1. What is deep learning?

Deep Learning is a subtype of Machine Learning that incorporates multi-layer networks (deep neural networks) to train and make decisions.

2. Explain the structure of a neural network.

A neural network consists of input layer, hidden layers (having weights and biases) and output layer having weighted connections connecting neurons in one layer to those in another.

3. What is the vanishing gradient problem, and how does it affect deep learning?

The problem of vanishing gradient happens when during backpropagation, gradients become very small hence slow or no learning at all takes place in deep neural networks; this makes them hard to train.

4. What is the role of an activation function in a neural network?

The introduction of non-linearities into neural networks by activation functions allows them to learn complex patterns.Sigmoid, tanh and ReLU are some typical examples of activation functions.

5. Explain backpropagation in the context of deep learning.

Backpropagation is an optimization algorithm used to train Neural Networks by propagating errors backward through the network so as to adjust weights that minimize differences

between predicted outputs and actual ones.

6. What is the purpose of dropout in deep learning?

When training a Neural Network, Dropout is employed as a technique for regularization against overfitting.It does this by randomly turning off neurons during training causing the Network to learn more robust features.

7. Describe the architecture of a Convolutional Neural Network (CNN).

Convolutional Neural Networks consist of convolutional layers for feature extraction; pooling layers for down-sampling; as well as fully connected layers which lead to classification.They are highly used for image recognition tasks.

8. What is the role of pooling layers in a CNN?

In CNNs, pooling layers reduce spatial dimensions of input data leading to down-sampling that retains only essential information needed for extracting features.

9. Explain recurrent neural networks (RNNs) and their applications.

Neural networks that have loops for recurrence contain memory of past input examples. They are useful in natural language processing (NLP) and time-series analysis.

10. What are GANs (Generative Adversarial Networks)?

GANs consist of a generator network and discriminator network which are trained together

using adversarial training. The work of the generator is to generate realistic samples while the discriminator helps differentiate between real data and generated data.

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