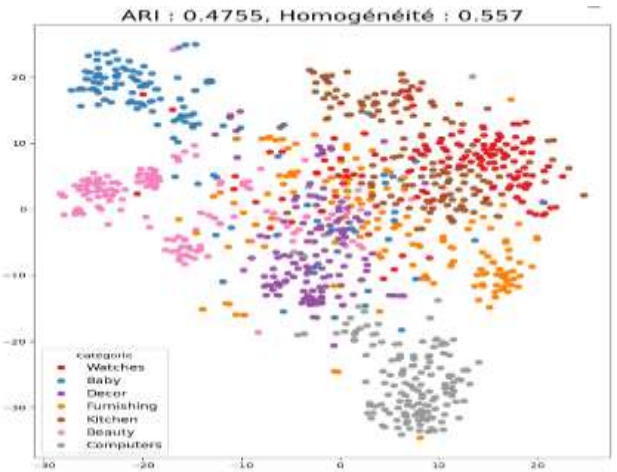
Sommaire

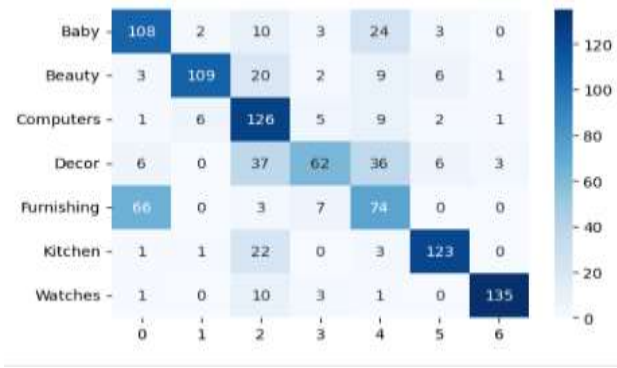
Traitement données images

IMAGES – CNN Transfert Learning

Images – Classification Non Supervisée KMeans

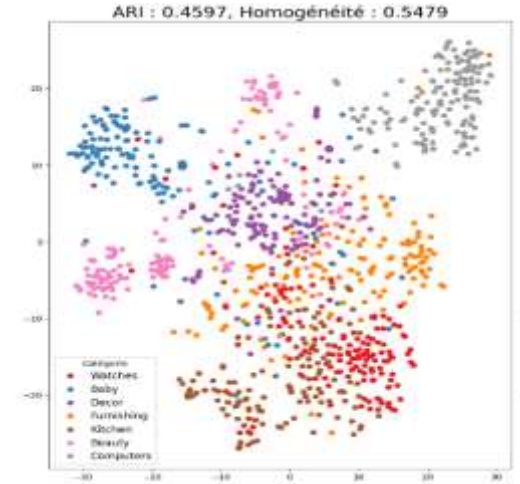
ACP + TSNE_VGG16

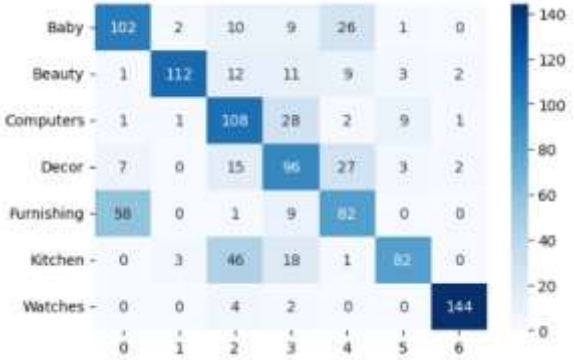




ARI: 0,47
Accuracy : 0,70

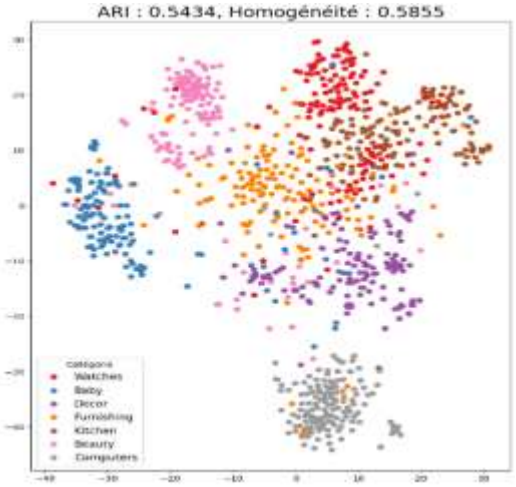
ACP + TSNE_VGG19

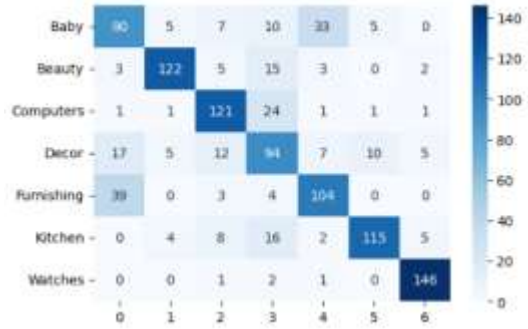




ARI: 0,46
Accuracy : 0,69

ACP + TSNE_INCEPTIONV3





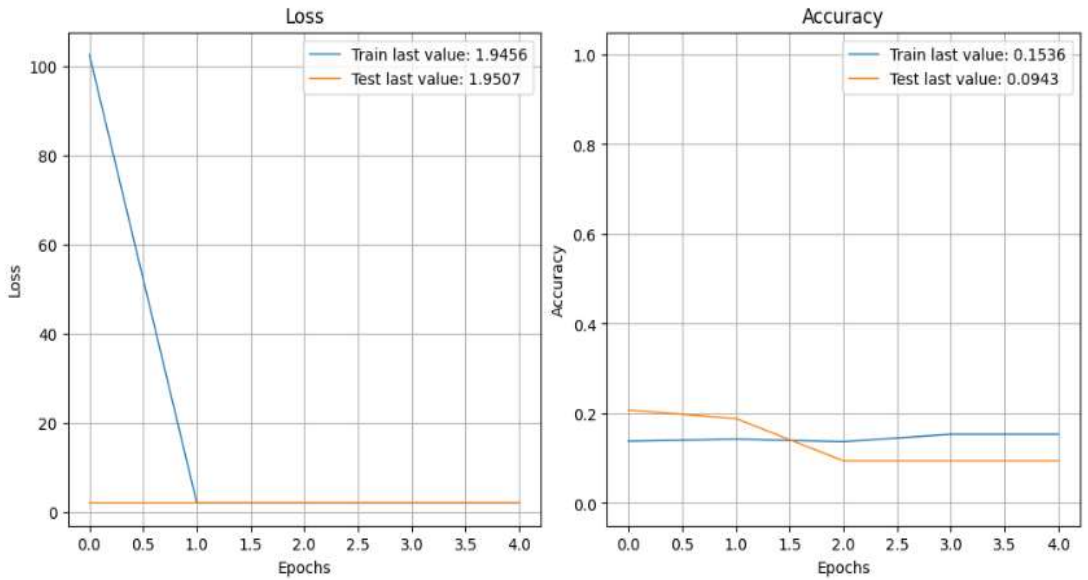
ARI: 0,54
Accuracy : 0,75

Images – Classification Supervisée

Approche Image Datagenerator avec data augmentation:

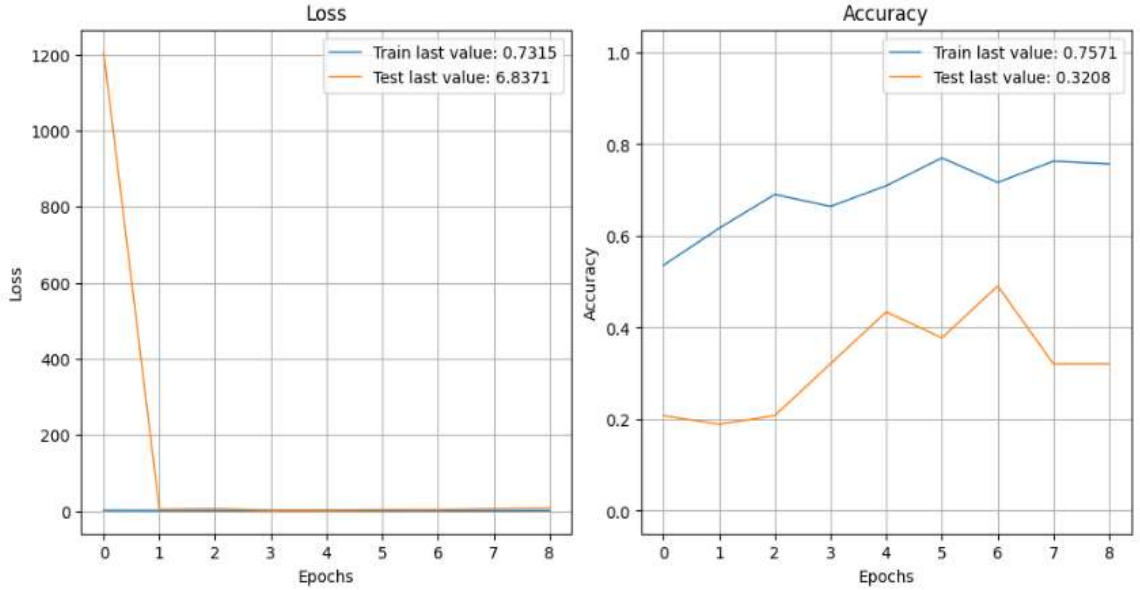
• Le principe de data augmentation consiste à effectuer des opérations modifiant l'aspect de l'image, sans pour autant en modifier la sémantique : par exemple, en diminuant la luminosité, en effectuant une rotation, etc…
• Cette méthode s'applique lorsque le jeu d'apprentissage est petit, voire inexistant. celui-ci va générer un échantillon d'images labelisées de taille suffisante afin d'alimenter un algorithme de type CNN (VGG16,...).

VGG19



Accuracy (Train): 0,15
Accuracy (Test): 0,09

INCEPTIONV3

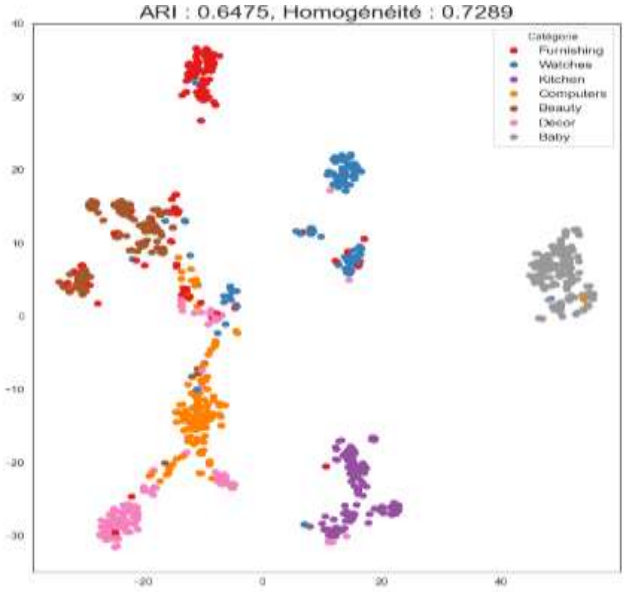


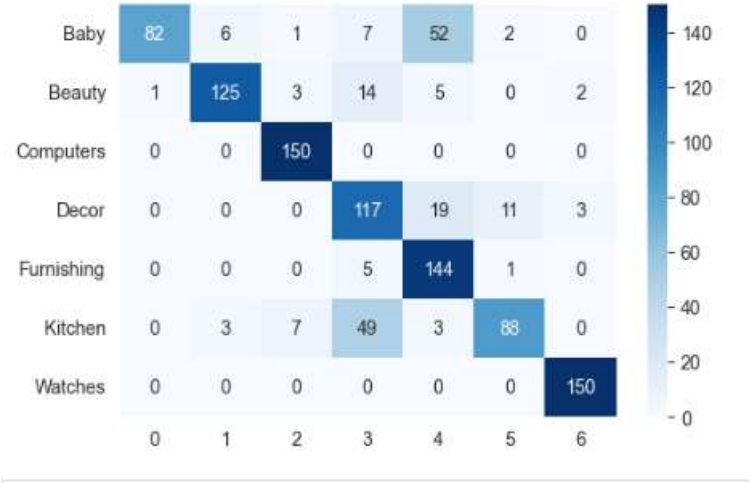
Accuracy (Train): 0,76
Accuracy (Test): 0,32

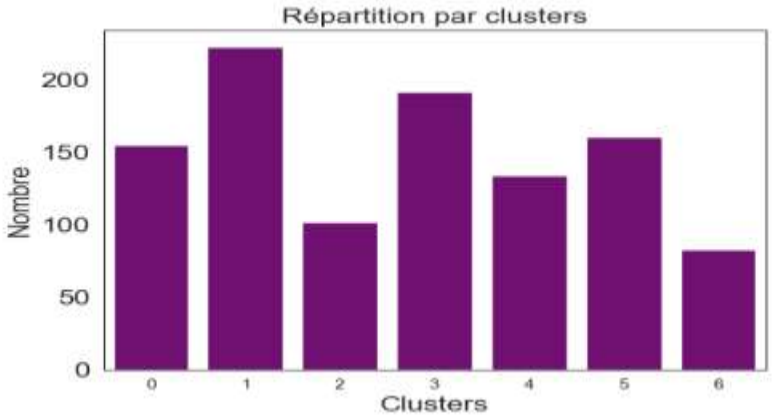
Sommaire

Combinaison USE 5 textes & INCEPTION V3 images

Use (version 5, textes, ARI=0.70, Accuracy=0.85) + **INCEPTIONV3** (Images, ARI=0.53, Accuracy=0.75)





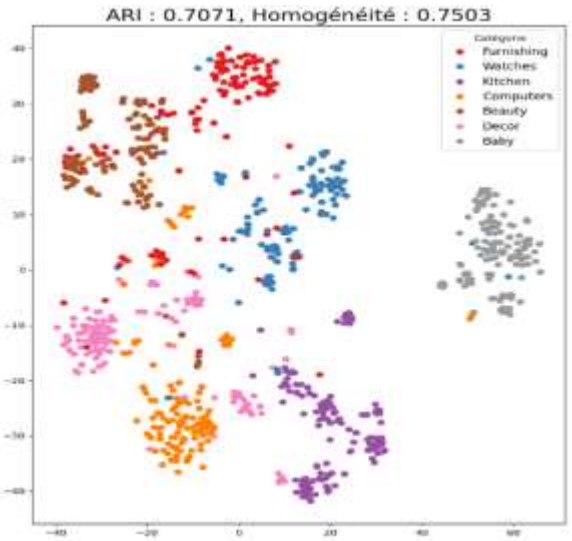


ARI: 0,65
Accuracy : 0,85

Sommaire

Conclusion – Etude de faisabilité validée

Meilleur	Données textuelles	Données images	Combinaison textuelles + images
Apprentissage NON SUPERVISEE			
Modèle	**USE 5**	**INCEPTIONV3**	**USE 5 + INCEPTIONV3**
ARI	**0,70**	**0,53**	**0,65**
Accuracy	**0,85**	**0,75**	**0,85**



Apprentissage SUPERVISEE	
Modèle	**USE 5**
Accuracy(Train)	**99,9 %**
Accuracy(Test)	**91 %**