**Quiz questions based on Perfect data size explanation:**

What is the purpose of cross-validation in machine learning?

a) To train a model on a large dataset

b) To determine the optimal number of features

c) To evaluate model performance on unseen data

d) To increase model complexity

(Correct Answer: c)

Which technique involves splitting a dataset into training and validation subsets to assess model performance?

1. Data augmentation b)
2. Cross-validation
3. c) Feature extraction
4. d) Power analysis

(Correct Answer: b)

What is the primary goal of power analysis?

a) To detect Type I errors

b) To determine sample size required for a specific power

c) To increase the significance level

d) To estimate the p-value

(Correct Answer: b)

A small effect size implies:

a) A higher likelihood of detecting an effect

b) A larger required sample size

c) A lower significance level

d) A smaller desired power

(Correct Answer: b)

Which factor is NOT considered in power analysis?

a) Effect size

b) Significance level

c) Desired power

d) Type II error rate

(Correct Answer: d)

What is the significance level commonly set to in power analysis?

a) 0.05

b) 0.01

c) 0.10

d) 0.50

(Correct Answer: a)

In power analysis, increasing the desired power will likely result in:

a) A smaller required sample size

b) A larger required sample size

c) A decrease in effect size

d) No change in sample size

(Correct Answer: b)

The minimum sample size needed to achieve a desired power:

a) Increases as the effect size increases

b) Decreases as the significance level decreases

c) Decreases as the desired power increases

d) Is unaffected by the statistical test used

(Correct Answer: a)

Power analysis is most closely related to:

a) Estimating p-values

b) Sample size determination

c) Data preprocessing

d) Model training

(Correct Answer: b)

Which scenario requires a larger sample size to achieve the same power?

a) Effect size = 0.1, Desired power = 0.9

b) Effect size = 0.5, Desired power = 0.8

c) Effect size = 0.3, Desired power = 0.7

d) Effect size = 0.2, Desired power = 0.9

(Correct Answer: a)

Which of the following is NOT a common cross-validation technique?

a) k-fold cross-validation

b) Leave-one-out cross-validation

c) Stratified cross-validation

d) Overfitting cross-validation

(Correct Answer: d)

A researcher aims to detect small differences between groups. What should the researcher consider when setting the desired power?

a) Choose a high desired power to ensure sensitivity

b) Choose a low desired power to save resources

c) Choose a significance level of 0.01 for maximum accuracy

d) Choose an effect size of 0.9 for better results

(Correct Answer: a)

When designing a study, what is the primary reason for performing power analysis?

a) To calculate the p-value

b) To determine the desired power

c) To estimate the effect size

d) To determine the required sample size

(Correct Answer: d)