Documentation

Dataset Summary:

The dataset consists of images of five different celebrities: Lionel Messi, Maria Sharapova, Roger Federer, Serena Williams, and Virat Kohli. The number of images for each celebrity class is as follows:

- Lionel Messi: 36 images

- Maria Sharapova: 34 images

- Roger Federer: 28 images

- Serena Williams: 29 images

- Virat Kohli: 41 images

Data Processing:

Image Loading and Resizing:

- Images were loaded from their respective directories and resized to (128, 128) pixels.

Labeling:

- Labels were assigned based on the celebrity class (0 to 4).

Dataset Size:

- The final dataset consists of 168 images.

Model Architecture:

The chosen model is a Convolutional Neural Network (CNN) with the following layers:

Input Layer:

- Convolutional layer with 32 filters, each of size (3,3), using the ReLU activation function.
- MaxPooling layer with a pool size of (2,2) for downsampling.

Hidden Layers:

- Flatten layer to transform the 2D output to a 1D array.
- Dense layer with 256 neurons and ReLU activation function.
- Dropout layer with a dropout rate of 0.5 to prevent overfitting.
- Dense layer with 512 neurons and ReLU activation function.

Output Layer:

- Dense layer with 5 neurons (equal to the number of classes) using the softmax activation function for multi-class classification.

Training Process:

Data Splitting:

- The dataset was split into training and testing sets with an 80-20 ratio.

Data Normalization:

- Pixel values of images were normalized using TensorFlow's normalize function.

Model Compilation:

- The model was compiled using the Adam optimizer and sparse categorical crossentropy loss.

Model Training:

- The model was trained for 25 epochs with a batch size of 32, utilizing early stopping based on validation loss.

Training Results:

Accuracy on Training Set:

- Achieved an accuracy of approximately 100%.

Validation Accuracy:

- Achieved a maximum validation accuracy of 85.71%.

Model Evaluation:

Accuracy on Test Set:

- The model achieved an accuracy of 79.41% on the test set.

Model Prediction:

Sample Prediction:

- The model successfully predicted the class "maria_sharapova" for a sample image.

Conclusion:

The implemented CNN model demonstrated effective learning on the provided dataset, achieving high accuracy on both the training and test sets. The early stopping mechanism helped prevent overfitting, and the model exhibited the ability to generalize well to unseen data. Further improvements could involve fine-tuning hyperparameters, experimenting with different architectures, or expanding the dataset for enhanced performance on diverse inputs.