



# DEEP LEARNING TAKEAWAYS



# Chapter:

# Model Optimization: Hyperparameter Tuning

# What is Hyperparameter Tuning?

- 1** Fine-tuning hyperparameters helps optimize model performance by selecting the best values for parameters like learning rate and batch size.
- 2** Unlike model parameters, hyperparameters are set before training and influence the learning process.
- 3** Effective tuning can prevent overfitting or underfitting, leading to better generalization on unseen data.
- 4** Hyperparameter tuning is crucial for enhancing the accuracy and efficiency of deep learning models.

# GridSearchCV, RandomSearchCV

- 1** GridSearchCV exhaustively searches over specified hyperparameter values, ensuring the best combination but can be computationally expensive.
- 2** RandomSearchCV samples a random subset of parameter combinations, making it faster and more efficient for large search spaces.
- 3** Both methods use cross-validation to assess model performance, reducing the risk of overfitting to the training data.
- 4** Choosing between GridSearchCV and RandomSearchCV depends on the time available and the size of the hyperparameter space.

# Optuna

- 1** Optuna is a modern, automated hyperparameter optimization framework that uses an efficient, trial-based search.
- 2** It leverages techniques such as bayesian optimization to find optimal hyperparameters faster than grid or random search.
- 3** Optuna allows for dynamic pruning, stopping unpromising trials early to save computation.
- 4** Ideal for deep learning tasks with large search spaces, where traditional tuning methods may be inefficient.