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**How would you define Machine Learning?**

Machine Learning is the field of teaching computers to learn from data.

**Can you name four types of problems where it shines?**

Supervised learning uses labeled data while unsupervised does not.

**What is a labeled training set?**

Online learning updates model gradually; batch learning trains all at once.

**What are the two most common supervised tasks?**

Instance-based memorizes examples; model-based generalizes from them.

**Can you name four common unsupervised tasks?**

Challenges include insufficient data, noise, overfitting, and underfitting.

**What type of Machine Learning algorithm would you use to allow a robot to walk in various unknown terrains?**

Overfitting: model is too complex; Underfitting: model is too simple.

**What type would you use to segment your customers into multiple groups?**

Test set checks how well model works on unseen data.

**Would you frame the problem of spam detection as a supervised or unsupervised learning problem?**

Validation set helps in model selection and hyperparameter tuning.

**What is an online learning system?**

Cross-validation averages results across multiple splits.

**What is out-of-core learning?**

Four main types: supervised, unsupervised, semi-supervised, reinforcement.

**What type of learning algorithm relies on a similarity measure to make predictions?**

Classification (e.g., spam detection); Regression (e.g., price prediction).

**What is the difference between a model parameter and a hyperparameter?**

Classification outputs categories, regression outputs continuous values.

**What do model-based learning algorithms search for?**

Model selection involves choosing the best model and tuning it.

**Can you name four of the main challenges in Machine Learning?**

Hyperparameters are set before training; tuned via validation.

.**If your model performs great on the training data but generalizes poorly to new instances, what is happening?**

Noise: irrelevant/random data that reduces accuracy.

**What is a test set, and why would you want to use it?**

Bias: wrong assumptions; Variance: too much sensitivity to data.

**What is the purpose of a validation set?**

Bias-variance tradeoff balances complexity and accuracy.

**What is cross-validation and why is it useful?**

ML Project steps: define problem, collect data, clean, model, evaluate.

**What can go wrong if you tune hyperparameters using the test set?**

ML is useful where rules are hard to define but data is available.