ART STYLE CLASSIFICATION

Team members:
Aparna S.   CB.AI.U4AIM24104
Rubashree R.   CB.AI.U4AIM24139
Sakthikailash SV.   CB.AI.U4AIM24140
Sangeetha S.   CB.AI.U4AIM24142

Faculty:
Dr.Manimaran S.
Dr.Prem Jagadeshan

Introduction

Art has developed over varied styles, each with unique features and historical relevance. This project investigates the categorization of artworks into various artistic styles based on three different methods. Through a comparison of their performance, we seek to establish the best method for correctly identifying and classifying artworks.

What has been done

Original Image

Augmented Image

Grayscale image

Magnitude Spectrum (Fourier Transform)

Review Questions

Review comments	Solutions
Why have we used Fourier transform?	For image classifications, the textures and patterns in the images are important. By analyzing the frequency components we can classify better , so we use Fourier transform which converts spatial to frequency domain with the reference of: https://arxiv.org/pdf/2106.11478
Why have we used CNN?	CNNs are better than other models because they automatically learn image features, reducing the need for manual feature extraction. They are also more efficient, accurate, and robust to changes in position, size, and lighting. https://arxiv.org/abs/1610.07629

Review comments	Solutions
Is there any hybrid model paper ?	https://dergipark.org.tr/en/download/article-file/4008785
Why Lists and Not Another Data Structure?	- Lists allow dynamic appending (images.extend(...)). - Lists maintain order, which is useful when splitting into subsets. - Lists support easy shuffling (shuffle(images)). - Lists allow efficient slicing (images[:split] and images[split:split + test_split]).

Dataset

Source: Kaggle
https://www.kaggle.com/datasets/sivarazadi/wikiart-art-movementsstyles/data

The "Surreal Symphonies" dataset offers a comprehensive collection of 42,500 JPEG images

These images categorized into 13 distinct art styles, including Academic Art, Expressionism, Neoclassicism, Realism, Renaissance, and Symbolism.

What has been done review-2

FFT + Xception:

```
Epoch 10/10
371/371 ━━━━━━━━━━━━━━━━━━ 0s 7s/step - accuracy: 0.6491 - loss: 1.1990WARNING:absl:You are saving your model as an HDF5 file
371/371 ━━━━━━━━━━━━━━━━━━ 2767s 7s/step - accuracy: 0.6491 - loss: 1.1990 - val_accuracy: 0.6451 - val_loss: 1.3626
41/41 ━━━━━━━━━━━━━━━━━━ 359s 9s/step - accuracy: 0.6439 - loss: 1.4003
Final Test Accuracy: 65.38%
```

why xception?

The significance of depth-wise separable convolutions in facilitating
  1. effective feature extraction and representation learning
  2. Reduce the computational cost

with reference to :
https://www.internationaljournalssrg.org/IJECE/2024/Volume11-Issue9/IJECE-V11I9P102.pdf

FFT + EfficientNet

```
1063/1063 ————————————  3743s 4s/step - accuracy: 0.8561 - loss: 0.4376 - val_accuracy: 0.0622 - val_loss: 3.4953
Epoch 12/20
1063/1063 ————————————  3743s 4s/step - accuracy: 0.8788 - loss: 0.3661 - val_accuracy: 0.1241 - val_loss: 3.0024
Epoch 13/20
1063/1063 ————————————  4389s 4s/step - accuracy: 0.8898 - loss: 0.3290 - val_accuracy: 0.1262 - val_loss: 46.9474
Epoch 14/20
1063/1063 ————————————  4460s 4s/step - accuracy: 0.9043 - loss: 0.2901 - val_accuracy: 0.0714 - val_loss: 56.1562
Epoch 15/20
 760/1063 ——————————   23:09 5s/step - accuracy: 0.9132 - loss: 0.2656
```

Why EfficientNet?

EfficientNet is useful because its compound scaling optimally balances depth, width, and resolution, ensuring better feature extraction with fewer parameters.

With reference to:

Image-based malware representation approach with EfficientNet convolutional neural networks for effective malware classification
a Dept. of Computer Science, University of Texas at San Antonio, San Antonio, TX 78249, USA
b Center for Artificial Intelligence, Prince Mohammad Bin Fahd University, Khobar, Saudi Arabia

Future goals

1)Improve Model Accuracy – Enhance performance for higher accuracy using data augmentation, fine-tuning, and ensemble learning.

2) Develop a User-Friendly Interface – Create a web or mobile app where users can upload an image to get instant art style

Thank You!