Week 3 – Task 1

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Question & Answers

Question 1

Define machine learning.

Answer:

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

Question 2

How do you know if a program is machine learning program or not?

Answer:

A program can be classified as machine learning if instead of completing a task with software schedules through series of instructions, it is trained to digest humungous data, run through algorithms giving it the capacity to learn how to perform a task.

Question 3

Which of the following problems can be classified as machine learning problems?

a) **Matrix multiplication in python**
   Answer: No, it is not a machine learning problem as it completes the task based on a set of predefined instructions and logic.
b) **YouTube home page generation algorithm for every user**
   Answer: Yes, as it learns the users' activity over time and suggests videos to watch using machine learning.

c) Flipkart e-commerce site

Answer: Yes, it tries to learn the users' requirement using data such as search history, purchase history, and recommends new/similar products for the user.

d) Quick sort algorithm

Answer: No. There is a fixed logic and procedure to solve the problem and does not depend on the type of data.

Question 4

Design suitable P,T,E parameters for a checkers program to formulate it as a well posed Machine Learning problem.

Answer:

In general, T=tasks, P=performance measure, E=training experience. For checkers,

T = playing checkers

P = percent of games won against opponents

E = playing practice games against itself.

Question 5

Define the characteristics of a well posed Machine Learning problem. Formulate the design for a Speech recognition program.

Answer:

For a well-defined learning problem, we must identity three characteristics:

- Class of tasks
- measure of performance to be improved
- and the source of experience.

For a speech recognition program, we have:

T = understanding said words and sentences

P = accuracy of words understood

E = giving sample sentences and meaning

Question 6

Differentiate between target concept and approximating function. Discuss the final design of the checkers learning problem.

Answer:

Target concept is an operational description of the ideal target function. On the other hand, approximating function is the approximation acquired by learning algorithms to the target function.

Coming to the checkers problem, the final design is described by four distinct program modules that represent the central components in many learning systems. These four modules are:

- Performance System
- The Critic
- The Generalizer
- The Experiment Generator

The design choices we make are:

1. Determine Type of Training Experience
2. Determine Target Function
3. Determine Representation of Learned Function
4. Determine Learning Algorithm

Question 7

What are the key issues in machine learning?

Answer:

Machine learning is vast and complex topic and many problems/issues are raised: e.g.

- What algorithms exist for learning general target functions from specific training examples
- How much training data is sufficient?
- When and how can prior knowledge held by the learner guide the process of generalizing from examples? Can prior knowledge be helpful even when it is only approximately correct?
- What is the best strategy for choosing a useful next training experience, and how does the choice of this strategy alter the complexity of the learning problem?

- What specific functions should the system attempt to learn? Can this process itself be automated?
- How can the learner automatically alter its representation to improve its ability to represent and learn the target function?

These questions highlight some of the key issues in machine learning.