

# Machine Learning

**Ryan W. Farparan**

## Abstract

Machine learning is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. Machine learning's aim is to allow the computer to learn automatically, completely on its own with no human assistance. The algorithms used in machine learning are generally categorized as supervised or unsupervised. Data is the most important part of machine learning. Without it, no model or automation will work or even be possible to make. From data it is then interpreted and manipulated to be meaningful to the users; this is information. From information it is transformed into knowledge; the combination of information, experiences, learning, and insights. Processing of data to a much more desired form is also part of machine learning. The efficiency and accuracy of data interpretation in machine learning helps the algorithms and models. The coding language of Python, offers the best options for machine learning especially when it comes to data creation and organization. In supervised learning, there is gradient descent, linear regression, logistic regression, support vector, decision tree, and random forest. In unsupervised learning, there is clustering, association, semi-supervised, reinforcement, temporal difference, Q-learning, and deep adversarial networks. Within machine learning is predictive modeling and dimensionality reduction is important for it. With dimensionality reduction, there are various methods to carry it out. Some methods are principal component analysis, linear discriminant analysis, and

generalized discriminant analysis. Artificial neural networks are a take on the biological neurons. Neural networks are studied to ultimately get a computer to respond like a human by giving the computer artificial neurons to simulate how a human brain functions. There are a few of these networks, which are convolutional neural networks, recurrent neural networks, and generative adversarial networks (GANs). Other parts of machine learning are its applications in the real world, like predicting rainfall and things like pattern recognition.