

Machine Learning Model

Before discussing the machine learning model, we must need to understand the following formal definition of ML given by professor Mitchell:

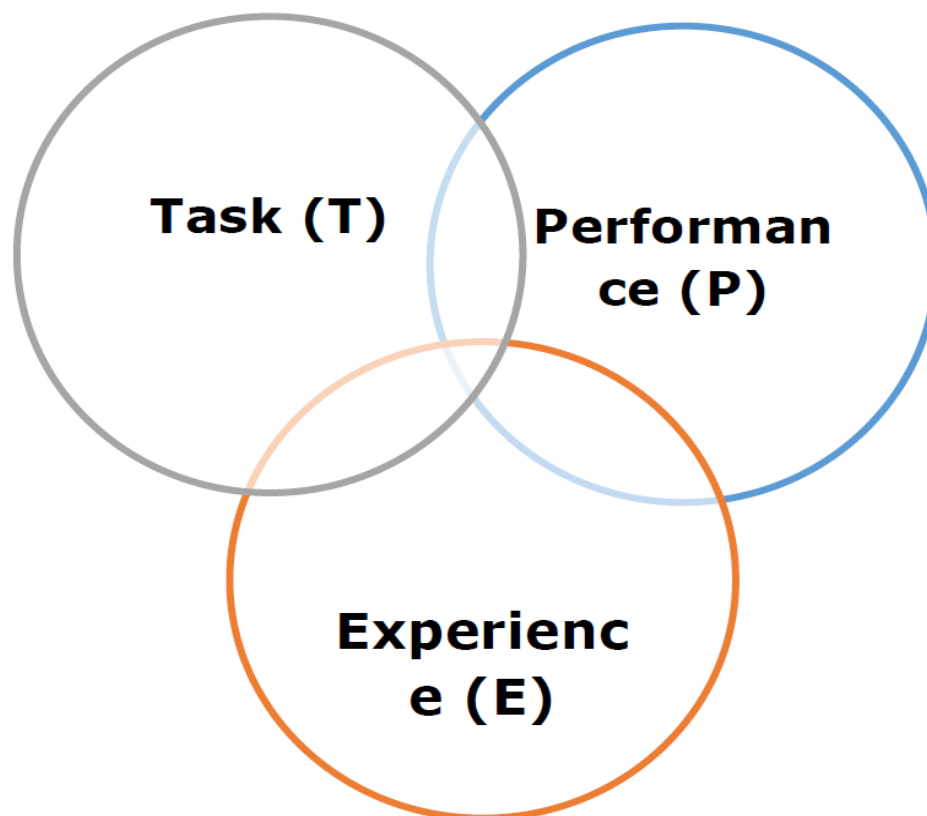
“A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E .”

The above definition is basically focusing on three parameters, also the main components of any learning algorithm, namely Task (T), Performance (P) and experience (E). In this context, we can simplify this definition as:

ML is a field of AI consisting of learning algorithms that:

- Improve their performance (P)
- At executing some task (T)
- Over time with experience (E)

Based on the above, the following diagram represents a Machine Learning Model:



Let us discuss them more in detail now:

Task (T)

From the perspective of problem, we may define the task T as the real-world problem to be solved. The problem can be anything like finding best house price in a specific location or to find best marketing strategy etc. On the other hand, if we talk about machine learning, the definition of task is different because it is difficult to solve ML based tasks by conventional programming approach.

A task T is said to be a ML based task when it is based on the process and the system must follow for operating on data points. The examples of ML based tasks are Classification, Regression, Structured annotation, Clustering, Transcription etc.

Experience (E)

As name suggests, it is the knowledge gained from data points provided to the algorithm or model. Once provided with the dataset, the model will run iteratively and will learn some inherent pattern. The learning thus acquired is called experience(E). Making an analogy with human learning, we can think of this situation as in which a human being is learning or gaining some experience from various attributes like situation, relationships etc. Supervised, unsupervised and reinforcement learning are some ways to learn or gain experience. The experience gained by our ML model or algorithm will be used to solve the task T.

Performance (P)

An ML algorithm is supposed to perform task and gain experience with the passage of time. The measure which tells whether ML algorithm is performing as per expectation or not is its performance (P). P is basically a quantitative metric that tells how a model is performing the task, T, using its experience, E. There are many metrics that help to understand the ML performance, such as **accuracy score, F1 score, confusion matrix, precision, recall, sensitivity** etc.