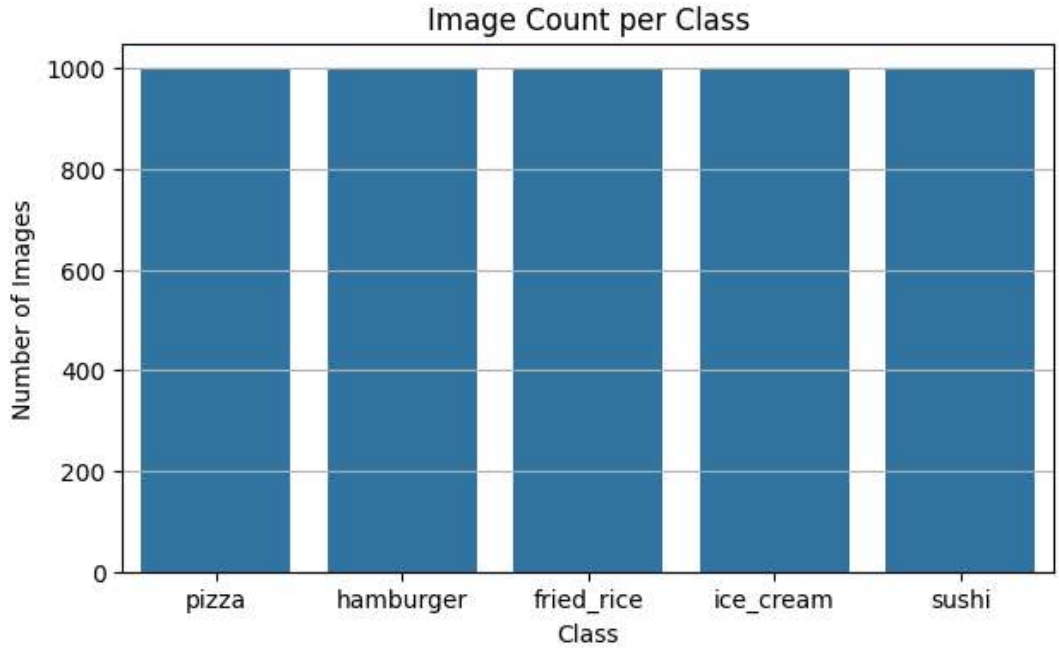
1.General Information on Dataset:

- Dataset Name: ***Food 101***
- Classes selected: ***Pizza***, ***Hamburger***, ***Fried Rice***, ***Ice Cream***, and ***Sushi*** (5 in total)
- Total number of samples is ***5000*** (***1000 per class)***



- The images size is ***224x224*** with batch size ***32*** and normalized using ***MobileNetV2*** preprocessing
- Training: ***70%*** = 3500 images
- Validation: ***15%*** = 750 images
- Testing: ***15%*** = 750 images

2.Implementation Details:

- Feature Extraction Phase:
  - Used ***MobileNetV2*** pretrained on ***ImageNet*** as a fixed feature extractor and removes top layers ***include_top=false*** and used ***average*** pooling
  - Number of features = ***1280 per images*** due to average pooling
  - The dimension of resulting features is a vector of shape ***(1280,) per image*** so train = (3500,1280) and Validation = Test = (750,1280)
  - ***StandardScaler*** is used for normalization and fit on training set and applied on validation and test

- Model-Specific:

Logistic:

Hyperparameters:

max_iter=2000, C=10, solver="saga", multi_class="multinomial"

K-Means:

Hyperparameters:

n_clusters=6, n_init=10, random_state=42

Cross-Validation:

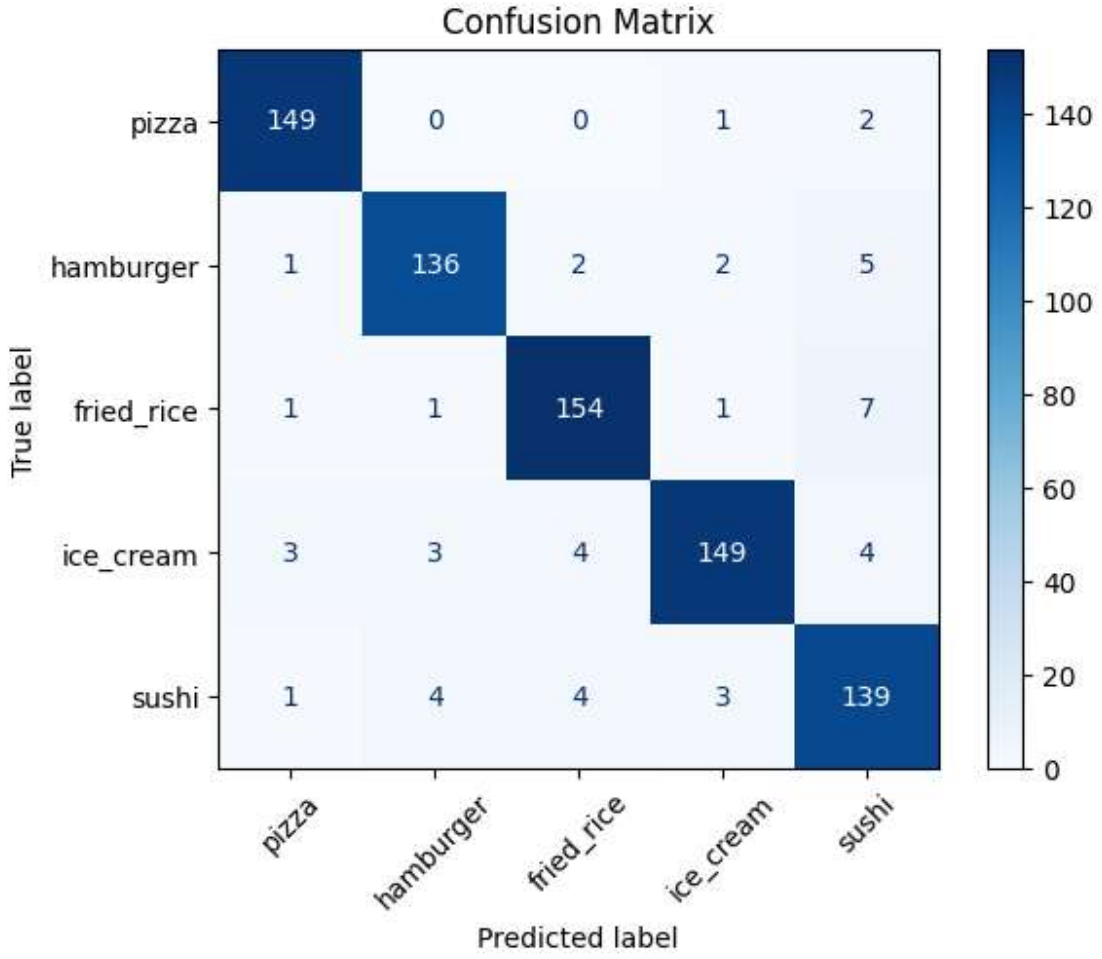
No Cross-Validation is used because dataset is split into fixed train, validation and testing sets

3.Results details:

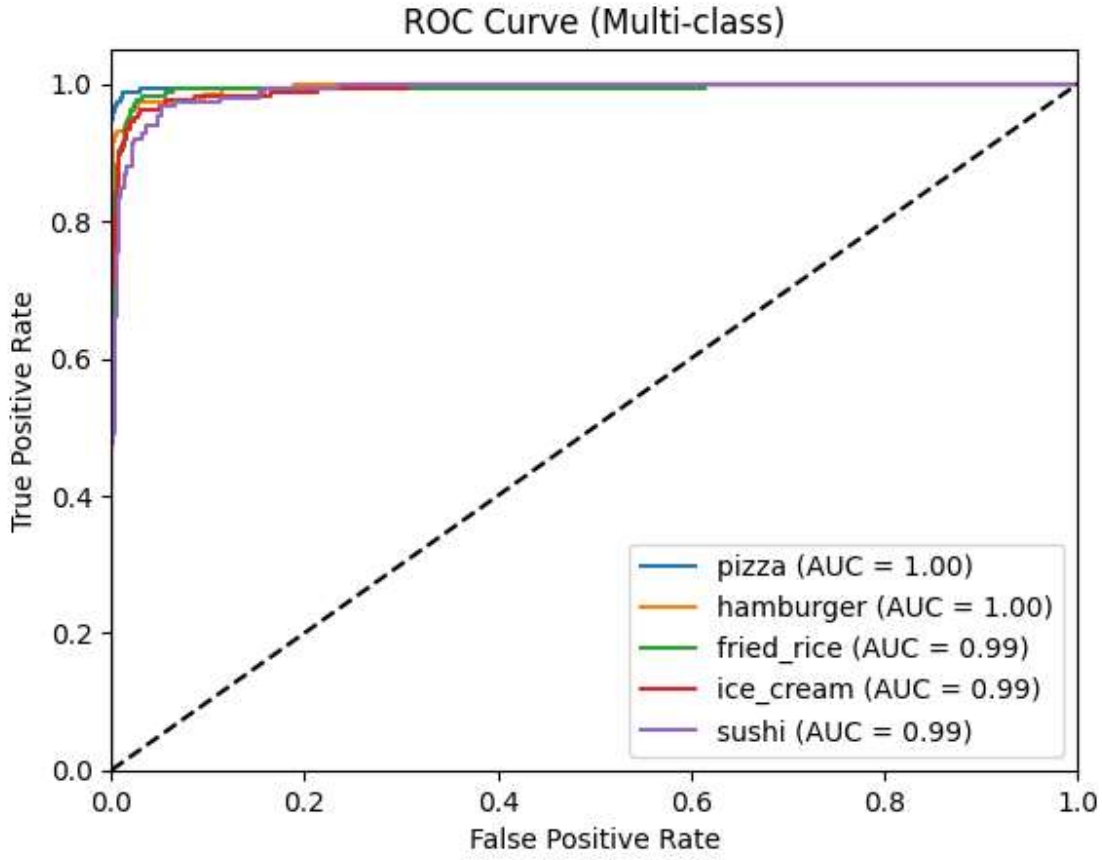
Logistic:

Loss:

Confusion Matrix:



ROC Curve:


ROC Curve (Multi-class)
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
pizza (AUC = 1.00)
hamburger (AUC = 1.00)
fried_rice (AUC = 0.99)
ice_cream (AUC = 0.99)
sushi (AUC = 0.99)

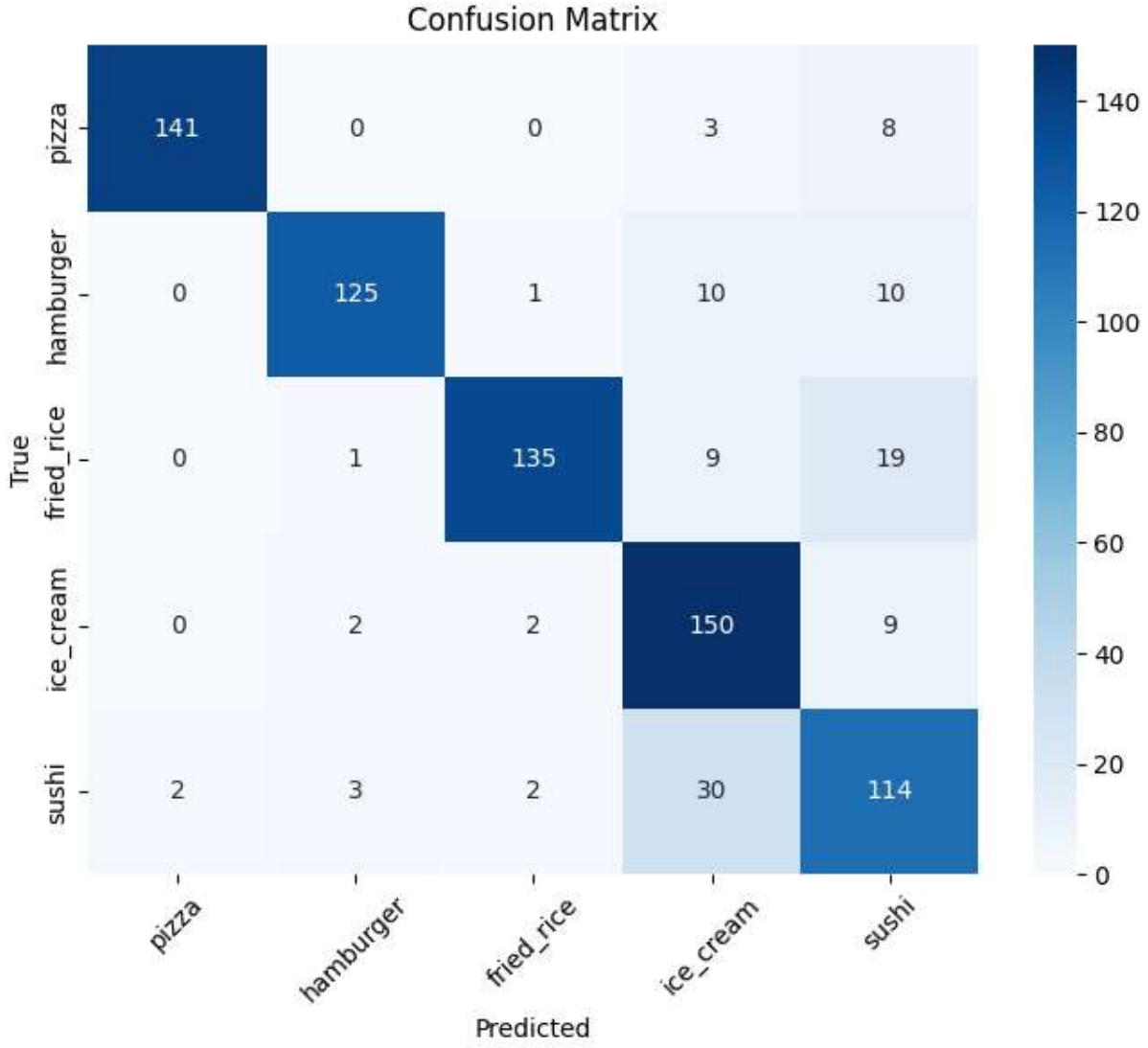
Accuracy:

Classification Report				
	Precision	Recall	F1-score	Support
Pizza	0.96	0.98	0.97	152
Hamburger	0.94	0.93	0.94	146
Fried Rice	0.94	0.94	0.94	164
Ice Cream	0.96	0.91	0.93	163
Sushi	0.89	0.92	0.90	151
Accuracy			0.94	776
Macro Avg	0.94	0.94	0.94	776
Weighted Avg	0.94	0.94	0.94	776
Train Accuracy	100.00%			
Test Accuracy	93.69%			

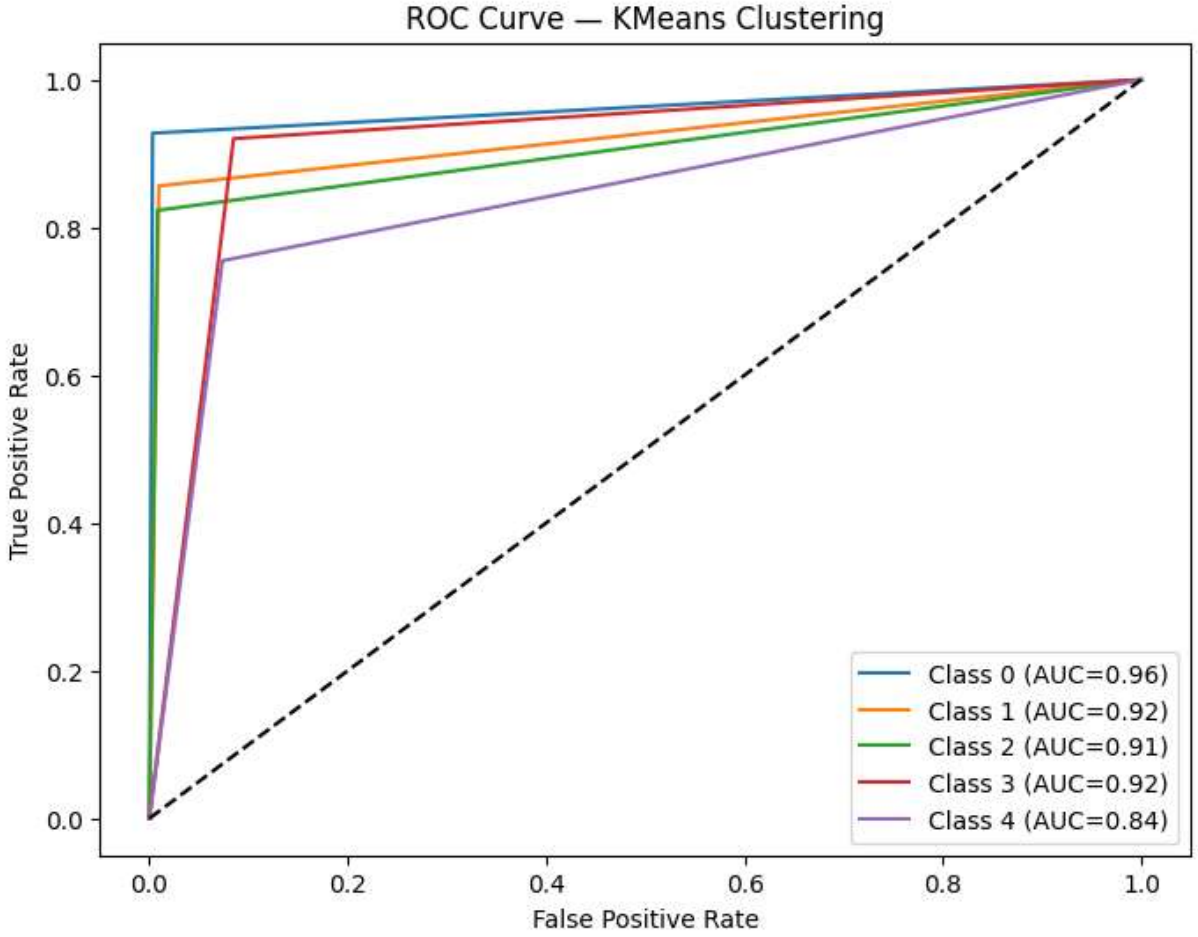
K-Means:

Loss:

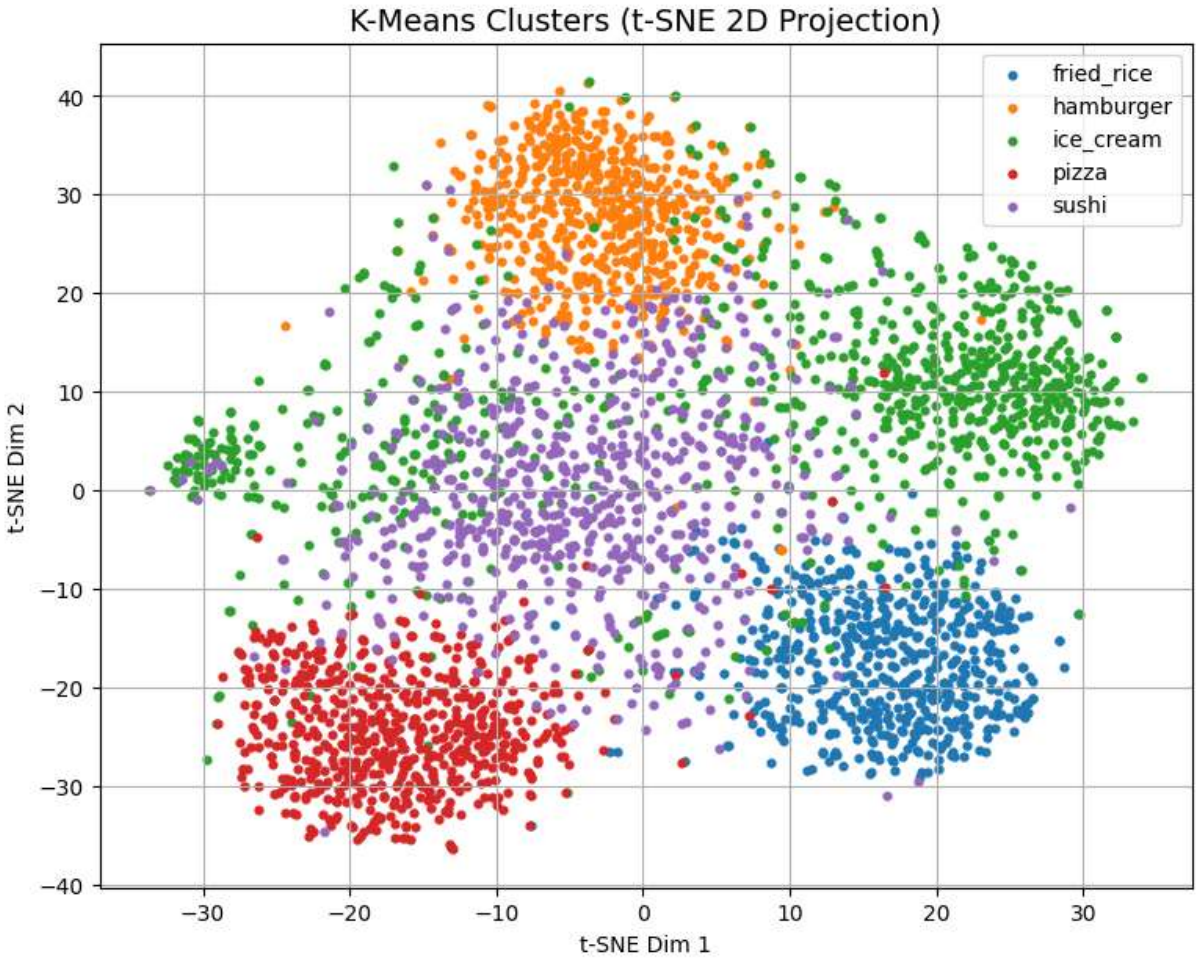
Confusion Matrix:



ROC Curve:


ROC Curve — KMeans Clustering
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
Class 0 (AUC=0.96)
Class 1 (AUC=0.92)
Class 2 (AUC=0.91)
Class 3 (AUC=0.92)
Class 4 (AUC=0.84)

K-Means Clusters:



Accuracy:

Classification Report				
	Precision	Recall	F1-score	Support
Pizza	0.99	0.93	0.96	152
Hamburger	0.95	0.86	0.90	146
Fried Rice	0.96	0.82	0.89	164
Ice Cream	0.74	0.92	0.82	163
Sushi	0.71	0.75	0.73	151
Accuracy			0.86	776
Macro Avg	0.87	0.86	0.86	776
Weighted Avg	0.87	0.86	0.86	776
Train Accuracy	84.15%			
Test Accuracy	85.70%			