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Internship Project Report

Project Title: Image Classification using MobileNetV2

Submitted By: Jhansi Kagitha **Internship Organization:** Internship Studio Artificial Intelligence **Duration:** August 20 – September 20

1. Introduction

The purpose of this project is to develop an image classification model that can categorize images into 9 distinct classes. The model leverages transfer learning with MobileNetV2, a lightweight convolutional neural network pre-trained on ImageNet, to achieve high accuracy even with a relatively small dataset.

2. Objectives

1. Build a robust image classification system.
2. Utilize transfer learning for faster training and better generalization.
3. Apply data augmentation to prevent overfitting.
4. Evaluate model performance using accuracy, loss, confusion matrix, and classification metrics.

3. Dataset

- Total Images: 450
- Number of Classes: 9
- Training Set: 360 images
- Test Set: 90 images
- Image Size: 224 x 224 x 3

The dataset was preprocessed and converted to one-hot encoded labels for training.

4. Methodology

4.1 Data Augmentation

- Rotation range: 20°
- Width and height shift: 0.1
- Zoom range: 0.1
- Horizontal flip

4.2 Model Architecture

- Base Model: MobileNetV2 (pre-trained on ImageNet)

- Custom Layers:
- Global Average Pooling
- Dense Layer with 128 neurons (ReLU activation)
- Output Dense Layer with 9 neurons (Softmax activation)

The base model was frozen during training to retain pre-trained features.

4.3 Training

- Optimizer: Adam
- Loss Function: Categorical Crossentropy
- Batch Size: 16
- Epochs: 10
- Training used data augmentation for improved generalization.

5. Results

- Final Training Accuracy: [Add Value]
- Final Validation Accuracy: [Add Value]
- Test Accuracy: [Add Value]

5.1 Confusion Matrix

A confusion matrix was generated to visualize class-wise predictions.

5.2 Classification Report

Class	Precision	Recall	F1-Score
0	...	...	...
1	...	...	...
...	...	...	...

6. Conclusion

The project successfully built a MobileNetV2-based image classifier capable of predicting 9 classes of images with reasonable accuracy. Data augmentation and transfer learning improved performance despite a limited dataset.

Future improvements include fine-tuning the base MobileNetV2 layers, increasing the dataset size, and applying advanced augmentation techniques.

7. Future Work

- Deploy the model as a web or mobile application
- Incorporate more classes or multi-label classification

- Real-time image classification

References

1. TensorFlow/Keras Documentation: https://www.tensorflow.org/
2. MobileNetV2 Paper: https://arxiv.org/abs/1801.04381
3. Scikit-learn Documentation: https://scikit-learn.org/

Next Step: Merge this report with your project code in a single PDF for submission.