Javascript

25th December 2022

Imperative vs Declarative Programming in JavaScript

A programming paradigm can be termed as an approach or a style of writing code. Most of the modern programming languages fall into two general paradigms: **imperative** (procedural, OOP etc.) and **declarative**(functional etc.).

Imperative approach

With imperative approach, the code describe a step-by-step process for program's execution. In other words, you're interested in how the program runs, and you give it explicit instructions.

"You defines the individual steps that need to be taken to achieve a desired outcome."

The step-by-step process contains individual statements, instructions, or function calls. In the programming world, this process is called the control flow.

Declarative approach

In contrast with imperative programming, declarative programming describes what you want the program to achieve rather than how it should run. In other words, within the declarative paradigm, you define the results you want a program to accomplish without describing its control flow.

"You defines the desired outcome and let the program to figure out the steps."

Example, in ReactJs, we define the desired target state(s) and let React figure out the actual Javascript DOM instructions.

JSX - It is a syntax extension to JavaScript.

Python Series and Data Frames

26th December 2022

Pandas

Pandas is a Python library used for working with data sets. It has functions for analyzing, cleaning, exploring, and manipulating data.

To import : `import pandas as pd`

Data types in Pandas

There are two main datatypes in pandas.

1. Series
2. DataFrame

Series

1 - dimensional

Series is a one-dimensional labeled array capable of holding data of any type (integer, string, float, python objects, etc.)

Example :

```
car_makes = pd.Series(["BMW","Toyota","Honda"])

colours = pd.Series(["Red", "Blue", "White"])
```

DataFrame

2 - dimensional

A DataFrame is a two-dimensional data structure, like a 2 dimensional array, or a table with rows and columns.

Example - We can create a dataframe from a series

```
car_data = pd.DataFrame({"Car make": car_makes, "Colors": colours})
```

We can import structured data such as CSV in to a dataframe.

```
car_sales=pd.read_csv("https://raw.githubusercontent.com/iyngaran/sample-datasets/master/car-sales.csv")
```

Also, we can export a dataframe to a CSV, using **to_csv** function like - **dataframe_name.to_csv("....")**

```
car_sales.to_csv("exported_car_sales.csv");
```

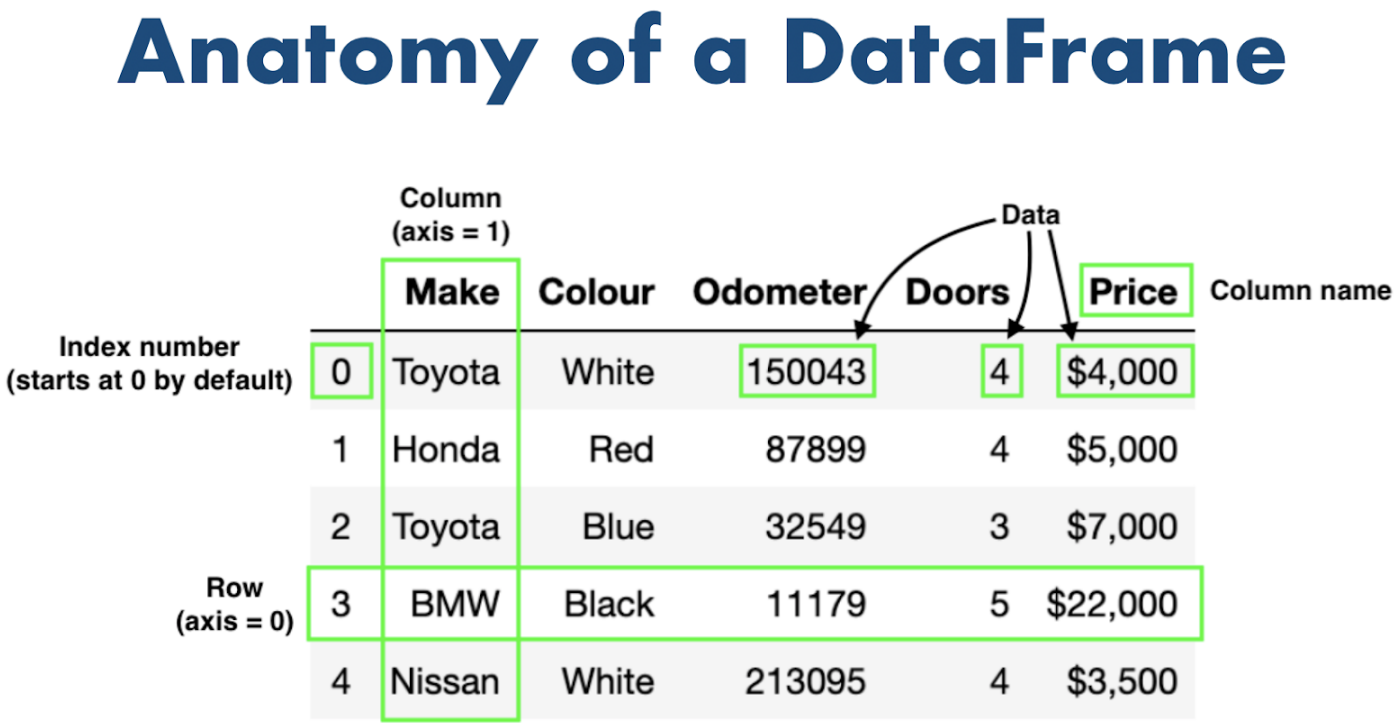
However, this function will export the data with index with the column name as unnamed column.

But we can skip the index by passing ***index=False*** as second parameter as following.

```
car_sales.to_csv("exported_car_sales_2.csv", index = False);
```

Anatomy of a DataFrame

1. Index starts from 0
2. Rows are refers to as axis = 0
3. Columns are refers to as axis = 1



Important Terms & Definitions

Artificial intelligence (AI)

Artificial intelligence (AI) refers to systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the information they collect.

Machine Learning (ML)

Machine learning is a subfield of artificial intelligence, which enables machines to learn from past data or experiences without being explicitly programmed.

It uses algorithms to automatically learn insights and recognize patterns from data, applying that learning to make increasingly better decisions.

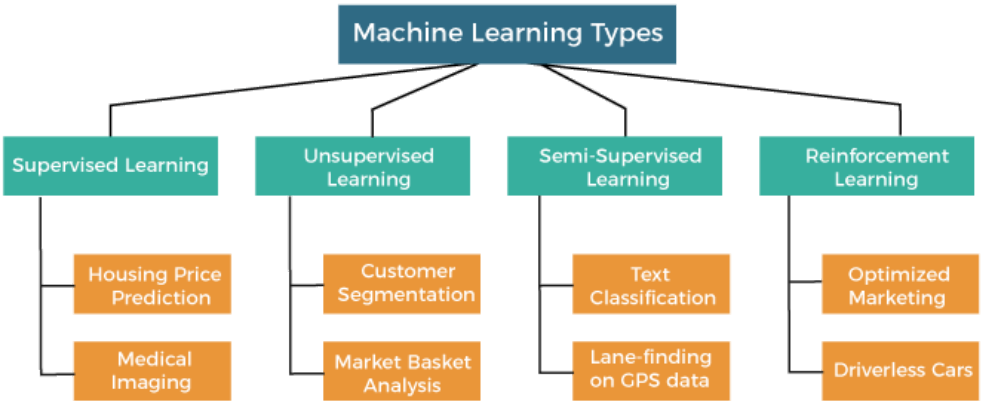
Different between Artificial intelligence (AI) & Machine Learning (ML)

Artificial intelligence (AI) and Machine Learning (ML) are often used interchangeably, but machine learning is a subset of the broader category of AI.

Types of Machine Learning

Based on the methods and way of learning, machine learning is divided into mainly four types, which are:

1. Supervised Machine Learning
2. Unsupervised Machine Learning
3. Semi-Supervised Machine Learning
4. Reinforcement Learning



Supervised Machine Learning

In the supervised learning technique, we train the machines using the "labelled" dataset, and based on the training, the machine predicts the output.

Here, the labelled data specifies that some of the inputs are already mapped to the output.

The main goal of the supervised learning technique is to map the input variable(x) with the output variable(y). Some real-world applications of supervised learning are Risk Assessment, Fraud Detection, Spam filtering, etc.

Categories of Supervised Machine Learning

Supervised machine learning can be classified into two types of problems, which are given below:

1. Classification
2. Regression

Classification

Classification algorithms are used to solve the classification problems in which the output variable is categorical, such as **"Yes"** or **No**, **Male or Female, Red or Blue, etc**.

The classification algorithms predict the categories present in the dataset. Some real-world examples of classification algorithms are **Spam Detection, Email filtering, etc**.

Some popular classification algorithms are given below:

1. Random Forest Algorithm
2. Decision Tree Algorithm
3. Logistic Regression Algorithm
4. Support Vector Machine Algorithm

Regression

Regression algorithms are used to solve regression problems in which there is a linear relationship between input and output variables.

These are used to predict continuous output variables, such as **market trends**, **weather prediction**, etc.

Some popular Regression algorithms are given below:

1. Simple Linear Regression Algorithm
2. Multivariate Regression Algorithm
3. Decision Tree Algorithm

4. Lasso Regression

Unsupervised Machine Learning

In unsupervised machine learning, the machine is trained using the unlabeled dataset, and the machine predicts the output without any supervision.

The main aim of the unsupervised learning algorithm is to group or categories the unsorted dataset according to the similarities, patterns, and differences.

Categories of Unsupervised Machine Learning

Unsupervised machine learning can be classified into two types of problems, which are given below:

1. Clustering
2. Association

Clustering

Clustering or cluster analysis are used to groups the unlabelled dataset. An example of the clustering algorithm is grouping the customers by their purchasing behaviour.

Some of the popular clustering algorithms are given below:

1. K-Means Clustering algorithm
2. Mean-shift algorithm
3. DBSCAN Algorithm
4. Principal Component Analysis
5. Independent Component Analysis

Association

Association learning is a rule based machine learning and data mining technique that finds important relations between variables or features in a data set.

The main aim of this learning algorithm is to find the dependency of one data item on another data item and map those variables accordingly so that it can generate maximum profit. This algorithm is mainly applied in Market Basket analysis, Web usage mining, continuous production, etc.

Some of the popular association algorithms are given below:

1. Apriori Algorithm
2. Eclat
3. FP-growth algorithm

Semi-Supervised Machine Learning

Semi-supervised machine learning is a combination of supervised and unsupervised learning. It uses a **small amount of labeled data** and a **large amount of unlabeled data**, which provides the benefits of both unsupervised and supervised learning while avoiding the challenges of finding a large amount of labeled data. **Example** : A text document classifier.

Reinforcement Learning

Reinforcement learning is a machine learning training method based on rewarding desired behaviors and/or punishing undesired ones.

In general, a reinforcement learning agent is able to perceive and interpret its environment, take actions and learn through trial and error.

Categories of Reinforcement Learning

Reinforcement machine learning can be classified into two types of problems, which are given below:

1. Positive Reinforcement Learning
2. Negative Reinforcement Learning

Real-world Use cases of Reinforcement Learning

1. Video Games
2. Resource Management
3. Robotics
4. Text Mining