We are living in the ‘age of data’ that is enriched with better computational power and  
more storage resources,. This data or information is increasing day by day, but the real  
challenge is to make sense of all the data. Businesses & organizations are trying to deal  
with it by building intelligent systems using the concepts and methodologies from Data  
science, Data Mining and Machine learning. Among them, machine learning is the most  
exciting field of computer science. It would not be wrong if we call machine learning the  
application and science of algorithms that provides sense to the data.

What is Machine Learning?

Machine Learning (ML) is that field of computer science with the help of which computer  
systems can provide sense to data in much the same way as human beings do.  
In simple words, ML is a type of artificial intelligence that extract patterns out of raw data  
by using an algorithm or method. The main focus of ML is to allow computer systems learn  
from experience without being explicitly programmed or human intervention.

Need for Machine Learning

Human beings, at this moment, are the most intelligent and advanced species on earth  
because they can think, evaluate and solve complex problems. On the other side, AI is still  
in its initial stage and haven’t surpassed human intelligence in many aspects. Then the  
question is that what is the need to make machine learn? The most suitable reason for  
doing this is, “to make decisions, based on data, with efficiency and scale”.  
Lately, organizations are investing heavily in newer technologies like Artificial Intelligence,  
Machine Learning and Deep Learning to get the key information from data to perform  
several real-world tasks and solve problems. We can call it data-driven decisions taken by  
machines, particularly to automate the process. These data-driven decisions can be used,  
instead of using programing logic, in the problems that cannot be programmed inherently.  
The fact is that we can’t do without human intelligence, but other aspect is that we all  
need to solve real-world problems with efficiency at a huge scale. That is why the need for  
machine learning arises.

Why & When to Make Machines Learn?

We have already discussed the need for machine learning, but another question arises  
that in what scenarios we must make the machine learn? There can be several  
circumstances where we need machines to take data-driven decisions with efficiency and  
at a huge scale. The followings are some of such circumstances where making machines  
learn would be more effective:

Lack of human expertise

The very first scenario in which we want a machine to learn and take data-driven decisions,  
can be the domain where there is a lack of human expertise. The examples can be  
navigations in unknown territories or spatial planets.

**Challenges in Machines Learning**

While Machine Learning is rapidly evolving, making significant strides with cybersecurity  
and autonomous cars, this segment of AI as whole still has a long way to go. The reason  
behind is that ML has not been able to overcome number of challenges. The challenges  
that ML is facing currently are:

**Quality of data:** Having good-quality data for ML algorithms is one of the biggest  
challenges. Use of low-quality data leads to the problems related to data preprocessing  
and feature extraction.

**Time-Consuming task:** Another challenge faced by ML models is the consumption of  
time especially for data acquisition, feature extraction and retrieval.  
**Lack of specialist persons:** As ML technology is still in its infancy stage, availability of  
expert resources is a tough job.

**No clear objective for formulating business problems:** Having no clear objective and  
well-defined goal for business problems is another key challenge for ML because this  
technology is not that mature yet.

**Issue of overfitting & underfitting:** If the model is overfitting or underfitting, it cannot  
be represented well for the problem.

**Curse of dimensionality:** Another challenge ML model faces is too many features of data  
points. This can be a real hindrance.

**Difficulty in deployment:** Complexity of the ML model makes it quite difficult to be  
deployed in real life.

**Applications of Machines Learning**

Machine Learning is the most rapidly growing technology and according to researchers we  
are in the golden year of AI and ML. It is used to solve many real-world complex problems  
which cannot be solved with traditional approach. Following are some real-world  
applications of ML:

•Emotion analysis

•Sentiment analysis

•Error detection and prevention

•Weather forecasting and prediction

•Stock market analysis and forecasting

•Speech synthesis

•Speech recognition