Indo Fashion Image Classification

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Problem Statement

- Indo-ethnic wear features a wide variety of garments with unique patterns, fabrics, and cultural significance.
- Deciphering the subtle visual differences between these garments is a complex task.
- Existing technology struggles to accurately classify and differentiate Indo-ethnic wear categories.
- Develop a CNN-based model to classify images of Indo-ethnic garments into categories like saree, kurta, and lehenga.

Methods

Image Classification Using CNN

- Train CNN to extract features like embroidery styles, patterns, and silhouettes.
- Perform single-label classification into categories (e.g., saree, kurta, lehenga).
- Output probability distributions for robust predictions.

Feature Map Comparisons

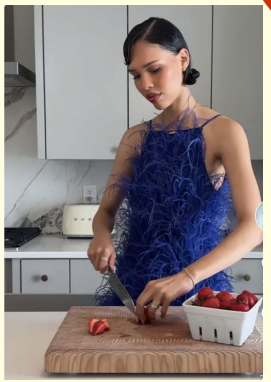
- Visualized feature maps from convolutional layers to understand the model's focus and evaluate the effectiveness of learned features.

Embeddings and Clustering

- Apply PCA analysis on embeddings

Data Augmentation for Generalization

- Use rotation, scaling and flipping for real-world variations.
- Generate synthetic data to improve accuracy across diverse conditions.

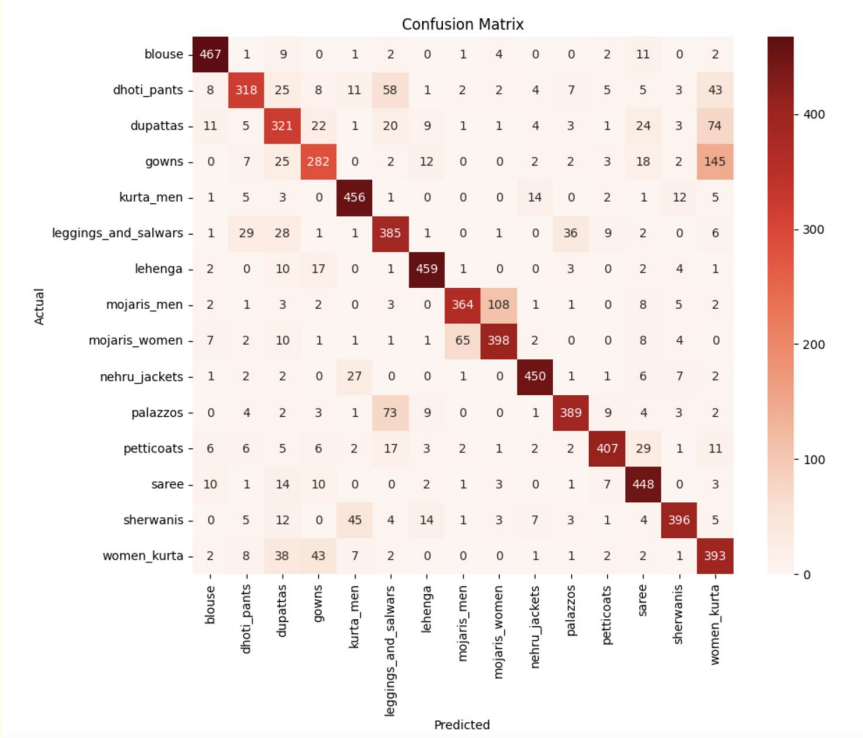


Making a CNN From Scratch <3

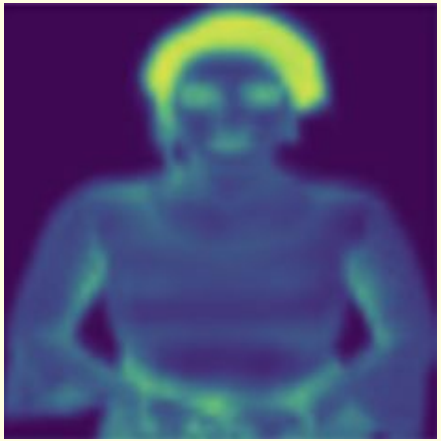
Challenges

- **Overfitting:** Initially, the model achieved 100% accuracy but was overfitting. We addressed this by balancing the dataset, ensuring underrepresented classes, like male kurtas, were more equally represented. This improved the accuracy to 83%.
- **Misclassification of Similar Garments:** Sarees and lehengas were frequently misclassified due to visual similarities. To resolve this, we applied additional data augmentations, such as rotations and transformations, to help the model better distinguish between them.

Results


Confusion Matrix
Actual
Predicted
blouse 467 1 9 0 1 2 0 1 4 0 0 2 11 0 2
dhoti_pants 8 318 25 8 11 58 1 2 2 4 7 5 5 3 43
dupattas 11 5 321 22 1 20 9 1 1 4 3 1 24 3 74
gowns 0 7 25 282 0 2 12 0 0 2 2 3 18 2 145
kurta_men 1 5 3 0 456 1 0 0 0 14 0 2 1 12 5
leggings_and_salwars 1 29 28 1 1 385 1 0 1 0 36 9 2 0 6
lehenga 2 0 10 17 0 1 459 1 0 0 3 0 2 4 1
mojaris_men 2 1 3 2 0 3 0 364 108 1 1 0 8 5 2
mojaris_women 7 2 10 1 1 1 1 65 398 2 0 0 8 4 0
nehru_jackets 1 2 2 0 27 0 0 1 0 450 1 1 6 7 2
palazzos 0 4 2 3 1 73 9 0 0 1 389 9 4 3 2
petticoats 6 6 5 6 2 17 3 2 1 2 2 407 29 1 11
saree 10 1 14 10 0 0 2 1 3 0 1 7 448 0 3
sherwanis 0 5 12 0 45 4 14 1 3 7 3 1 4 396 5
women_kurta 2 8 38 43 7 2 0 0 0 1 1 2 2 1 393
blouse
dhoti_pants
dupattas
gowns
kurta_men
leggings_and_salwars
lehenga
mojaris_men
mojaris_women
nehru_jackets
palazzos
petticoats
saree
sherwanis
women_kurta
400
300
200
100
0

Feature Maps



Conclusions

- Demonstrated the effectiveness of CNNs in classifying images of Indo ethnic wear into distinct categories such as sarees, kurtas, and lehengas.
- Leveraged advanced data augmentation techniques to ensure the model generalized well across diverse styles and real-world conditions.
- Employed a structured approach to data preparation and model training, resulting in robust predictions.
- Achieved improved accuracy and performance metrics through optimized techniques.

Fun fact

While exploring the dataset, we discovered that sarees often have over 100 unique draping styles across different Indian states, each with its own cultural significance!