**Exercises**

1. **How would you define machine learning?**

Machine Learning is the science of programming computer so they can learn from data.

“It is the field of study that gives computer the ability to learn without explicitly programming ” – Arthur Samuel, 1959.

Machine Learning is about making machines get better at some task by learning from data, instead of having to explicitly programming it.

1. **Can you name four types of problems where it shines?**

* Analyzing image of products on a production line to automatically classify them. (Image Classification- CNN)
* Mapping app to react to voice commands. (Speech Recognition- RNN)
* Segmenting clients based on their purchase (Clustering)
* Detecting credit card fraud (Anomaly detecting)

1. **What is a labelled training set?**

In supervised learning, the training set you feed to the algorithm includes the desired solution which is called label.

1. **What are two most common supervised tasks?**

Classification and predicting a target numeric value.

1. **Can you name four common unsupervised tasks?**

* Clustering
* Anomaly detection and novelty detection
* Visualization and dimensionality reduction.
* Association rule learning.

1. **What types of machine learning algorithm would you use to allow a robot to walk in various unknow terrains?**

Reinforcement learning.

1. **What types of algorithm would you use to segment your customers into multiple groups?**

If groups are unknown, then we use unsupervised learning – clustering algorithm. If we know the groups, we use supervised learning – clustering algorithm.

1. **Would you frame the problem of spam detection as a supervised learning problem or unsupervised learning problem?**

It is a supervised learning algorithm.

1. **What is online learning system?**

Iterative learning. It can be learned incrementally, this makes it capable of adapting rapidly to both changing data and autonomous systems, and training on a huge dataset.

1. **What is out of core learning?**

Out-of-core algorithms can handle vast amount of data that cannot fit in memory. It can chop of data into mini branches and uses online learning to learn from these mini branches.

1. **What types of learning algorithm relies on similarity measure to male prediction?**

Instance based learning. Similarity measures how similar the instance are and make prediction accordingly.

1. **What is the difference between a model parameter and a learning algorithm hyperparameter?**

Model parameter – It determines what the model will predict given a new instance (Eg: slope and height of a linear model).

Learning algorithm – It finds the optimal value for model parameter such that model generalize well on new instance.

Hyperparameter – Is a parameter of learning algorithm.

1. **What do model-based learning algorithms search for? What is the most common strategy they use to succeed? How do they make prediction?**

Model-based learning algorithm – It searches for an optimal value for the model parameter such that model will generalize well on the new instance.

Minimizing cost function.

We feed the new instance into model’s prediction function, using the parameter values found by the learning algorithm.