General AI/ML

Unit 2: Optimization,
Fine-tuning, Transfer Learning

2.4.1

Fine-tuning

Fine-tuning vs. Transfer Learning

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Introduction to Fine-tuning

- Fine-tuning is a special type of transfer learning that involves retraining and adjusting the parameters of an already trained model to adapt to a new, related task

- The pre-trained model acts as a starting point, and minor adjustments are made for the specific task

Both strategies start with a pre-trained model, their paths diverge based on the level of customization and specificity required for the new task.

Approach

Transfer Learning

- The layers of a pre-trained model are frozen except for the output layer.
- Frozen layer weights are not updated during backpropagation
- Model is adjusted to better fit the new task, by re-training some final layers or only the output layer with the new dataset.

Fine-tuning

- Certain or all layers of a pre-trained model are selectively identified and retrained for the new task
- Weights of layers chosen for retraining are updated during backpropagation
- Smaller learning rates are typically used to prevent the loss of previously learned features.

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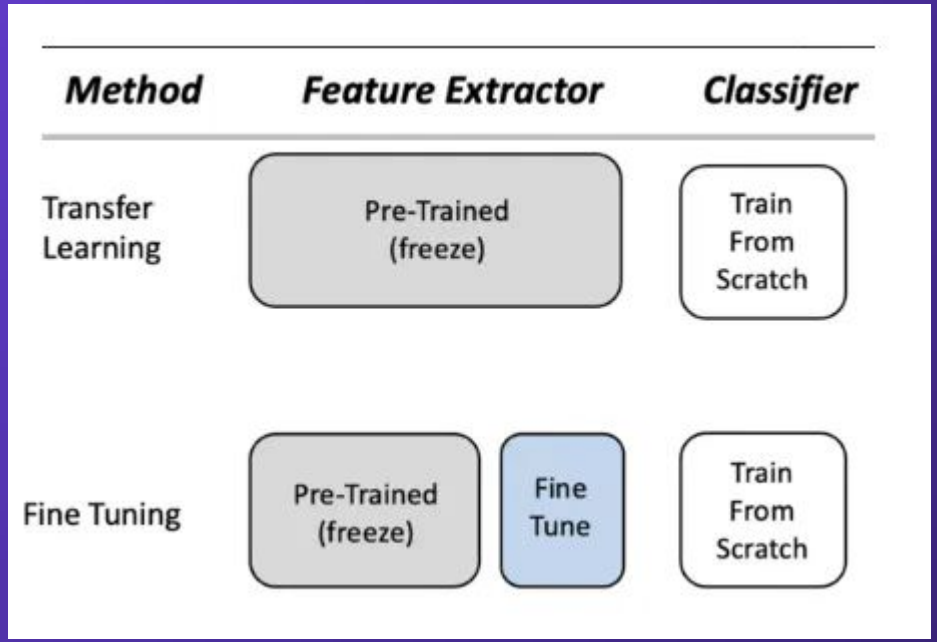
Approach



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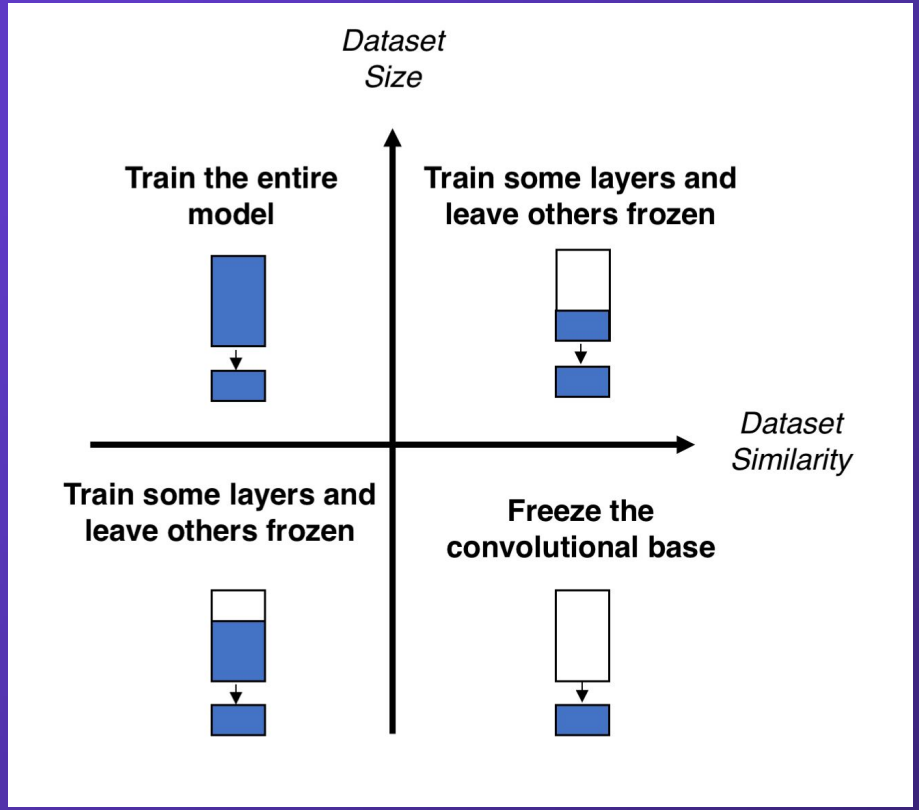
Considerations



Conclusion

- Choosing between transfer learning or fine-tuning depends on the available data, the task's specificity, and the desired performance
- In both cases, selecting a relevant pre-training model that is aligned closely with the target task or domain is important
- Experiment with different learning rates, regularization techniques, hyperparameters and monitor model’s performance