Question and Answers Document

1. What is the trade off between bias and variance?  
  
Bias is the error that a model makes due to its systematic errors. Variance is the error that a model makes due to its random errors. A model with high bias will make the same mistake on every data point, while a model with high variance will make different mistakes on different data points. The goal of machine learning is to find a model with low bias and low variance. However, this is often difficult to do, and there is often a trade-off between bias and variance. In other words, if we try to reduce bias, we may increase variance, and vice versa.  
  
2. Differentiate classification and regression tasks with examples.  
  
Classification is a supervised learning task in which the goal is to predict a class label for each data point. For example, we might want to classify images of cats and dogs. Regression is a supervised learning task in which the goal is to predict a continuous value for each data point. For example, we might want to predict the price of a house.  
  
3. What is imbalanced dataset? How would you handle it?  
  
An imbalanced dataset is a dataset in which the classes are not evenly represented. This can be a problem for machine learning algorithms, because they can be biased towards the majority class. There are a number of ways to handle imbalanced datasets, such as oversampling the minority class, undersampling the majority class, or using a cost-sensitive learning algorithm.  
  
4. Why XOR problem cannot be solved by a single layer perceptron?  
  
A single layer perceptron is a neural network with one hidden layer. It can be used to solve classification problems, but it cannot solve XOR problem. The XOR problem is a Boolean function that takes two inputs and outputs 1 if the inputs are different and 0 if the inputs are the same. A single layer perceptron cannot learn to solve the XOR problem because it cannot represent all possible functions.  
  
5. Define Markov decision process.  
  
A Markov decision process (MDP) is a mathematical model that describes a decision-making process under uncertainty. An MDP consists of a set of states, a set of actions, a transition function, a reward function, and a discount factor. The goal of an MDP is to find a policy that maximizes the expected reward.  
  
6. Discuss the importance of pooling layer in convolutional neural networks.  
  
A pooling layer is a layer in a convolutional neural network that reduces the spatial size of the feature maps. This is done by taking a small neighborhood of pixels and replacing them with a single value. Pooling layers are important because they help to reduce the number of parameters in the network and to make the network more robust to noise.  
  
7. What is Fi score? Explain its significance.  
  
The F1 score is a measure of the performance of a binary classifier. It is calculated as the harmonic mean of the precision and recall. The F1 score is a good measure of overall performance, because it takes into account both the precision and the recall. The F1 score is often used in natural language processing and machine learning.