CS7641 ML Practice Quiz  
Module SL 7: Computational Learning Theory

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# Question 1

Which of the following statements correctly reflect the concepts discussed in Computational Learning Theory?

A. In computational learning theory, algorithms are primarily analyzed in terms of their accuracy, disregarding time and space resources.

B. Inductive learning is defined as learning from examples, focusing on the probability of success and the complexity of the hypothesis class.

C. The complexity of the hypothesis class has no impact on the risk of overfitting in machine learning algorithms.

D. In machine learning, training examples are only presented in a batch format, where a fixed training set is provided.

E. Different methods of selecting training examples, such as the learner asking questions or the teacher providing pairs, are crucial in understanding machine learning.

# Question 2

Regarding the resources and efficiency of learning algorithms, which of the following are true?

A. Time efficiency of algorithms is irrelevant in computational learning theory.

B. Space efficiency, especially in algorithms with exponential space complexities, is a major consideration in machine learning.

C. Data, in terms of availability and quality of training samples, is not considered a significant resource in machine learning algorithms.

D. Managing time, space, and data efficiently is crucial for the effectiveness of a learning algorithm.

E. Algorithms requiring large amounts of space are preferred due to their comprehensive data handling capacity.

# Question 3

Concerning the concept of teaching and learning in machine learning, which statements are correct?

A. The teacher’s role in selecting training examples is insignificant in the learning process.

B. The learner's task of finding the best hypothesis is equally challenging, whether the teacher selects the questions or the learner asks them.

C. A helpful teacher can significantly reduce the number of questions required for the learner to identify the right hypothesis.

D. The learner's ability to ask questions that split the hypothesis set in half is not crucial for efficient learning.

E. Teaching via 20 questions demonstrates that with a helpful teacher, the correct answer can be obtained in one question.

# Question 4

What are the key aspects and implications of resource management in learning algorithms?

A. The efficiency of algorithms in terms of time and space has a minor impact on their practical application.

B. The goal is to select algorithms that run in the shortest amount of time and require the least amount of space.

C. Managing data as a resource involves considering the quantity of data but not its quality.

D. A learning algorithm's ability to learn well with a small amount of samples indicates ineffective generalization.

E. Time, space, and data are the three main resources that need to be managed in a learning algorithm.

# Question 5

Regarding the theoretical aspects and implications of computational learning theory, which of the following statements are accurate?

A. Computational learning theory does not involve mathematical reasoning and careful definitions.

B. Upper-bound analysis in computational learning theory is concerned with fundamentally hard problems that cannot be improved.

C. Lower-bound analysis focuses on improving algorithms and their performance.

D. Practical algorithms are not relevant in illuminating the fundamental learning questions in computational learning theory.

E. The theory draws parallels between analyzing algorithms in computing and understanding learning algorithms' functionality.

# Answer Key

1. B, E

2. B, D

3. C, E

4. B, E

5. E