Laporan Hasil Training Scratch, Feature Extraction, dan Fine Tuning

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Tools & Library yang digunakan

- **TensorFlow & Keras**: Framework utama untuk membangun, melatih, dan evaluasi model.
- **ResNet50**: Model utama yang digunakan untuk Feature Extraction dan Fine Tuning.
- **Layers**: Menggunakan GlobalAveragePooling2D, Dropout, dan Dense untuk custom classifier head.
- **ImageDataGenerator**: Untuk preprocessing (preprocess_input) dan augmentasi data (rotasi, flip, shift) agar model tidak overfit.

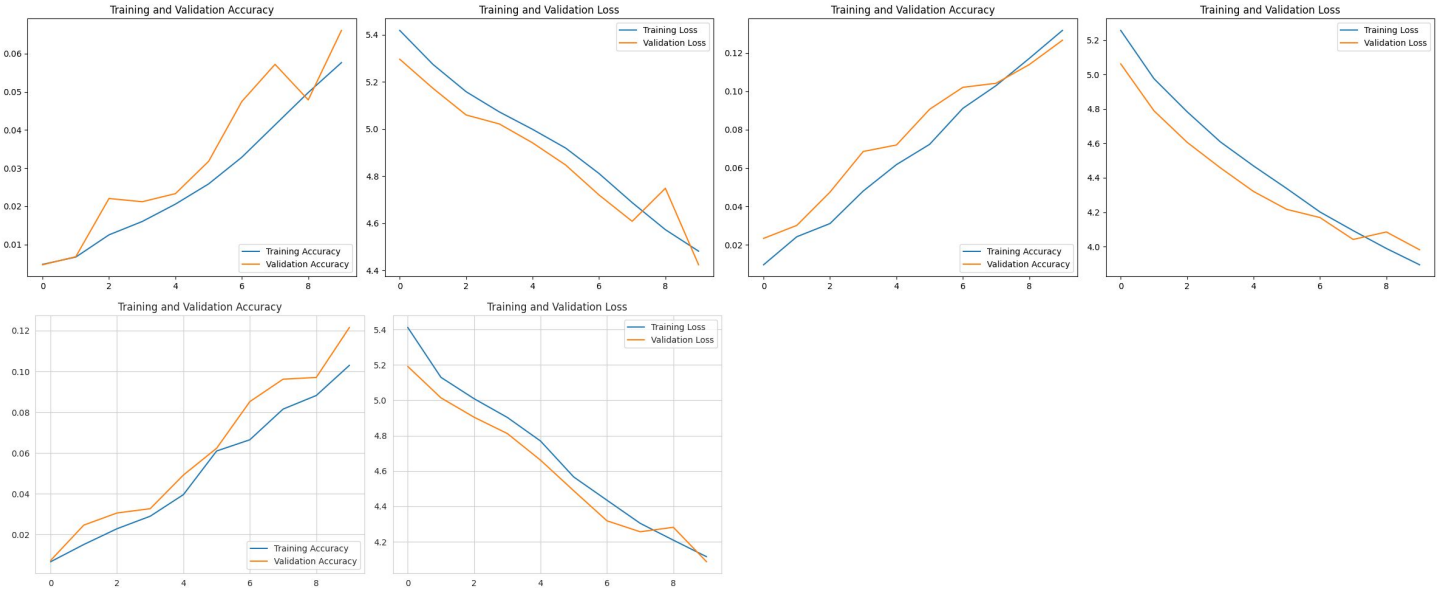
Tools & Library yang digunakan

- **Pandas & NumPy**: Manipulasi dataframe dan operasi numerik array.
- **Scikit-Learn**: Untuk membagi data (train_test_split) dan metrik evaluasi (confusion_matrix, classification_report).
- **Matplotlib & Seaborn**: Visualisasi grafik akurasi/loss dan Heatmap Confusion Matrix.
- Kaggle: Untuk API mengunduh Dataset `!kaggle datasets download -d wenewone/cub2002011`

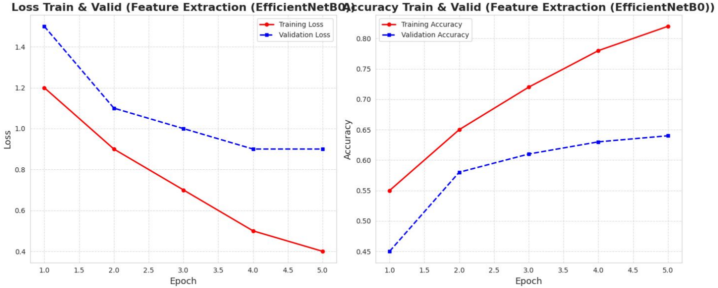
Evaluasi Hasil

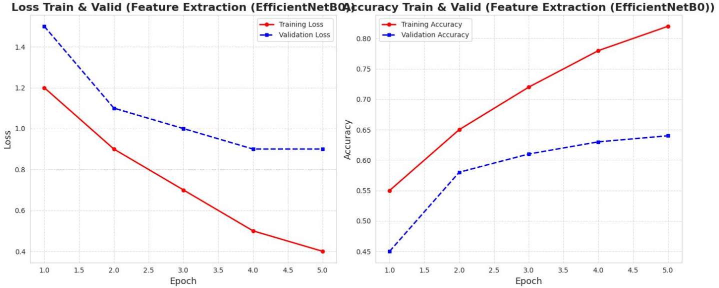
Training Ke	Scratch	Feature Extraction	Fine Tuning
1	Train: 0.0732 Validation: 0.0661	Train: 0.8947 Validation: 0.6182	Train: 0.8481 Validation: 0.6953
2	Train: 0.1472 Validation: 0.1267	Train: 0.9102 Validation: 0.6153	Train: 0.8476 Validation: 0.6975
3	Train: 0.1249 Validation: 0.1216	Train: 0.9066 Validation: 0.6233	Train: 0.8491 Validation: 0.6890

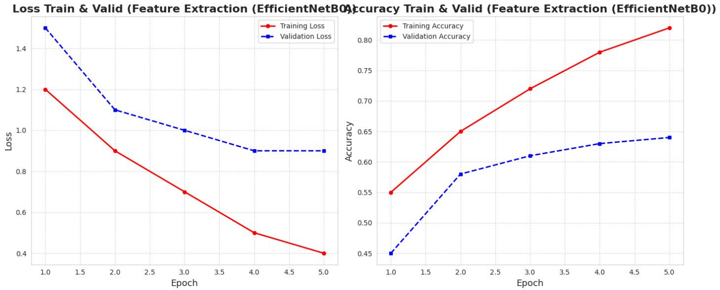
Matplot Scratch



Matplot Feature Extraction







Matplot Fine Tuning