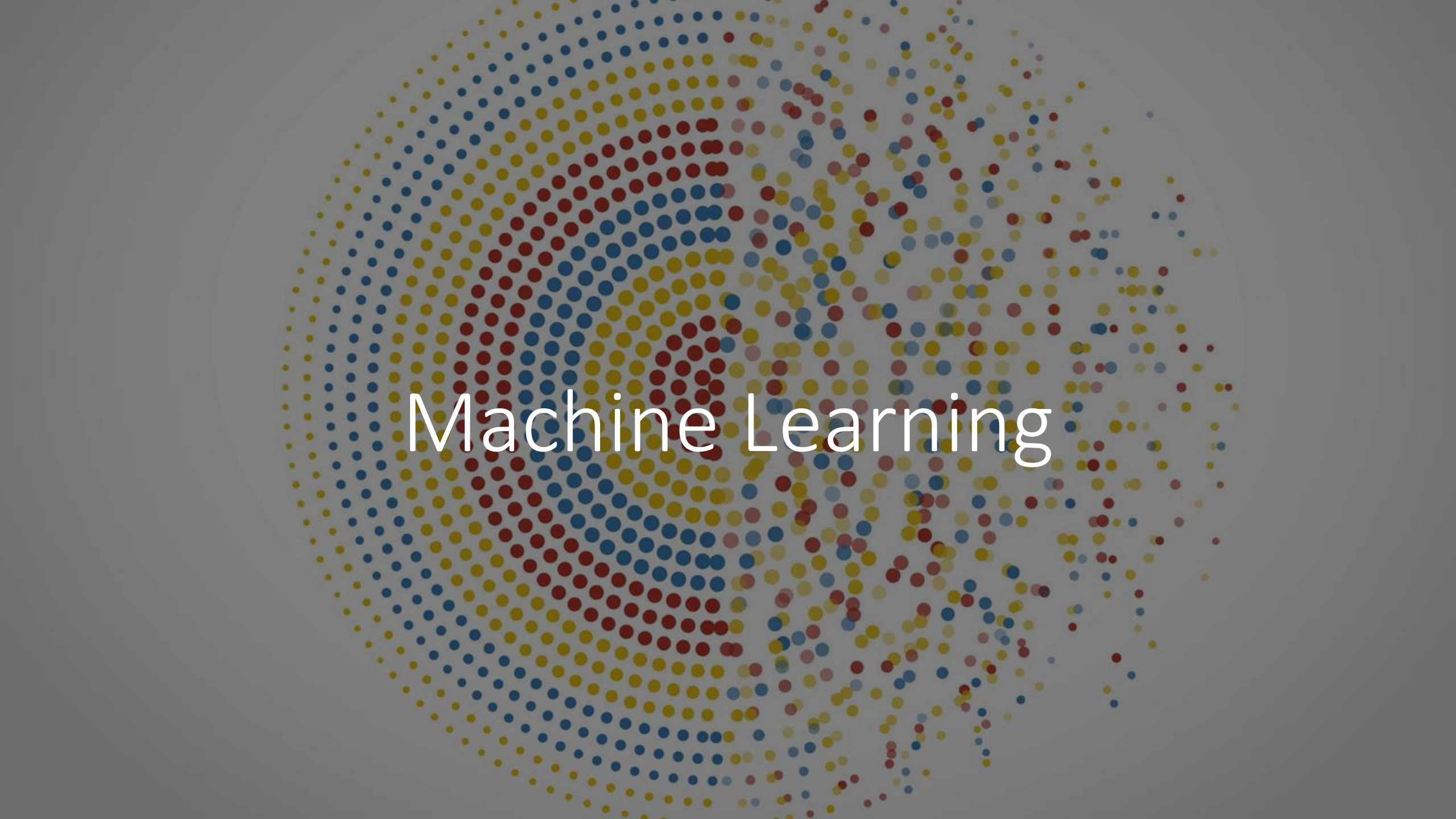
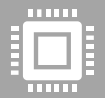

Machine Learning

What is Machine Learning?

Arthur Samuel coined the term Machine Learning in the year 1959.



Defines Machine Learning as “Field of study that gives computers the capability to learn without being explicitly programmed”

Machine Learning is an application of Artificial Intelligence (AI) which enables a program(software) to learn from the experiences and improve their self at a task without being explicitly programmed.

For example, how would you write a program that can identify fruits based on their various properties, such as colour, shape, size or any other property?

- One approach is to hardcode everything, make some rules and use them to identify the fruits.
- This may seem the only way and work but one can never make perfect rules that apply on all cases.
- This problem can be easily solved using machine learning without any rules which makes it more robust and practical
- Thus, we can say that Machine Learning is the study of making machines more human-like in their behaviour and decision making by giving them the ability to learn with minimum human intervention, i.e., no explicit programming.

- How can a program attain any experience and from where does it learn?
- The answer is data.
- Data is also called the fuel for Machine Learning and we can safely say that there is no machine learning without data.
- Machine Learning needs a huge computational power, a lot of data and devices which are capable of storing such vast data. We have only recently reached a point where we now have all these requirements and can practice Machine Learning

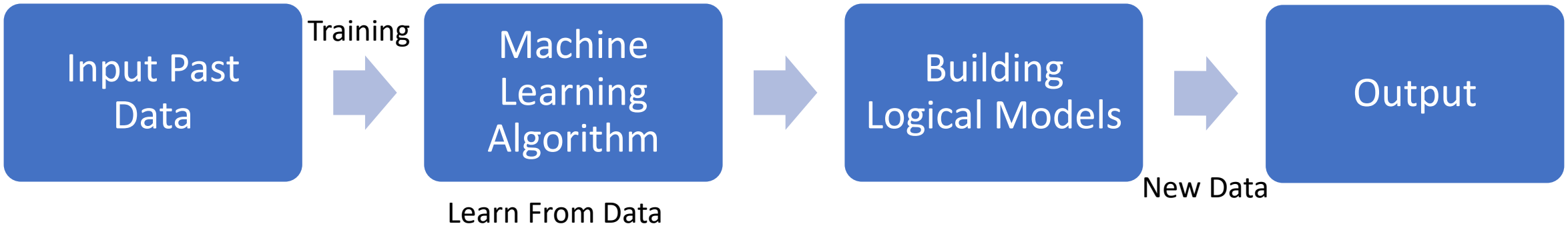
- With the help of sample historical data, which is known as **training data**, machine learning algorithms build a **mathematical model** that helps in making predictions or decisions without being explicitly programmed.
- Machine learning brings computer science and statistics together for creating predictive models.
- Machine learning constructs or uses the algorithms that learn from historical data.
- The more we will provide the information, the higher will be the performance.

- **A machine has the ability to learn if it can improve its performance by gaining more data.**

How Machine Learning Works?

- A Machine Learning system **learns from historical data, builds the prediction models, and whenever it receives new data, predicts the output for it**.
- The accuracy of predicted output depends upon the amount of data, as the huge amount of data helps to build a better model which predicts the output more accurately.
- Suppose we have a complex problem, where we need to perform some predictions, so instead of writing a code for it, we just need to feed the data to generic algorithms, and with the help of these algorithms, machine builds the logic as per the data and predict the output.
- Machine learning has changed our way of thinking about the problem.

- The below block diagram explains the working of Machine Learning algorithm:



Need For Machine Learning

Machine Learning today has all the attention it needs.

Machine Learning can automate many tasks, especially the ones that only humans can perform with their innate intelligence.

Replicating this intelligence to machines can be achieved only with the help of machine learning.

With the help of Machine Learning, businesses can automate routine tasks.

It also helps in automating and quickly create models for data analysis.

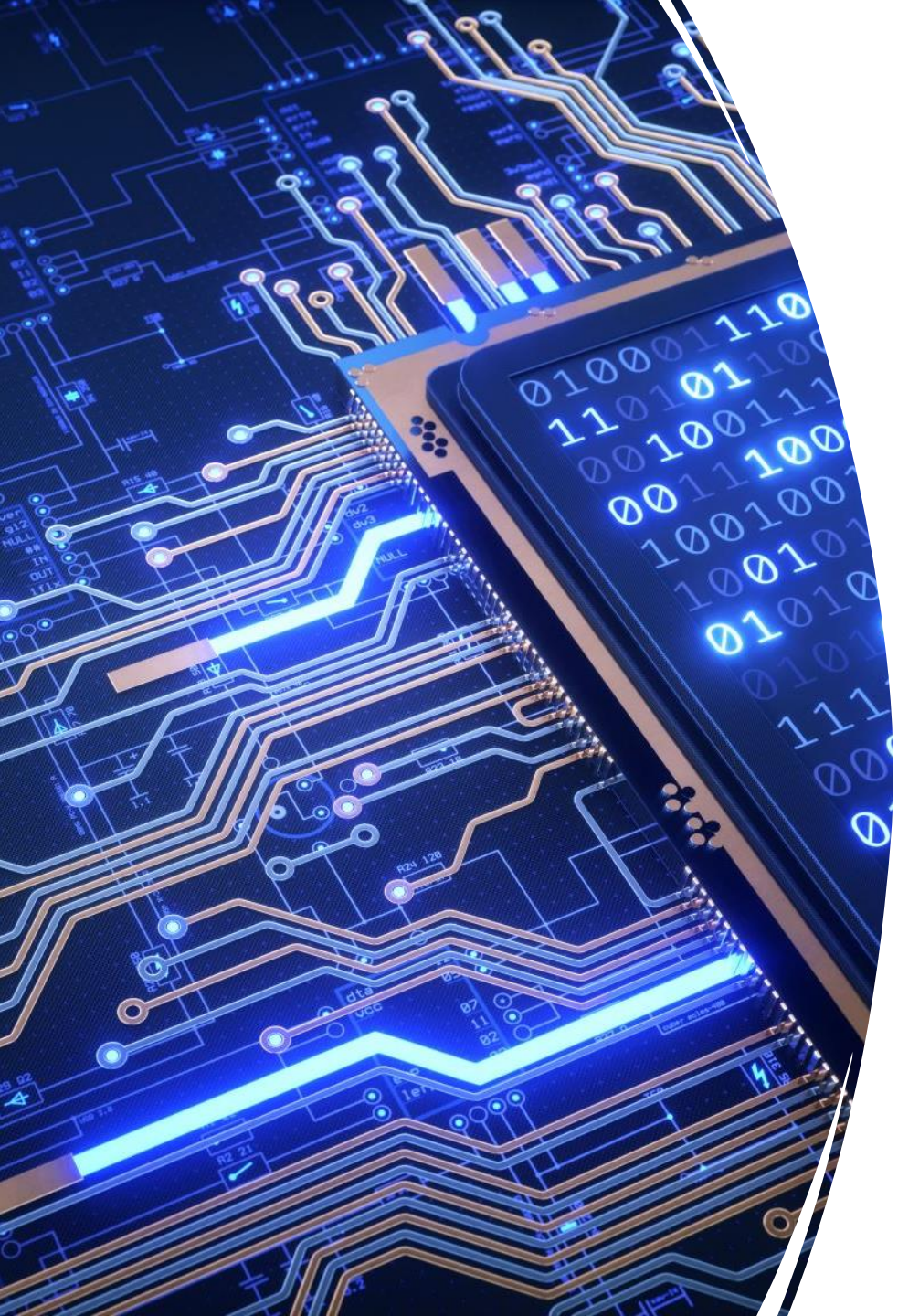
Various industries depend on vast quantities of data to optimize their operations and make intelligent decisions.

Machine Learning helps in creating models that can process and analyze large amounts of complex data to deliver accurate results.

We can train machine learning algorithms by providing them the huge amount of data and let them explore the data, construct the models, and predict the required output automatically.

The performance of the machine learning algorithm depends on the amount of data, and it can be determined by the cost function.

With the help of machine learning, we can save both time and money



How is it different from traditional programming?

- Are you wondering how is Machine Learning different from traditional programming?
- Well, in traditional programming, we would feed the input data and a well written and tested program into a machine to generate output.
- When it comes to machine learning, input data along with the output associated with the data is fed into the machine during the learning phase, and it works out a program for itself.