Quiz 2.1 | Probability

Due No due date **Points** 8 **Questions** 7 **Time Limit** None

Instructions

The quizzes consists of questions carefully designed to help you self-assess your comprehension of the information presented on the topics covered in the module. Quiz once attempted i.e answered will not be able to attempt the same question again, so please be careful when submitting.

Each question in the quiz is of multiple-choice or "true or false" format. Few maybe having multiple options correct. You will be awarded points accordingly. Each correct or incorrect response will result in appropriate feedback at end when submitted.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	2 minutes	6 out of 8 *

* Some questions not yet graded

Score for this quiz: **6** out of 8 *
Submitted Aug 30 at 7:32pm
This attempt took 2 minutes.

Question 1 — 1 / 1 pts

Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

- 1/2
- 2/5
- 8/15

Correct!

- 9/20

Question 2

1 / 1 pts

Three unbiased coins are tossed. What is the probability of getting at most two heads?

- 3/4
- 3/8
- 1/4

Correct!

- 7/8

Question 3

1 / 1 pts

Marginal probability of an event comprises of joint probabilities of events that are

- Independent
- Mutually exclusive
- Collectively exhaustive

Correct!

- Mutually exclusive and Collectively exhaustive

Question 4

1 / 1 pts

If an outcome of an event X is not impacted by the outcome of another event Y, then

Correct!

- (selected) X and Y are Statistically Independent
- X and Y are Mutually exclusive
- X and Y are a part of Bayesian Inference
- None of the above

Question 5

1 / 1 pts

Previous probabilities in Bayes Theorem that are revised with help of new available information are called

Correct!

- (selected) Posterior probabilities
- Independent Probabilities
- Marginal Probabilities
- Joint Probabilities

Question 6

1 / 1 pts

What is the probability of getting a sum 9 from two throws of a dice?

- 1/12
- 1/6

Correct!

- (●) 1/9
- ( ) 1/8

Question 7

Not yet graded / 2 pts

Mention 3 points describing significance of use of probability in ML.

Your Answer:

Three reasons to learn probability in ML are:

1. **Class Membership Requires Predicting a Probability**

Classification predictive modeling problems are those where an example is assigned a given label.

An example that you may be familiar with is the iris flowers dataset where we have four measurements of a flower and the goal is to assign one of three different known species of iris flower to the observation.

We can model the problem as directly assigning a class label to each observation.

Input: Measurements of a flower.
Output: One iris species.

A more common approach is to frame the problem as a probabilistic class membership, where the probability of an observation belonging to each known class is predicted.

Input: Measurements of a flower.
Output: Probability of membership to each iris species.

Framing the problem as a prediction of class membership simplifies the modeling problem and makes it easier for a model to learn. It allows the model to capture ambiguity in the data, which allows a process downstream, such as the user to interpret the probabilities in the context of the domain.

The probabilities can be transformed into a crisp class label by choosing the class with the largest probability. The probabilities can also be scaled or transformed using a probability calibration process.

This choice of a class membership framing of the problem interpretation of the predictions made by the model requires a basic understanding of probability.

2. **Models Are Designed Using Probability**

There are algorithms that are specifically designed to harness the tools and methods from probability.

These range from individual algorithms, like Naive Bayes algorithm, which is constructed using Bayes Theorem with some simplifying assumptions.

Naive Bayes

The linear regression algorithm can be seen as a probabilistic model that minimizes the mean squared error of predictions, and the logistic regression algorithm can be seen as a probabilistic model that minimizes the negative log likelihood of predicting the positive class label.

Linear Regression
Logistic Regression

It also extends to whole fields of study, such as probabilistic graphical models, often called graphical models or PGM for short, and designed around Bayes Theorem.

A notable graphical model is Bayesian Belief Networks or Bayes Nets, which are capable of capturing the conditional dependencies between variables.

3. Models Are Tuned With a Probabilistic Framework

It is common to tune the hyperparameters of a machine learning model, such as k for kNN or the learning rate in a neural network.

Typical approaches include grid-searching ranges of hyperparameters or randomly sampling hyperparameter combinations.

Bayesian optimization is more efficient to hyperparameter optimization which involves a directed search of the space of possible configurations based on those configurations that are most likely to result in better performance. As its name suggests, the approach was devised from and

harnesses Bayes Theorem when sampling the space of possible configurations.

Quiz Score: **6** out of 8