

Image Classification Model

1. Model Overview

The image classification model is designed to recognize and classify images of celebrities using Convolutional Neural Networks (CNNs). The dataset comprises images of five sports celebrities: Lionel Messi, Maria Sharapova, Roger Federer, Serena Williams, and Virat Kohli.

2. Data Preprocessing

- **Dataset:** Images were collected for each celebrity from the provided directory.
- **Preprocessing:** Images were resized to (128x128) pixels and converted to NumPy arrays to be fed into the CNN model.

3. Model Architecture

The CNN model architecture consists of the following layers:

- **Convolutional Layers:** Three sets of Conv2D and MaxPooling2D layers to extract features from the images.
- **Dropout Layer:** A dropout layer with a dropout rate of 0.2 for regularization.
- **Flatten Layer:** Flattening the output to be fed into Dense layers.
- **Dense Layers:** Two dense hidden layers with ReLU activation functions and a final output layer with Softmax activation for multi-class classification.

4. Training Process

- **Train-Test Split:** The dataset was divided into training and testing sets with a 80:20 split.
- **Normalization:** Image pixel values were normalized to the range [0, 1].
- **Model Compilation:** Adam optimizer was used with Sparse Categorical Crossentropy loss function.
- **Training:** The model was trained for 25 epochs with a batch size of 64, using a validation split of 20%.
- **Training Metrics:** Accuracy and loss were monitored during training to assess model performance.

5. Model Evaluation

- **Accuracy:** After training, the model achieved an accuracy of **73.35%** on the test dataset.

6. Model Prediction

- **Prediction:** A prediction function was implemented to predict the celebrity from a given image path using the trained model.

7. Results and Findings

- **Training Plots:** Plots were generated for training accuracy vs. validation accuracy and training loss vs. validation loss.
- **CSV Output:** Model predictions were saved to a CSV file ('Image_CNN.csv') containing the actual and predicted labels for the test dataset.

Conclusion

The image classification model successfully identifies and classifies images of celebrities with an accuracy of **73.53%**. Further enhancements or fine-tuning could be considered for improved performance.