QUESTIONS ANSWERS AWS ML FOUNDATIONS

1. A loss function...

- is a model hyperparameter.
- measures how close the model is towards its goal.

2. The model training algorithm iteratively updates a model’s parameters to minimize some loss function.

- True

3. True or false:

Supervised learning uses labeled data while training a model, and unsupervised learning uses unlabeled data while training a model.

- True

4. True or false: Your data requirements will not change based on the machine learning task you are using.

- False

5. True or false: Models are universal, so the data is not relevant.

- False

6. True or false: Data needs to be formatted so that is compatible with the model and model training algorithm you plan to use.

- True

7. True or false: Data visualizations are the only way to identify outliers in your data.

- False

8. True or false: After you start using your model (performing inference), you don't need to check the new data that it receives.

- False

9. True or false: The loss function measures how far the model is from its goal.

- True

10. Why do you need to split the data into training and test data prior to beginning model training?

- If you use all the data you have collected during training, you won't have any with which to test the model during the model evaluation phase.

11. What makes hyperparameters different than model parameters? (There is more than one correct answer)

- Hyperparameters are not updated during model training.
- Hyperparameters are set manually

12. What are some methods or tools that could be useful to consider when evaluating a linear regression output? Can you provide an example of a situation in which you would apply that method or tool?

we can use r2 score and rmse to evaluate

One of the most common evaluation metrics in a regression scenario is called *root mean square* or *RMS*.
The math is beyond the scope of this lesson, but RMS can be thought of

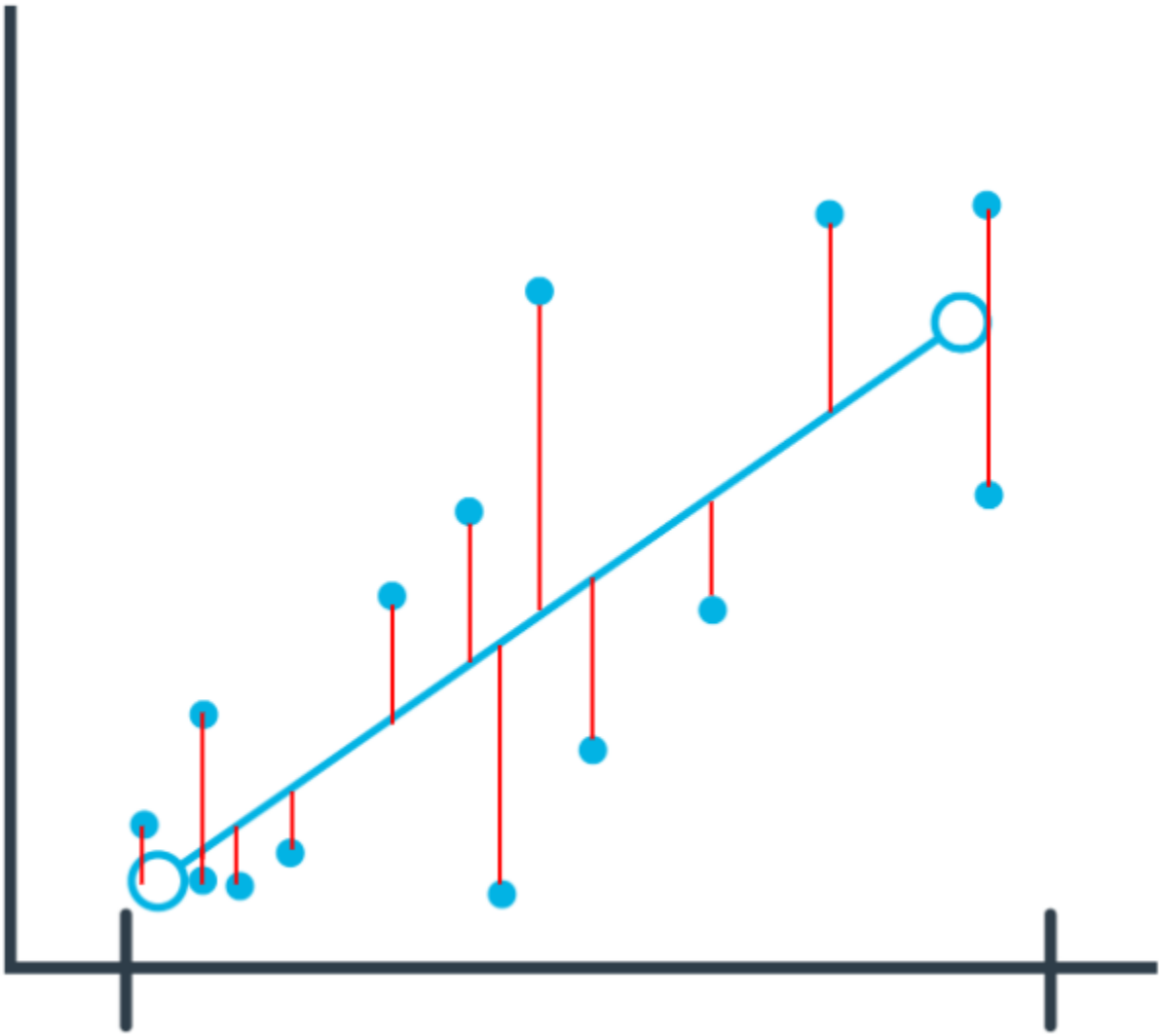
roughly as the "average error” across your test dataset, so you want this value to be low.

$$RMS = \sqrt{\frac{1}{n}\sum_{i} x_i^2}$$

The math behind RMS

In the following chart, you can see where the data points are in relation to the blue line. You want the data points to be as close to the "average" line as possible, which would mean less net error.

You compute the *root mean square* between your model’s prediction for a data point in your test dataset and the true value from your data. This actual calculation is beyond the scope of this lesson, but it's good to understand the process at a high level.



Interpreting Results

In general, as your model improves, you see a better RMS result. You may still not be confident about whether the specific value you've computed is good or bad.

Many machine learning engineers manually count how many predictions were off by a threshold (for example, $50,000 in this house pricing problem) to help determine and verify the model's accuracy.

13. Model inference involves...

- Generating predictions.

- Finding patterns in your data.
- Using a trained model.
- Testing your model on data it has not seen before

14. What kind of machine learning task was used in the book micro-genre example?

- Unsupervised learning

15. In the k-means model used for this example, what does the value for "k" indicate?

- The number of clusters the model will try to find during training.

PART 2

1. TRUE or FALSE: In reinforcement learning, "Exploration" is using experience to decide.

- FALSE

2. How does a balance of "Exploration" and "Exploitation" help a reinforcement learning model?

- The more an agent learns about its environment, the more confident it becomes about the actions it chooses.
- If an agent doesn't explore enough, it often sticks to information its already learned even if this knowledge doesn't help the agent achieve its goal.
- The agent can use information from previous experiences to help it make future decisions that enable it to reach its goal.

AND THE REWARD FUNCTION DOESN’T GIVE ALL THE INFORMATION NEEDED TO GET TO A GOAL

Term
Definition

State

The current position within the environment that is visible, or known, to an agent.

Action

For every state, an agent needs to do this toward achieving its goal.

Episode

Represents a period of trial and error when an agent makes decisions and gets feedback from its environment.

Reward

Feedback given to an agent for each action it takes in a given state.

Environment

The surrounding area our agent interacts with.

Which is the following statements is false in the context of AR-CNNs?

- "Edit event" refers to a note added to the input track during inference.

REASON: Correct! An edit event is when a note is either added or removed from your input track during inference.

True or false: Loss functions help us determine when to stop training a model.

- True

When we see the loss function stabilize, we can be confident that training is complete.

Please identify which of the following statements are true about a generative adversarial network (GAN). There may be more than one correct answer.

- The generator learns to produce more realistic data and the discriminator learns to differentiate real data from the newly created data.
- The discriminator learns from both real Bach music and realistic Bach music.

Discriminators distinguish the source data from the data the generator creates.

PART 3

Making your code **modular** makes it easier to do which of the following things? There is more than one correct answer.

- Reuse your code
- Write less code
- Read your code
- Collaborate on code

These changes make the code clear enough that we should actually remove the comments. The code is now very readable on its own. Take a look at the code before and after these changes:

Before:

```
t = end_time - start
c = category(t)
print('Task Duration: {} seconds, Category: {}'.format(t, c)
```

After:

```
execution_time = end_time - start_time
category = categorize_task(execution_time)
print('Task Duration: {} seconds, Category: {}'.format(execution_time, category)
```

That is much better!

Quiz: Buying stocks

Imagine you analyzed several stocks and calculated the ideal price, or *limit price*, at which you'd want to buy each stock. You write a program to iterate through your stocks and buy it if the current price is below or equal to the limit price you computed. Otherwise, you put it on a watchlist.

Below are three ways of writing this code. Which of the following is the most clean?

```
# Choice A
stock_limit_prices = {'LUX': 62.48, 'AAPL': 127.67, 'NVDA': 161.24}
for stock_ticker, stock_limit_price in buy_prices.items():
    if stock_limit_price <= get_current_stock_price(ticker):
        buy_stock(ticker)
    else:
        watchlist_stock(ticker)
# Choice B
prices = {'LUX': 62.48, 'AAPL': 127.67, 'NVDA': 161.24}
for ticker, price in prices.items():
    if price <= current_price(ticker):
        buy(ticker)
    else:
        watchlist(ticker)
# Choice C
limit_prices = {'LUX': 62.48, 'AAPL': 127.67, 'NVDA': 161.24}
for ticker, limit in limit_prices.items():
    if limit <= get_current_price(ticker):
        buy(ticker)
    else:
        watchlist(ticker)
```

Quiz Question

Which code is most clean?

- Choice C

Great job! All of the choices were passable, but Choice C was the most simple while also being descriptive. Choice A unnecessarily included the word `stock` everywhere, when we can already assume we are dealing with stocks based on the context. Naming everything with this can be redundant unless there is a clear reason to differentiate it with something similar. Choice B was also passable but could have more clearly differentiated the limit prices from the current price.

Which of the following statements about in-line comments are true? There may be more than one correct answer.

- Comments are useful for clarifying complex code.
- Readable code is preferable over having comments to make your code readable

ERROR is the appropriate level for this error message, though more information on where, when, and how this occurred would be useful for debugging. It's best practice to use concise and clear language that is professional and uses normal capitalization. This way, the message is efficient and easily understandable. The second sentence seems quite unclear and personal, so we should remove that and communicate it elsewhere.

PART 4

What are some ways this log message could be improved? There may be more than one correct answer.

```
ERROR - Failed to compute product similarity. I made sure to fix the error from October so not sure why this would occur again.
```

-
- Add more details about this error, such as what step or product the program was on when this occurred
-
- Remove the second sentence

PART 5: Introduction to Object-Oriented Programming

Quiz Question

Match the vocabulary term on the left with the examples on the right.

Submit to check your answer choices!

Term
Examples

Object

Stephen Hawking, Angela Merkel, Brad Pitt

Class

Scientist, chancellor, actor

Attribute

Color, size, shape

Method

To rain, to ring, to ripen

Value

Gray, large, round

solved using this: https://onlinestatbook.com/2/calculators/normal_dist.html

Assume the average weight of an American adult male is 180 pounds, with a standard deviation of 34 pounds. The distribution of weights follows a normal distribution. What is the probability that a man weighs exactly 185 pounds?

Great job! When finding the probabilities using a continuous distribution, the probability of obtaining an exact value is zero. If the question had been what is the probability that a man's weight is between 184.99 and 185.01, then the answer would be a small but positive value of 0.0002.

Assume the average weight of an American adult male is 180 pounds, with a standard deviation of 34 pounds. The distribution of weights follows a normal distribution. What is the probability that a man weighs somewhere between 120 and 155 pounds?

Correct! The area under this particular Gaussian distribution between 120 and 155 would be 0.19. The area under the Gaussian curve represents the probability.

ANSWERS: https://www.discoveringdata.org/index.php/2020/06/07/some-probability-distribution-problems/

Check the boxes next to the statements that are true. There may be more than one correct answer.

- Inheritance helps organize code with a more general version of a class and then specific children.
- Inheritance can make object-oriented programs more efficient to write.
- Updates to a parent class automatically trickle down to its children