Image Classification of Traditional Indian Clothing

Kelly Butler

Lehenga (the skirt) with a blouse and a dupatta

Nehru jacket

Saree

Women’s mojaris

Men’s kurta

Women’s kurta

Palazzos

Sherwani

Blouse

Salwar with dupatta

Dhoti pants

Gown

Dupatta

Men’s mojaris

Business Problem

- Can a highly accurate model be created to classify images of traditional Indian clothing for a new e-commerce site in the U.S.?
- This site wants a model that will easily classify the Indian clothing since many of these clothes are quite similar.
- Most machine-learning image-classification models have been trained on western clothing.
- A model exists that does this classification (Rajput and Aneja). However, the images for this model were scraped from the web in 2020 or early 2021 (the paper does not specify) and may be out of date.

Rajput, P.S., Aneja, S., *IndoFashion : Apparel Classification for Indian Ethnic Clothes*, https://arxiv.org/abs/2104.02830

Data From Kaggle

15 Class Labels

7500 validation images

7500 test images

91166 training images

Class Label	Number of Images
Women's Kurtas	11694
Sarees	10791
Blouses	9174
Leggings and Salwars	7787
Men's Kurtas	6951
Dupattas	6587
Nehru jackets	6491
Lehenga	5753
Gowns	5211
Petticoats	4441
Dhoti Pants	4145
Palazzos	3375
Women's Mojaris	3228
Sherwanis	2992
Men's Mojaris	2546

Newly Scraped Test Data

MOJARI

500 images of each type

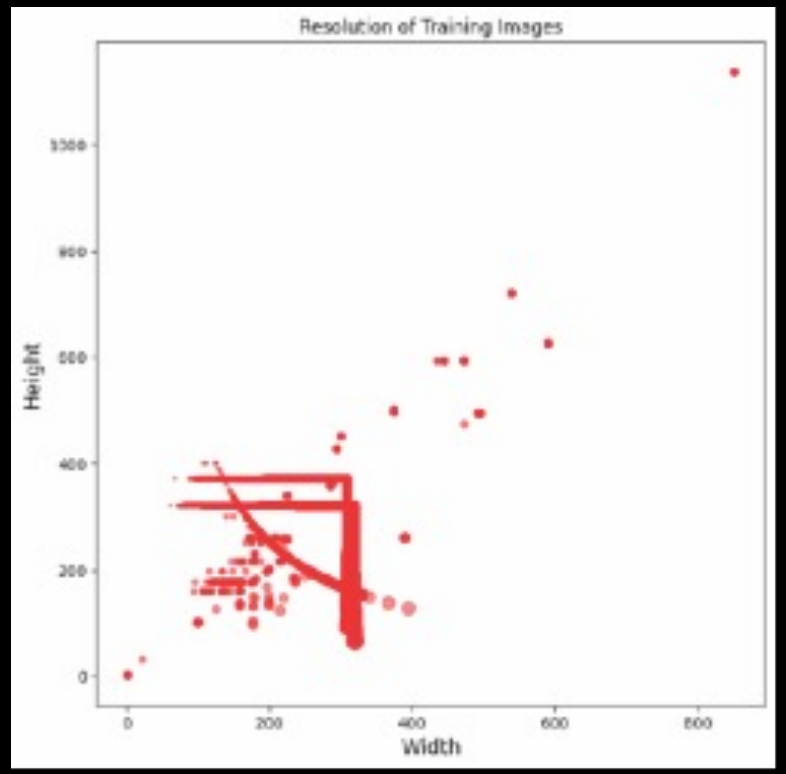


Image resolution in the training set

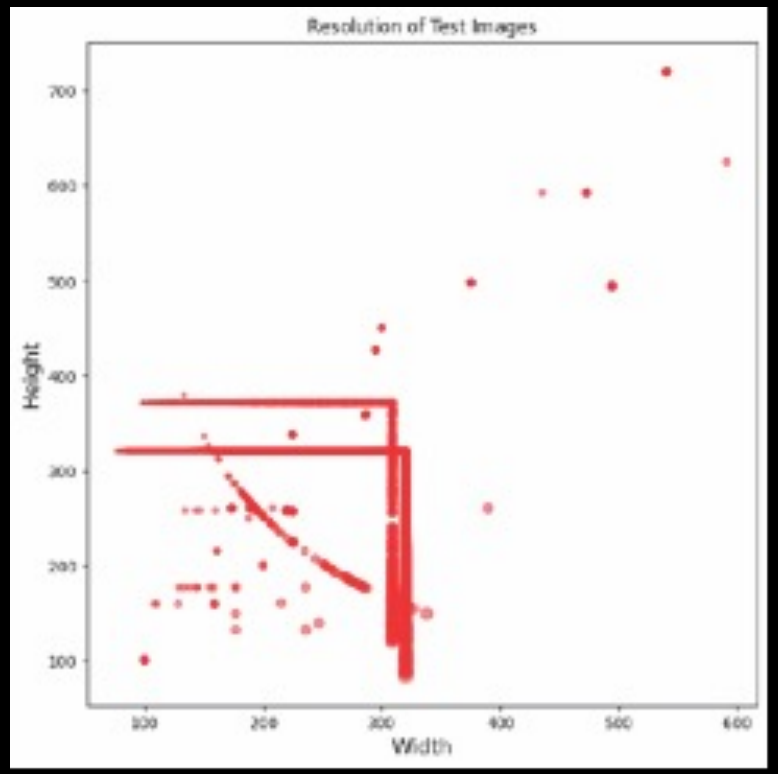


Image resolution in the test set

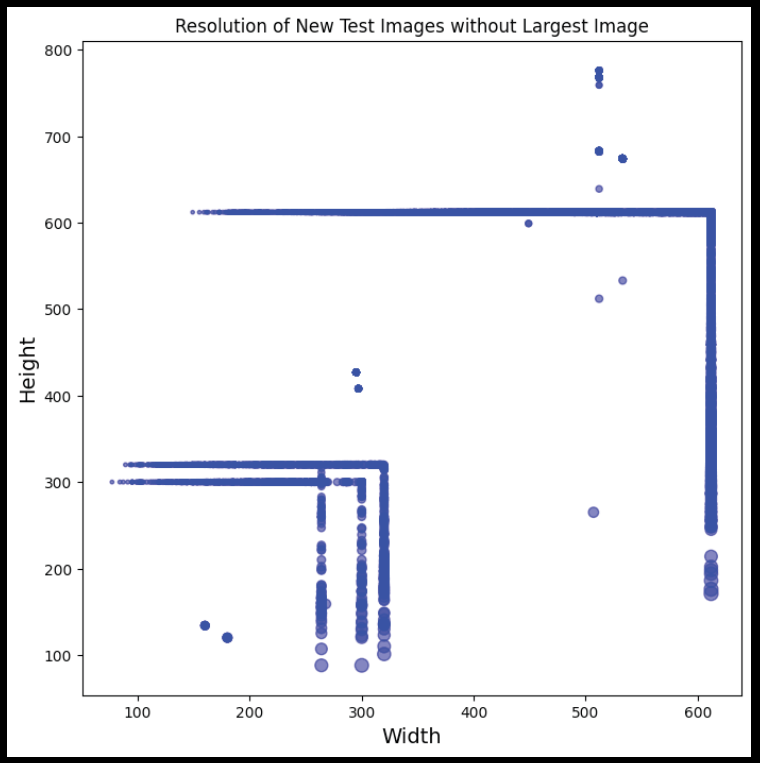
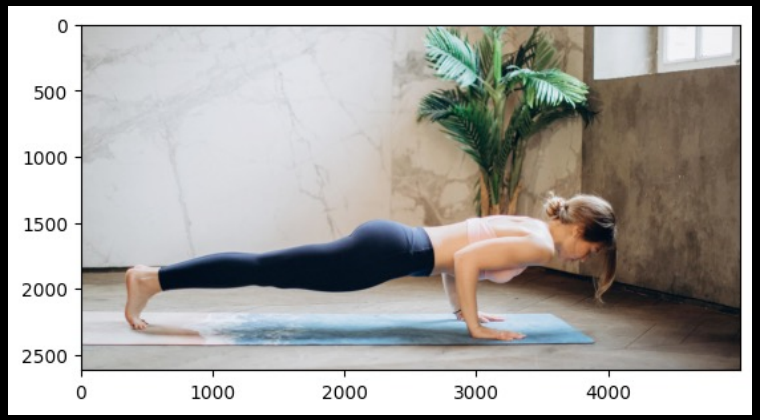


Image resolution in the new test set

Image Sizes



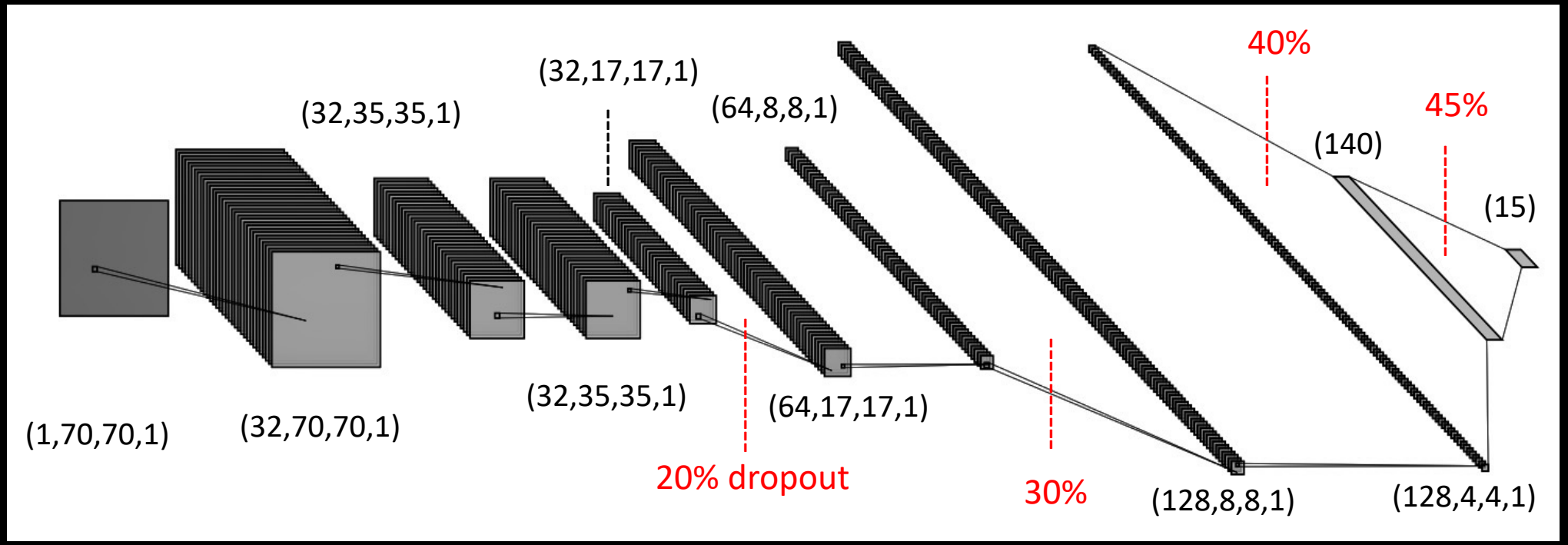
Convolutional Neural Networks

Resnet50

- Without top layer
- With fully connected layer of 100 nodes and relu activation
- 20% Dropout
- Output layer with softmax activation

ResNet152-v2

- Without top layer
- With fully connected layer of 512 nodes and relu activation
- 40% Dropout
- Output layer with softmax activation



Batch normalization after each convolutional layer.
Relu activation except for softmax activation for output layer

Convolutional Neural Network with Different Architecture (Model 1)

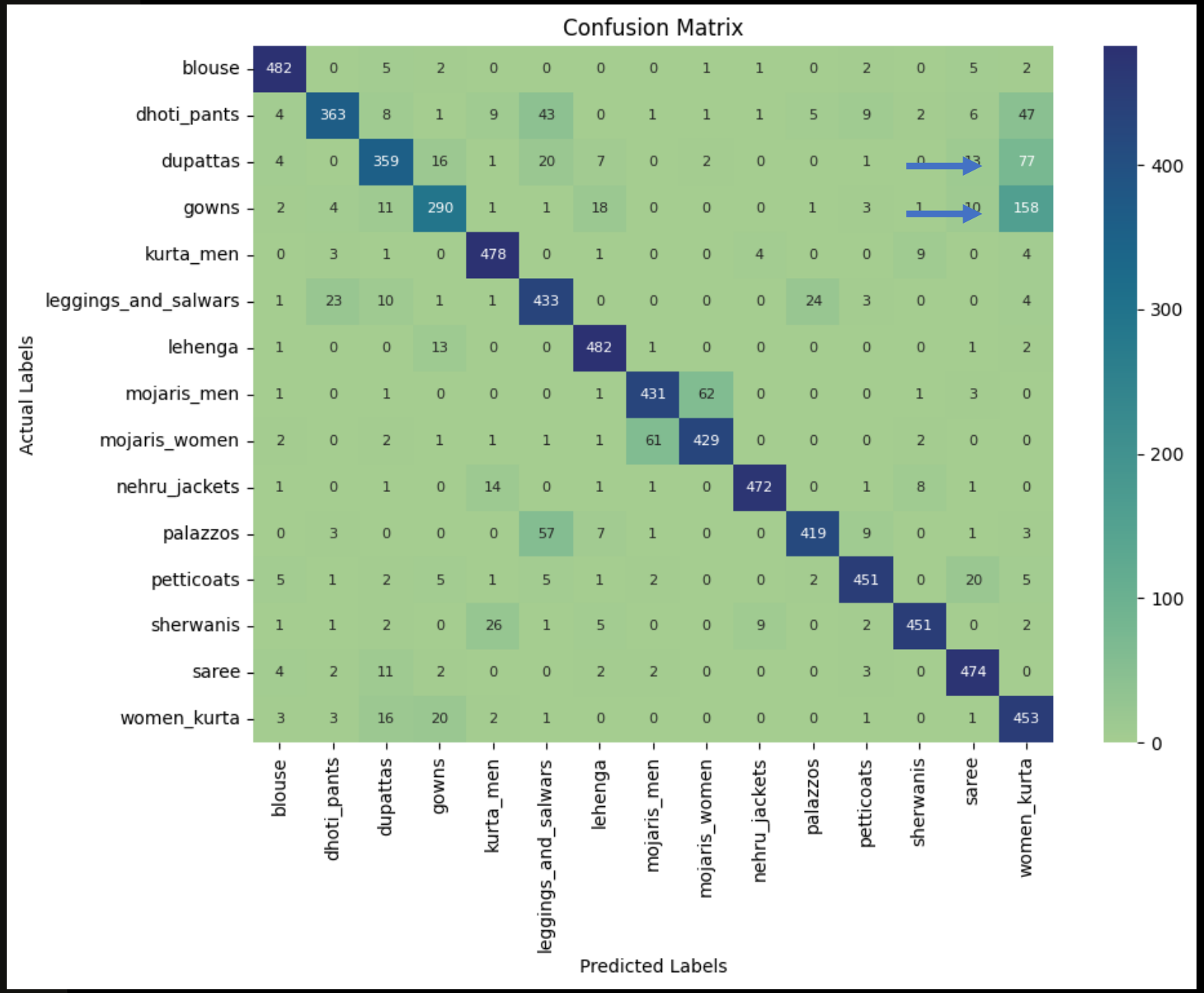
Metrics with Original Test Set

With Original Test Set	Accuracy	Precision	Recall	F1 Score
Model 1	86.23 %	85.98 %	84.68 %	84.61 %
ResNet50	85.05 %	85.91 %	85.05 %	85.10 %
ResNet152-v2	80.92 %	82.34 %	80.93 %	80.83 %
With New Test Set				
Model 1	63.91 %	68.59 %	63.91 %	63.59 %

Metrics with New Test Set

With New Test Set	Accuracy
Model 1	63.91 %
ResNet50	63.22 %
ResNet152-v2	61.82 %

Confusion Matrix Original Test Data



Comparing Training and Test Images

Training set:
Women’s
Kurta

Test set:
Gown

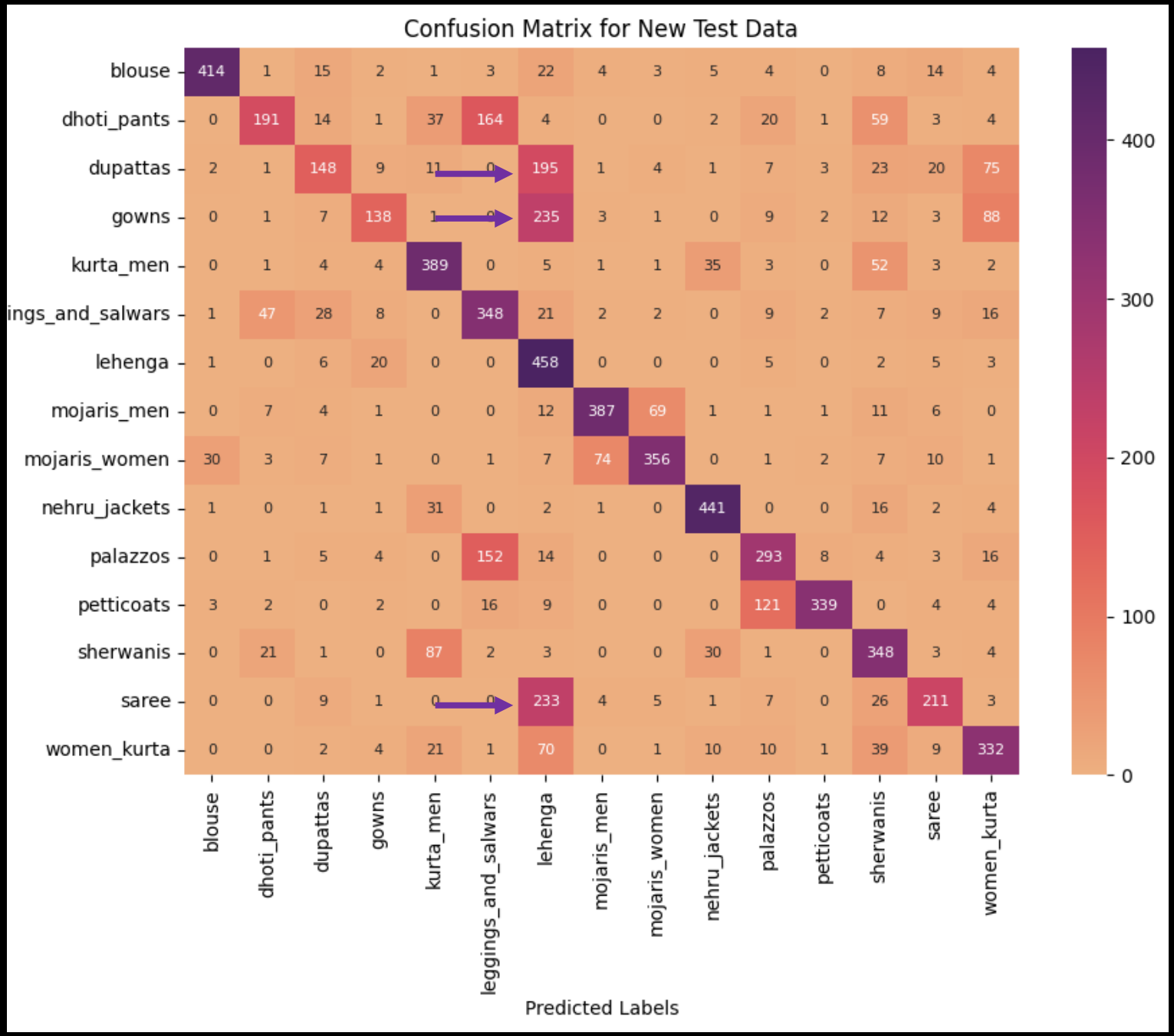
Predicted label:
Women’s Kurta

Comparing Training and Test Images

Training set
Women’s Kurta

Test set
Dupatta
Predicted:
Women’s Kurta

Confusion Matrix Newly Scraped Test Data



Mis-labeled Training Images

Men’s Mojaris

Training Number	Product Title	
56696	Ladies Jutti Women Jutti Women Mojari Tan	
56958	Womens Mojaris	

Business Insights

- Since the accuracy with newly acquired data was 63.91% significantly lower than the 86.23% for the original test set, a new model needs to be trained on current images from other e-commerce sites.
- It is imperative that the data used in training a new model be correctly categorized. The product title may be a better way of determining the category than the label used in searching for the image.
- Much of the change in images may not reflect a change in the fashion of clothing in each category but a rather a change in the way they are presented.
- Many clothes are shown in conjunction with one another. A multi-class multi-label model may be a better approach.