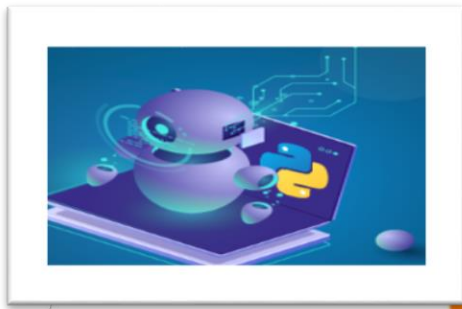


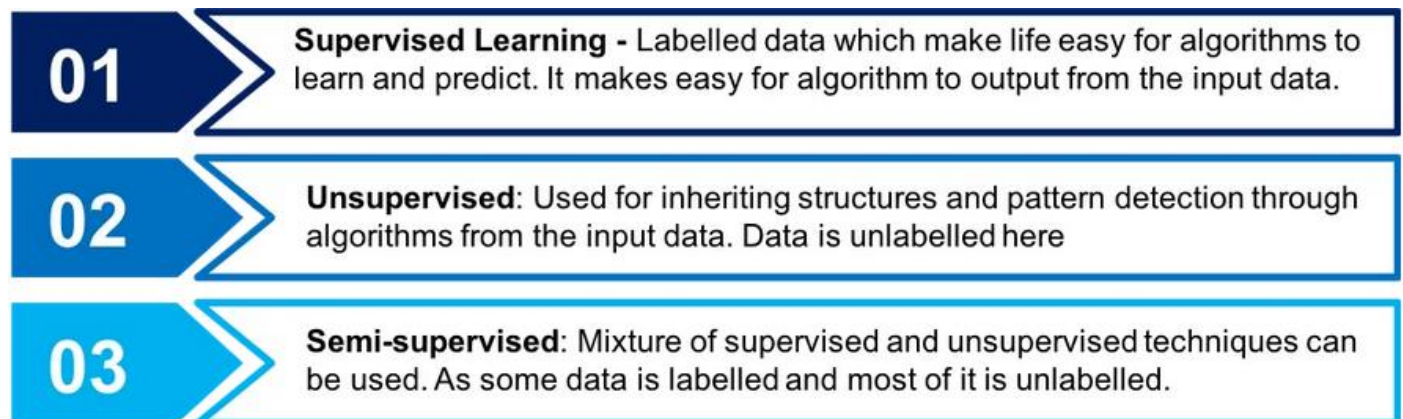
Data science and Machine learning with Python



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Machine Learning Types

The difference between supervised, unsupervised and semi-supervised learning. Let's see one-liners as below



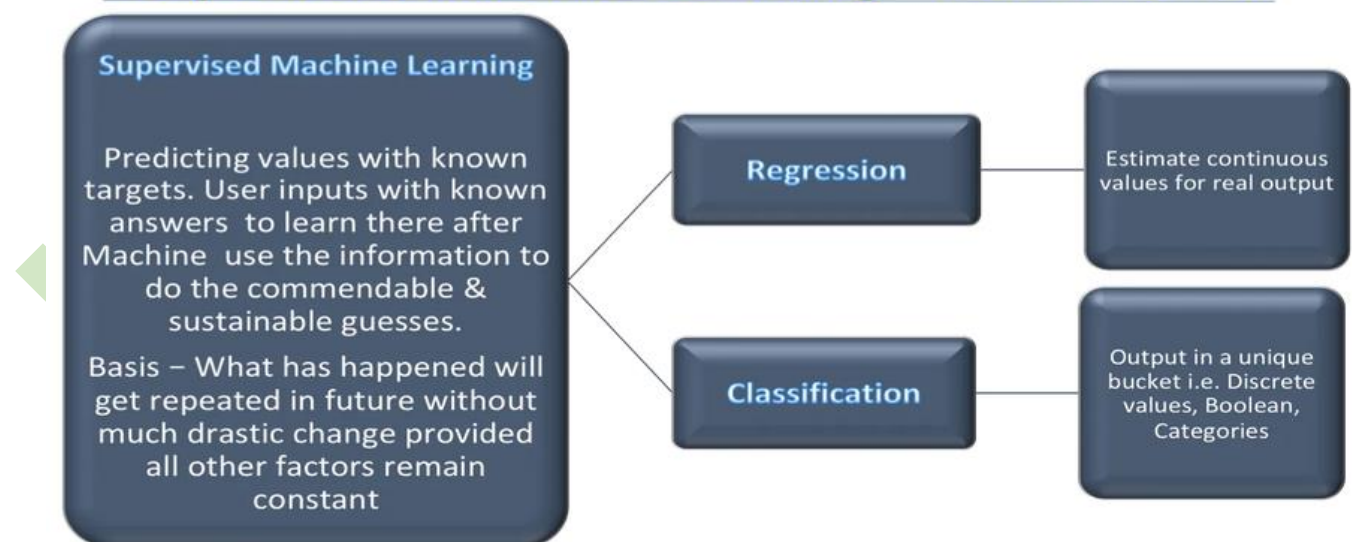
What is SML – Supervised Machine Learning?

In supervised learning, each example is a pair consisting of an input object (typically a vector) and the desired output value (also called the supervisory signal).

SML through historic data set is able to hunt for correct answers, and the task of the algorithm is to find them in the new data. Supervised Machine Learning is

- Is a task of deducing function from labelled training data.
- Making predictions based on evidence in the presence of uncertainty
- Identifying patterns in given data with adaptive algorithms

Supervised Machine Learning – Screen Shot

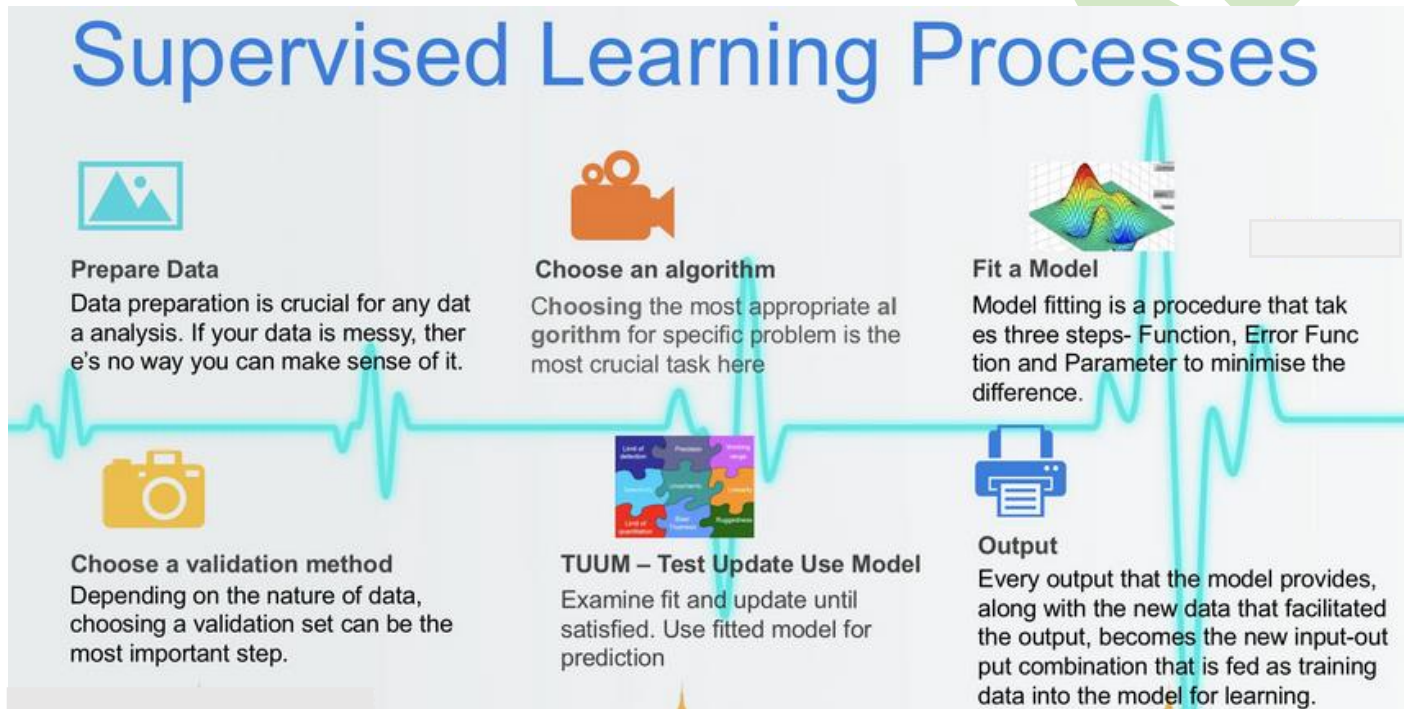


How Supervised Machine Learning Works

The process for Supervised Machine Learning is basically a two-step process as below.

- **Learning** – Learn a model using the training data or train model using training data.
- **Testing** – Test the model using unseen test data to assess the model accuracy

The detailed steps for supervised learning processes are included but not limited though as directed in below graphics



In summary, we can say comfortably in supervised learning; learning comes from known label data to create a model than predicting target class as output for the given input data. Supervised learning is also known as data mining task and it's used for inferring a function from labelled training data.

Let's take an apple as an example of this learning process. Let's assume we have our fruit basket and we call it as our fruit basket. Now to pick an apple from our basket below process at a high level would work perfectly.

- From our fruit basket, we collect data like size, color, weight, skin type, and shape etc. of all the fruits.
- After collecting the data we start classifications
 - If size is Big, color is red, the shape is rounded shape with a depression at the top and bottom put it in set-1
 - If skin type is smooth and shiny on set-1 fruits; put it in set-2
 - Set-2 data can now be comfortably labelled as apple will be put in the apple group.

Real Life Business Uses Cases for Supervised Learning

Supervised learning model makes predictions based on evidence in the presence of uncertainty. Some of the use cases for supervised learnings are depicted in the below picture.

- People analytics
- Internet of things
- Info and Cyber Security
- Asset Management
- Stock Exchange
- Marketing & Sales
- Health Care
- FinTech

Supervised Machine Learning Use Cases



Supervised Learning Algorithms:

The main job of any supervised learning algorithm is to analyse the training data as the first step. In the second step deduce the function which can be used for depict new examples. It has “labelled” data for creating predictive models by using either type of ml algorithms as mentioned below. It provides outputs typically in one of two forms.

- **Regression outputs** are real-valued numbers that exist in a continuous space.
- **Classification outputs**, on the other hand, fall into discrete categories.

As shown above problems under classification (binary or multi-class) and regression come under supervised learning. Some of the algorithms are mentioned below.

- Linear regression
- Logistic Regression
- Polynomial regression
- SVM for regression
- Decision trees
- Random forest
- Support vector machine (SVM)
- Naive Bayes
- k-Nearest Neighbors

Focused Use Cases Under Supervise Learning

Here will focus mainly on 4 main problems that should be considered for supervised learning. In below use cases it's simple and easy to collect data, label data and make predictions with accuracy.

Below use cases came out as focus areas.



- People analytics

Analytical tools are being embedded into day-to-day decision-making. A new paradigm shift in HR on People Analytics has brought revolutionary transformation.

- *Existing Task Force*– Almost all respondent agreed this is extremely important for companies to invest in order to understand their people better. Performance measurement, retention and predicting who is on an outward path.
- *New Task Force* – Recruitment remains the no-1 area as of now to understand workforce planning, compensation benchmarking and detecting suspicious items in CV's

- Info and Cyber Security

Threat hunters or threat analyst's roles came up recently. Skilled resources are now upgrading their skills and knowledge in areas like network administration or network engineering with Artificial Intelligence and Machine Learning blend.

- Here machines are able to learn and gain knowledge of internal and external information vulnerabilities and able to do a mapping against real-world cyber-attacks.
- *Past & Future of Threats & Protection* – the Year 2017 was dominated by news of major hacks, cybersecurity threats and data breaches. What will 2018 have in store? Cybersecurity threats and data breaches are on rising. What will 2019 will bring?
- *Beating the baddies* – In the info-security industry that comes first with leadership roles with best-developed products and excellent professional services, this will be known as the winner. Yet the researchers say the technology may also be used to beat baddies at their own game.

Supervised Learning in Business : Common Algorithms



- **Health Care**

Supervised learning in healthcare provides practical information on how to get cut health care cost, diagnose and successful solutions. This is still struggling to gain attraction for mainly two reasons i.e regulations and litigations.

- *Decision Support*: Supervised learning based systems on medical imaging recognition greatly aid in the work of radiologists and anatomical pathologists.
- Machine learning in medicine has recently made headlines. Google has developed a machine learning algorithm to help find cancerous tumor's on mammograms.
- Stanford is using a deep learning algorithm to find skin cancer. Also, supervised learning methods are becoming extremely popular in the health insurance industry for predicting healthcare costs

- **Financial Technology – FinTech**

Data Science of FinTech deals with both structured and unstructured data. Supervised learning provides insights in a well-organized way that combines the programming, logical reasoning, mathematics and statistics.

- *Digital Age of financial transactions* – As smartphones become a bigger part of our everyday lives, it's only natural that we will use them more and more for shopping. Studies seem to back up this simple reflection. People spend prediction attributes like how much, when, which channel and on what are some example here.
- *Supervised learning to demystifying FinTech* – SL algorithms are built through which input is received and after statistical analysis output value is predicted. Because the algorithms are trained from the dataset

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and thus learn from data, finally improved results are predicted. Furthermore, improved functionality of system and markets.

Common Examples of Supervised Learning

Supervised Learning is as good as low hanging fruit in data science for businesses. The key question when dealing with ML classification is not whether a learning algorithm is superior to others, but under which conditions a particular method can definitely outperform others on a given problem.

