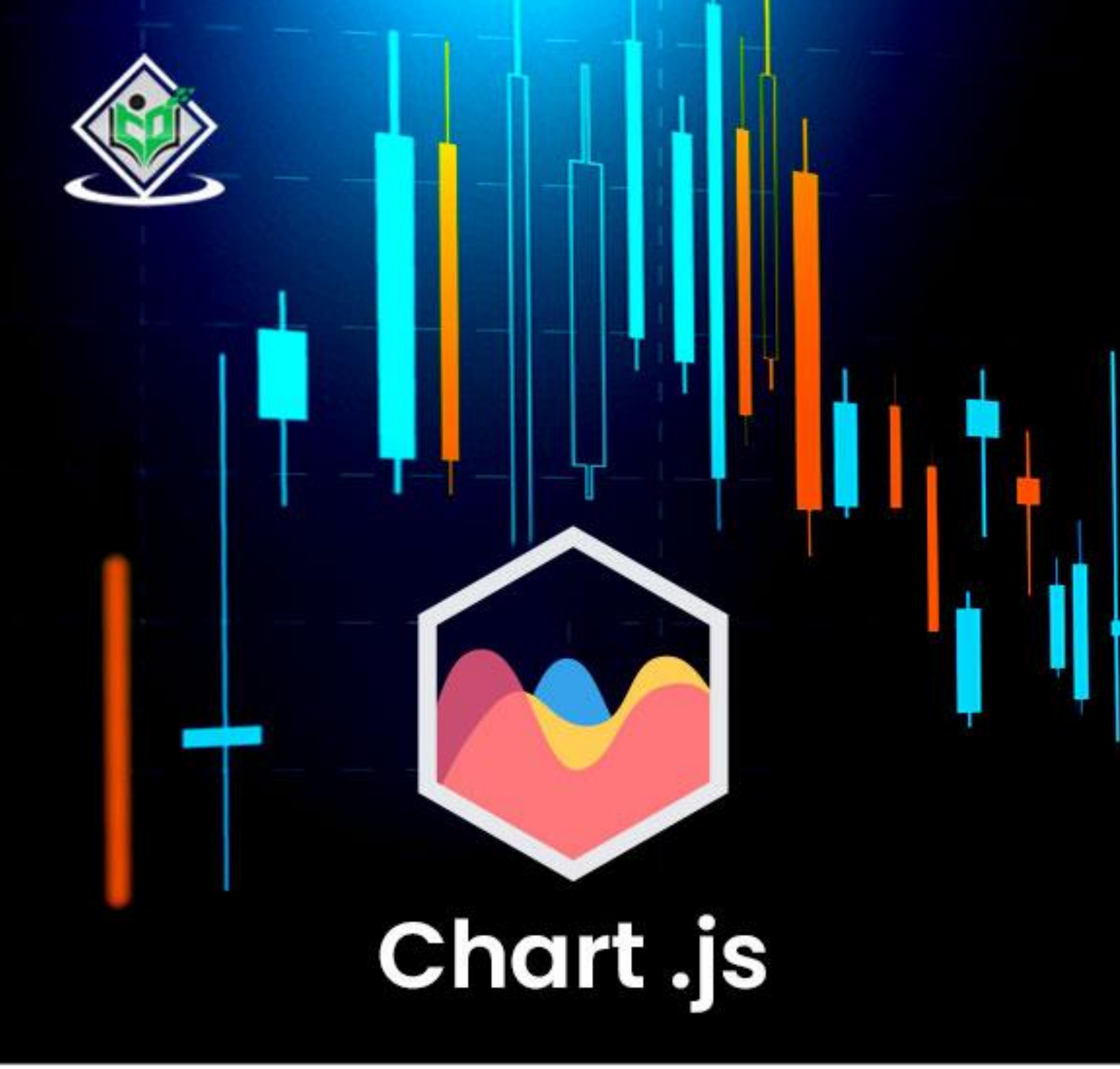

Chart .js

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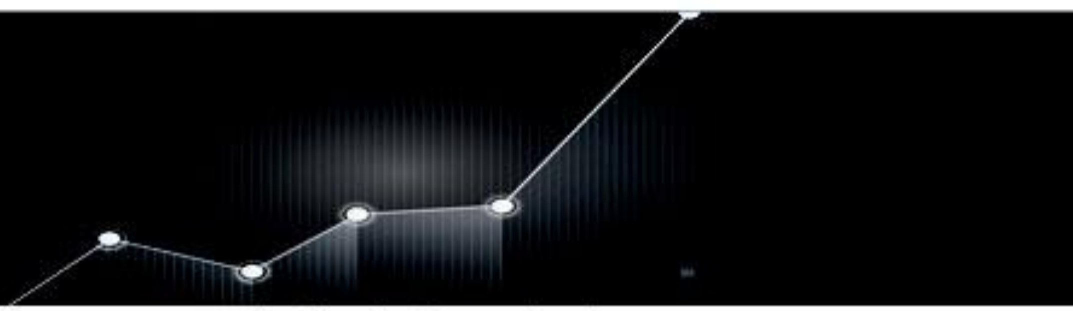

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About the Tutorial

Chart.js, a popular open-source data visualization framework, enables us to generate the Scatter Plot, Line Chart, Bar Chart, Pie Chart, Donut Chart, Bubble Chart, Area Chart, Radar Chart, Mixed Chart, etc. Chart.js is a community-maintained free JavaScript library for making HTML-based charts.

While working with Chart.js, the user just needs to indicate where on page he wants the graph to be displayed and what sort of graph he wants. Once done with that, the user needs to supply Chart.js with data, labels, and some other settings. Rest of the things will be managed by library itself.

Audience

This tutorial will be useful for graduates, post-graduates, and research students who either have an interest in Java Script, Chart.js, Web Development, Web Designing or have these subjects as a part of their curriculum. The reader can be a beginner or an advanced learner.

Prerequisites

Before proceeding with this tutorial, you should have a basic knowledge of HTML and CSS language. You should also be familiar with how to use Visual Studio, Notepad++, and other similar IDEs.

Disclaimer & Copyright

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1. Chart.js – Introduction

What is Chart.js?

Chart.js, a popular open-source data visualization framework, enables us to generate the following chart types:

- Scatter Plot
- Line Chart
- Bar Chart
- Pie Chart
- Donut Chart
- Bubble Chart
- Area Chart
- Radar Chart
- Mixed Chart

Chart.js is a community-maintained free JavaScript library for making HTML-based charts. While working with Chart.js the user just needs to indicate where on page he wants the graph to be displayed and what sort of graph he wants. Once done with that, the user needs to supply Chart.js with data, labels, and some other settings. Rest of the things will be managed by library itself.

Chart.js Features

Below are the features of Chart.js:

- **Open-source free library:** Chart.js is a free open-source community-maintained library which you can use either in offline or online mode.

- **Canvas:** It provides us canvas element for dynamic images.

- **Built-in charts:** It provides the user various built-in charts such as Line, Bar, Horizontal Bar, Radar, Bubble etc., to be used.

- **Extendable to Custom Charts:** You can create a custom charts using Chart.js library.

- **Supports Modern Browsers:** Chart.js supports all the modern browsers.

- **Extensive Documentation:** Chart.js documentation is well organized that provides detailed information about each feature. It makes it easy to understand and use even for novice users.

Chart.js – Advantages

The advantages of Chart.js are as follows:

- Chart.js provides the user 6 different animated views to visualize the data.

- It provides lots of customization options as well as interactivity extensions.

- It provides various types of interactive charts to display data.

- It is totally free to use.

- The update, remove, and modification of data from a chart is easy and hustle-free.

- Chart.js due to its simple structure can store maximum data in minimum space.

- Chart.js uses several y-axes due to which it can stores multiple data in a single graph.

- Chart.js charts are fully responsive.

- Many plugins are available for use via NPM. In fact, you can write your own plugins as well.

Chart.js – Limitations

Apart from various advantages, Chart.js is having the following limitations:

- Chart.js displays only similar type of data with variations.

- An installation of Chart.js only supports display of graphs and charts. It lacks the flexibility offered by other options.

- The canvas element is bitmap based. It shares the same issues as non-vector formats.

Comparison with Google Chart and Plotly.js

Chart.js has main competition with two other JavaScript charting libraries namely plotly.js and Google chart.

Google chart uses web services to create charts. Although it offers maximum charts, but they do not offer enough customization and interactivity. On the other hand, Chart.js, is a free JavaScript charting library, which provides less charts but with great customization and interactivity options. To summarize if you need charts without any complex interaction then go for Google Charts. And if you need simple set of charts with least configurations then Chart.js would be the choice for you.

Chart.js and Plotly.js both are open-source free to use tools for charting. Chart.js is animated, HTML5 based and responsive whereas Plotly.js is an online chart editor that supports MatLab, Python, and R programming languages with full interactivity. The documentation of chart.js is easy than the plotly.js.

2. Chart.js – Installation

Prerequisites

Before installing and start using Chart.js library, you need to have the basic understanding of the following programs:

- Basics of Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS)

- Basic understanding of JavaScript especially Object-Oriented Programming (OOP) concepts and Arrays.

Installation

Before start working with Chart.js, we need to first install it. Below are the couple of ways you can use to install Chart.js:

Method 1: Using NPM

You can use NPM to install Chart.js. Copy and paste the following command to download Chart.js in your project:

```
npm install chart.js --save
```

Method 2: Using a CDN

Using a CDN to install and use Chart.js in your project is one of the fastest and easiest way. First grab the latest CDN link from CDN website: https://cdnjs.com/libraries/Chart.js. Now, copy the URL that has Chart.min.js at the end.

Method 3: Using GitHub

You can use GitHub to download the latest version of the chart.js library. The link https://github.com/chartjs/Chart.js/releases/latest helps to get the Chart.js library.

Method 4: Using jsDelivr

You can also use jsDelivr to download the latest version of the chart.js library. The link https://www.jsdelivr.com/ helps to get the Chart.js built files.

Setup Project with Chart.js

Using CDN: To set up your project with chart.js, include a script tag in your HTML that links to the chart.js CDN. In other words, load the CDN into the body section as follows:

```
<html>


<body>
    <script type="text/javascript"
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
</body>


</html>
```

Using jsDelivr: You can follow the below steps to setup chart.js for your project using jsDelivr:

- **Step 1:** Create a file and save the name with the "js" keyword. For example: **firstchart.js.**

- **Step 2:** Now download chart.js library from the jsDelivr. The downloaded library saves in the filename.js file. Copy and paste the link https://cdn.jsdelivr.net/npm/chart.js@3.1.1/dist/chart.min.js in the .js file.

- **Step 3:** Next, create a HTML file and write the code. Put the script tag in the **<body> </body>** section.

- **Step 4:** Last, add this file into the script tag with the path **<script src = "path/folder/firstchart.js"></script>**

3. Chart.js – Syntax

To create a chart using chart.js library, we need to know the following details regarding the chart:

- Position of the chart
- Type of graph
- Chart configuration
- Responsiveness

Let's take a simple chart.js example and understand how you can supply this data in your code:

Example

In this example, we will create a basic chart using the chart.js library:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, 
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>


    <script 
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script 
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/hel
pers.esm.min.js"></script>
    <canvas id="graph" aria - label="chart" height="350" 
width="580"></canvas>
    <script>
```

```
        var chrt = document.getElementById("graph");
        var graph = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [9, 8, 10, 7, 6, 12],
                }],
            },
            options: {
                responsive: true,
            },
        });
    </script>

</body>

</html>
```

Use the "Edit and Run" option and run this code to see the kind of chart it produces.

Description

Given below is the description of various object used in chart.js syntax:

- **Canvas:** It help us to select a position of the graph or chart. You can provide the height and width of your chart.

- **Chart:** As name implies, this object will create a chart or graph using the canvas id.

- **Type:** It provides various types of the graph and charts such as Pie chart, Bar chart, Bubble chart, etc. You can choose the types of graphs as per your requirement.

- **Labels:** The labels assign heading to different elements of the graph or chart. For example, HTML, CSS, JAVASCRIPT, etc. are the labels in above given example.

- **Label:** Like Labels, object label assigns heading to the graph or chart itself.

- **Data:** The Data object provides values of the graph elements. For example, 9, 8, 10, 7, 12 etc. is the data assigned for various labels in the above given example.

- **Options:** The options object adds are the features like animation, integration, responsive to our graph or chart.

4. Chart.js – Basics

To understand the basics of chart.js, let's go step-by-step and see how to create a simple bar chart using chart.js library:

Step 1: First we need to create a canvas id using canvas object. Here we can add various styles and HTML elements. We also need to provide the height and width of our graph or chart. Let's see how we can create it:

```
<canvas id="chartId" aria-label = "chart" height="500" width =
"500"></canvas>
```

Step 2: Now, we need to access the **canvas Id** and chart.js object as follows:

```
var chrt = document.getElementById("chartId").getContext("2d");
```

Step 3: Next use the Chart.js **Type** object to specify what type of chart or graph you need. There are various types of graphs you can choose from.

```
type: 'bar',
```

Step 4: If you want to give labels to the elements of the graph or chart, you can use Chart.js "labels" object as follows:

```
labels: ["HTML", "CSS", "JAVASCRIPT", "CHART.JS", "JQUERY", "BOOTSTRP"],
```

Likewise, you can also provide the label of the graph or chart using the **label** object as follows:

```
label: "Online Tutorial Subjects"
```

Step 5: For graph, give the values of elements of your graph or chart. It can be done with the help of **data** object as follows:

```
data: [20, 40, 30, 10, 40, 20]
```

Step 6: You can also apply some advance features like animation, responsive etc. by using the **options** object as follows:

```
options: {
responsive: false,
},
```

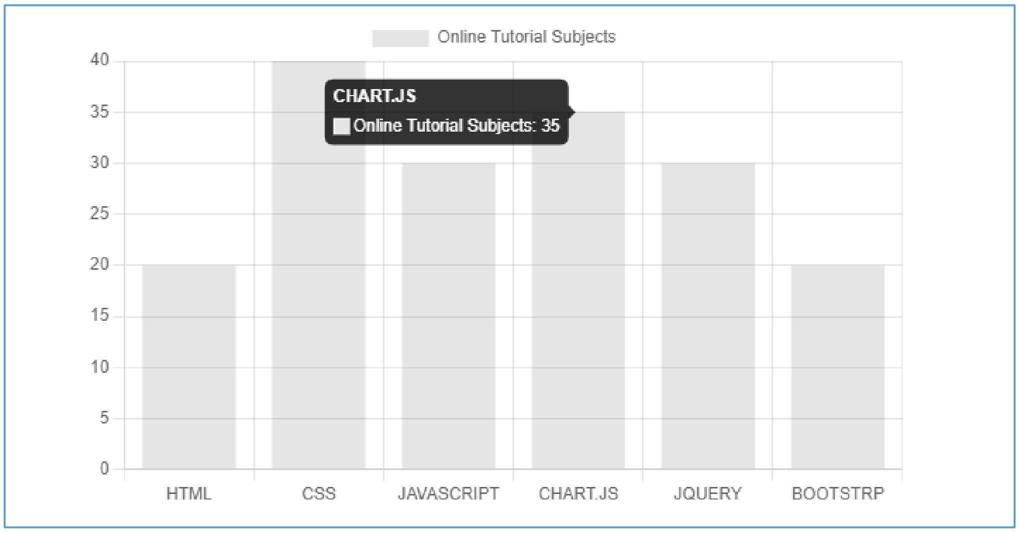
Example

In this example, we will create a bar graph showing various subjects for online tutorials.

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>


    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/hel
pers.esm.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT", 
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "Online Tutorial Subjects",
                    data: [20, 40, 30, 35, 30, 20],
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>

</html>
```

Output

Run the above HTML code and you will get the following bar chart as the output:



5. Chart.js – Color

Chart.js library provides us various format with the help of which we can easily supply the colors to the chart or graph options. You can specify the color as string in the following notations:

- Hexadecimal
- RGB
- HSL

Chart.js will use the global default color, if you haven't specified any color and if the chart needed color. The following table provides the 3 color options that are stored in "Chart.defaults":

Name	Type	Default	Description
backgroundColor	Color	rgba(0, 0, 0, 0.1)	Background color
borderColor	Color	rgba(0, 0, 0, 0.1)	Border color
Color	Color	#666	Font color

Example

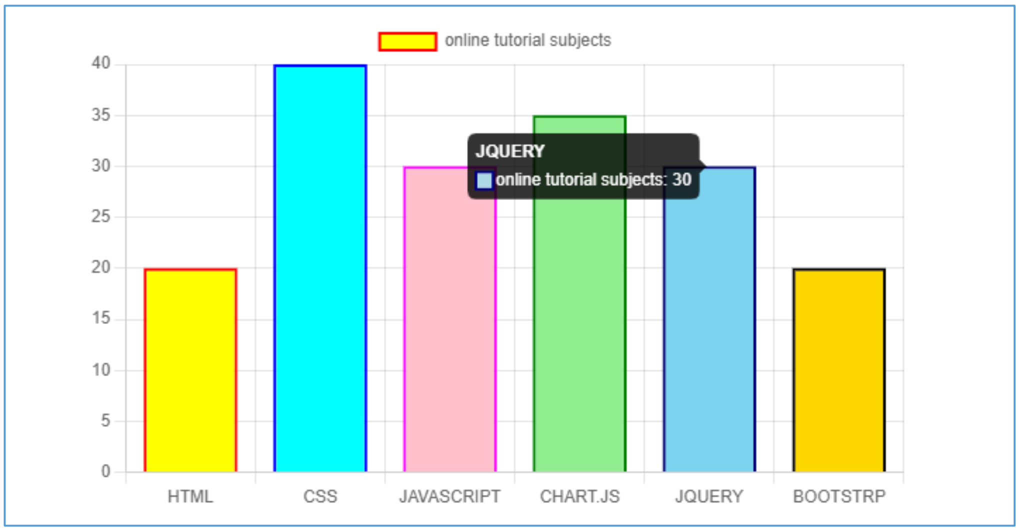
Let's take an example in which we will set the color in our chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
```

```
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>

    <script>

        var chrt =
document.getElementById("chartId").getContext("2d");

        var chartId = new Chart(chrt, {

            type: 'bar',

            data: {

                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],

                datasets: [{

                    label: "online tutorial subjects",

                    data: [20, 40, 30, 35, 30, 20],

                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],

                    borderColor: ['red', 'blue', 'fuchsia',
'green', 'navy', 'black'],

                    borderWidth: 2,

                }],

            },

            options: {

                responsive: false,

            },

        });

    </script>

</body>


</html>
```

Output

This HTML code will produce the following chart having graph elements with different colors:


online tutorial subjects
40
35
30
25
20
15
10
5
0
HTML
CSS
JAVASCRIPT
CHART.JS
JQUERY
BOOTSTRP
JQUERY
online tutorial subjects: 30

6. Chart.js – Options

In Chart.js, using a context dependent route, the Options are resolved from top of the code to the bottom of it. We have different levels of options as shown below:

Chart Level Options

We have three chart level options:

- options
- overrides
- defaults

Dataset Level Options

Chart.js provides us below options to be used at dataset level:

- dataset
- options.datasets
- options
- overrides
- defaults.datasets
- defaults

Dataset Animation Options

Chart.js provides us below options to be used at dataset animation level:

- Dataset.animation
- options.datasets.animation
- options.animation
- overrides.datasets.animation
- defaults.datasets.animation
- defaults.animation

Dataset Element Level Options

Chart.js provides us below options to be used at dataset element level:

- Dataset
- options.datasets
- options.datasets.elements
- options.elements

- options
- overrides.datasets
- overrides.datasets.elements
- defaults.datasets
- defaults.datasets.elements
- defaults.elements
- defaults

Scale Options

Chart.js provides us below scale options:

- options.scale
- overrides.scales
- overrides.datasets.elements
- defaults.scales
- defaults.scale

Plugin Options

Chart.js provides us below plugin options that provides array of paths to additionally look for its options in:

- options.scale
- options.plugins[plugin.id]
- (options.[...plugin.additionalOptionScopes])
- overrides[config.type].plugins[plugin.id]
- defaults.plugins[plugin.id]
- (defaults.[...plugin.additionalOptionScopes])

Example

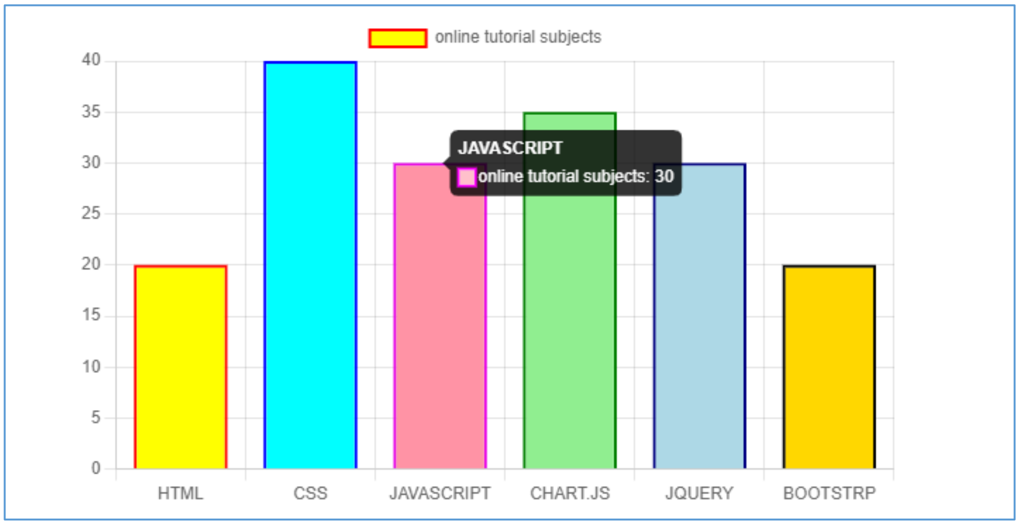
Let’s take an example in which we will use various **Options** in our chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>
```

```
<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],
                    borderColor: ['red', 'blue', 'fuchsia',
'green', 'navy', 'black'],
                    borderWidth: 2,
                }],
            },
            options: {
                responsive: false,
                layout: {
                    padding: {
                        left: 40,
                        right: 40,
                    }
                },
                plugins: {
                    legend: {
                        labels: {
                            font: {
                                size: 25,
                                family: 'Helvetica',
                                style: 'bold',
                            }
                        }
                    }
                }
            },
        });
    </script>
</body>

</html>
```

Output

The following output chart shows padding of the element and font style:



7. Chart.js – Interactions

Chart.js interactions help us to communicate with the elements of our chart. You can apply these interactions using both the hover and tooltip. The table below gives the descriptions of various kinds of interactions we can use:

Name	Type	Default	Description
Mode	string	'nearest'	It will set which elements appear in the interaction.
Intersect	Boolean	true	Intersect can be used to set the mouse position. If you keep this true, the interaction mode only applies when the mouse position intersects an item on the chart else not.
Axis	string	'x'	Axis can be set to 'x', 'y', 'xy' or 'r'. It defines the directions are used in calculating distances. For index mode the default value is 'x'. Whereas 'xy' is the default value for 'nearest' modes.
includeInvisible	Boolean	false	if false, the invisible points that are outside of the chart area will not be included when evaluating interactions.

The namespace to use interactions in our charts is "options.interactions".

On the similar note, the following table gives the descriptions how the chart will interact with events:

Name	Type	Default	Description
Events	string[]	['mousemove', 'mouseout', 'click', 'touchstart', 'touchmove']	This option defines the browser events that the chart should listen.
onHover	function	Null	This event will be called when any of the events fire over our chartArea.).
onClick	function	Null	This event will be called if the event is of type 'mouseup', 'click' or 'contextmenu' over our chartArea.

Syntax

The interaction syntax is given below:

```
interaction: {
    mode: 'nearest',
 }
```

And the Chart.js event syntax is given below:

```
events: ['click'],
```

Example

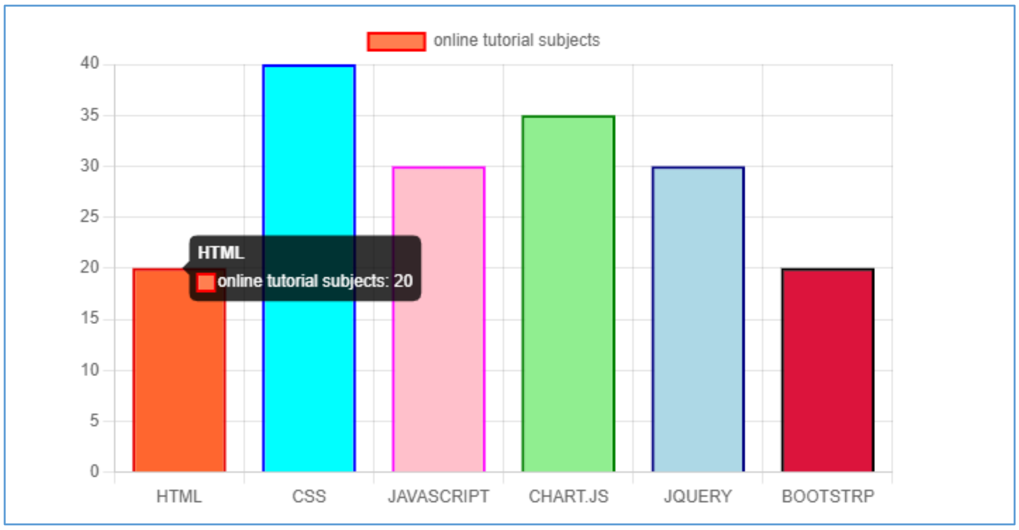
Let's take an example in which we will use various **interactions** and **events** in our chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
```

```
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['coral', 'aqua', 'pink',
'lightgreen', 'lightblue', 'crimson'],
                    borderColor: ['red', 'blue', 'fuchsia',
'green', 'navy', 'black'],
                    borderWidth: 2,
                }],
            },
            options: {
                responsive: false,
                events: ['click'],
                interaction: {
                    mode: 'nearest',
                }
            },
        });
    </script>
</body>


</html>
```

Output

It will produce the following chart having various **interactions** and **events**:



8. Chart.js – Legend

Chart.js legend displays that data about the dataset which is going to be seen on our chart or graph. The namespace for Legend configuration options is `options.plugins.legend` whereas, the global option for the chart legend is defined in `Chart.defaults.plugins.legend`.

The table below gives the descriptions of various kinds of configuration options we can use with chart legend:

Name	Type	Default	Description
Display	Boolean	true	If true, it will show the legend, else NOT.
Position	string	'top'	It is used to set the position of the legend. The default is top position.
Align	string	'center'	It is used to set the alignment of the legend. The default is center position.
maxHeight	number		It will set the maximum height of the legend in pixels.
maxWidth	number		It will set the maximum width of the legend in pixels
fullSize	Boolean	true	As name implies, if true, the box will take the full width/height of the canvas.
onClick	function		It is a callback function which is called when you register a click event on a label item.
onHover	function		It is a callback function which is called when you register a 'mousemove' event on the top of a label item.
onLeave	function		It is a callback function which is called when you register a 'mousemove' event outside of a previously hovered label item.

Reverse	Boolean	false	As name implies, with this configuration, the legend will show datasets in reverse order. The default value if false.
Labels	object		You can use various Legend Label Configurations such as color, font, padding, boxWidth, boxHeight, etc.
Rtl	Boolean		If true, the legend will render from right to left.
textDirection	string	canvas' default	As name implies, this configuration will force the text direction 'rtl' or 'ltr' on the canvas for rendering the legend, regardless of the css specified on the canvas
Title	object		You can use various Legend Title Configurations such as color, font, padding, text, display, etc.

Syntax

The Chart Legend syntax is given below:

```
legend: {
    display: true,
    position: 'bottom',
    labels: { color: 'darkred', }
}
```

The legend **enabled** property must be **true** to display the data label. If it sets to **false**, then the **legend** becomes deactivated.

Example

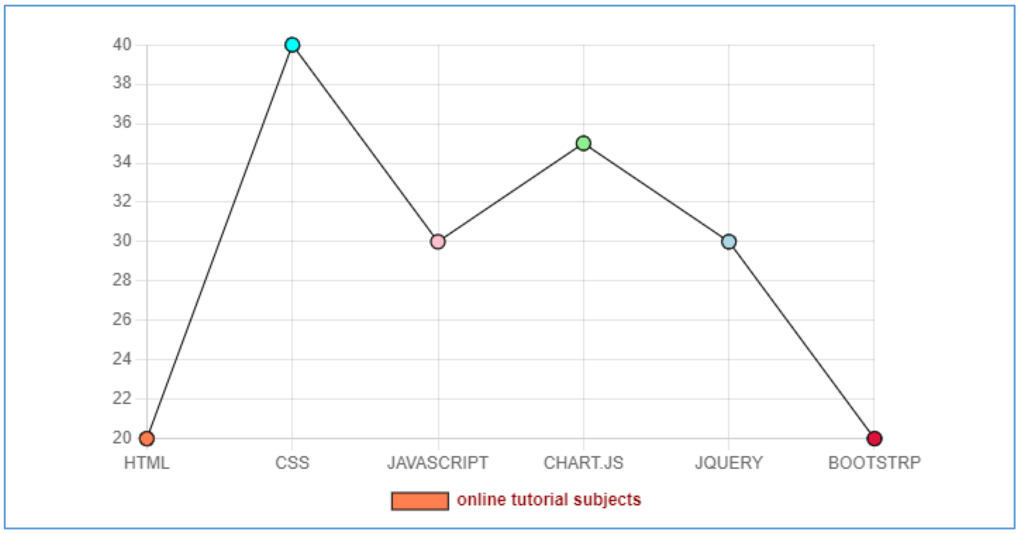
Let’s take an example in which we will be using various Legend configurations:

```
<!DOCTYPE html>
<html>


<head>
```

```
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title> chart.js</title>
</head>


<body>
    <canvas id="toolTip" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chartTooltip =
document.getElementById("toolTip").getContext("2d");
        var toolTip = new Chart(chartTooltip, {
            type: "line",
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['coral', 'aqua', 'pink',
'lightgreen', 'lightblue', 'crimson'],
                    borderColor: [
                        "black",
                    ],
                    borderWidth: 1,
                    pointRadius: 5,
                }],
            },
            options: {
                responsive: false,
                plugins: {
                    legend: {
                        display: true,
                        position: 'bottom',
                        align: 'center',
                        labels: {
                            color: 'darkred',
                            font: {
                                weight: 'bold'
                            },
                        }
                    }
                }
            }
        });
    </script>
</body>
</html>
```

Output

Take a look at the output. It shows the various Legend configurations:



9. Chart.js – Title

Chart.js title defines which text is going to be seen at the top of our chart or graph. The namespace for Title configuration is `options.plugins.title` whereas the global option for the chart title is defined in `Chart.defaults.plugins.title`.

The table below gives the descriptions of various kinds of configuration options we can use with chart title:

Name	Type	Default	Description
align	string	'center'	As name implies, with this configuration you can set the alignment of the title.
color	Color	Chart.defaults.color	It will define the color of text.
display	Boolean	false	If true, it will show the title, else NOT.
fullSize	Boolean	true	As name implies, if true, the box will take the full width/height of the canvas.
position	string	'top'	It is used to set the position of the title. The default is top position.
font	Font	{weight: 'bold'}	You can use various fonts. The options are in "Chart.defaults.font".
padding	Padding	10	It is use for padding to be applied around the title.
text	string|string[]	''	As name implies, it is use for the title text to display.

Syntax

The Chart Title syntax is given below:

```
title: {
    display: true,
    text: 'write heading here',
    color: 'navy',
    position: 'bottom',
}
```

The title **enabled** property must be **true** to display the data label. If it is set to **false**, then the **title** becomes deactivated.

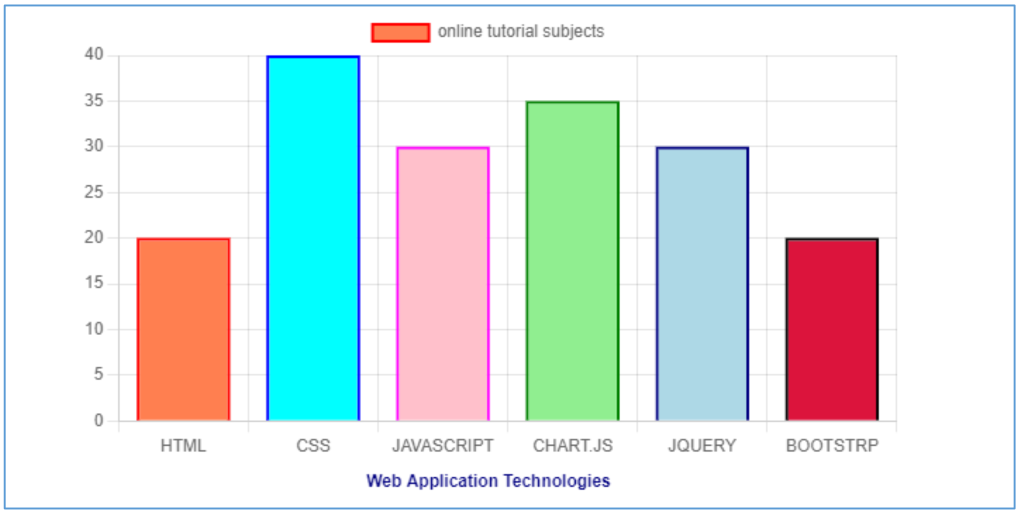
Example

Let's take an example in which we will be using various **Title** configurations:

```
<!DOCTYPE>
<html>
<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['coral', 'aqua', 'pink',
'lightgreen', 'lightblue', 'crimson'],
                    borderColor: ['red', 'blue', 'fuchsia',
'green', 'navy', 'black'],
                    borderWidth: 2,
                }],
            },
            options: {
                responsive: false,
                plugins: {
                    title: {
                        display: true,
                        text: 'Web Application Technologies',
                        color: 'navy',
                        position: 'bottom',
                        align: 'center',
                        font: {
                            weight: 'bold'
                        },
                        padding: 8,
                        fullSize: true,
                    }
                }
            },
        });
    </script>
</body>
</html>
```

Output

The following output chart shows the various **Title** configurations:



10. Chart.js – Animation

Chart.js animations are used to animate the charts or graphs. It provides us various options to configure the animations and to set the time for how much time animation will be shown. The namespace for Animation configuration is "`options.animation`".

The table below gives the descriptions of various kinds of configuration options we can use with chart animation:

Name	Type	Default	Description
duration	number	1000	It will set the number of milliseconds an animation in the chart takes.
easing	string	'easeOutQuart'	It is the easing function which we will use for animations. Some options are linear, easeInQuad, easeOutQuad, easeInOutBounce, etc.
delay	number	undefined	As name implies, it represents the delay before starting the animations.
loop	Boolean	undefined	If true, the animations in chart will loop endlessly.

Syntax

The Chart Animation syntax is given below:

```
animations: {
    tension: {
        duration: 750,
        easing: 'easeInBounce',
        from: 1,
        to: 0,
        loop: true
    }
},

scales: {
    y: {
        min: 0,
        max: 45,
    }
}
```

The animation "loop" property must be true to animate. If it sets to false, then the "animation" becomes deactivated.

Example

Let’s take an example in which we will be using various Animation configurations:

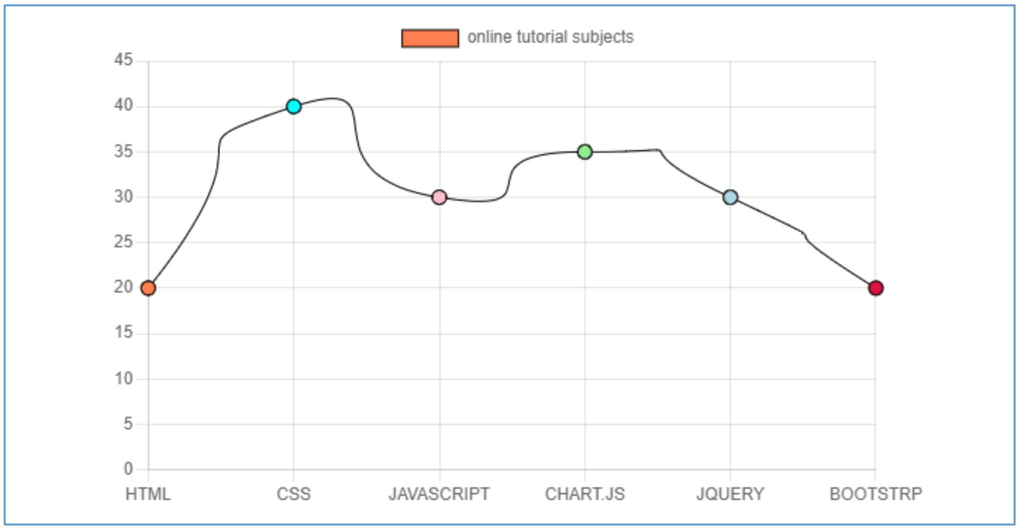
```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title> chart.js</title>
</head>


<body>
    <canvas id="toolTip" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chartTooltip =
document.getElementById("toolTip").getContext("2d");
```

```
        var toolTip = new Chart(chartTooltip, {
            type: "line",
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['coral', 'aqua', 'pink',
'lightgreen', 'lightblue', 'crimson'],
                    borderColor: [
                        "black",
                    ],
                    borderWidth: 1,
                    pointRadius: 5,
                }],
            },
            options: {
                responsive: false,
                animations: {
                    tension: {
                        duration: 750,
                        easing: 'easeInBounce',
                        from: 1,
                        to: 0,
                        loop: true
                    }
                },
                scales: {
                    y: {
                        min: 0,
                        max: 45,
                    }
                }
            }
        });
    </script>
</body>

</html>
```

Output

Use the "Edit and Run" option to run the code and see how the chart behaves with the applied animations.

The following output chart shows the various Animations configurations:



11. Chart.js – Tooltip

Chart.js Tooltip provides us an option to show tooltip text in our chart. Tooltip is a graphical UI element that provides extra information as we hover the mouse over the chart elements. The namespace for Animation configuration is **`options.plugins.tooltip`**.

Syntax

The Chart Tooltip syntax is given below:

```
options: {
     plugins: {
         tooltip: {
             enabled: true,
             (Write tooltip's style element)
             },
     }
}
```

The tooltip **enabled** property must be **true** to display the data label. If it sets to **false**, then the **tooltip** becomes deactivated.

Example

Let's take an example in which we will be using various Tooltip configurations:

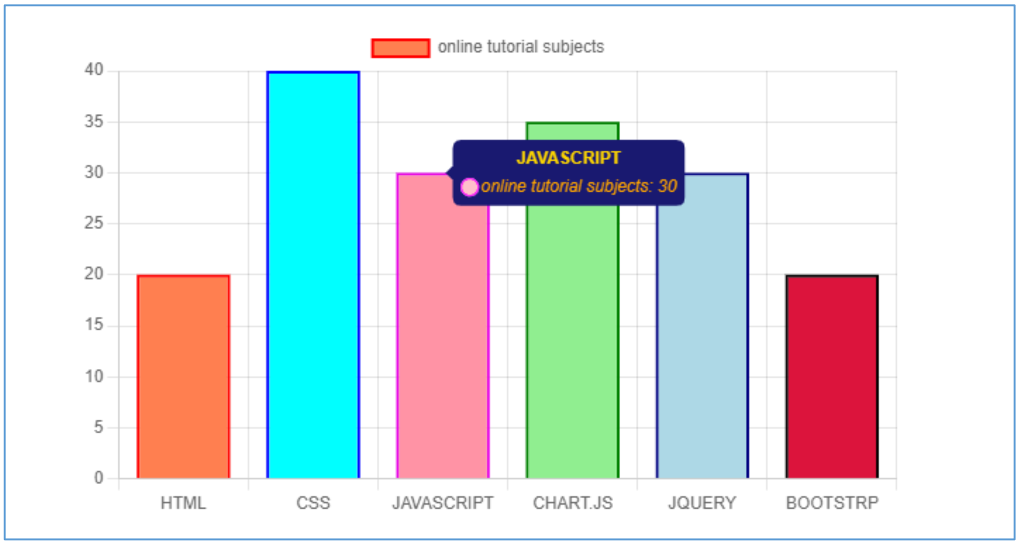
```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>
```

```
<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/hel
pers.esm.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['coral', 'aqua', 'pink',
'lightgreen', 'lightblue', 'crimson'],
                    borderColor: ['red', 'blue', 'fuchsia',
'green', 'navy', 'black'],
                    borderWidth: 2,

                }],
            },
            options: {
                responsive: false,
                plugins: {
                    tooltip: {
                        enabled: true,
                        usePointStyle: true,
                        titleAlign: 'center',
                        titleColor: 'gold',
                        titleSpacing: 3,
                        TitleFont: {
                            weight: 'bold'
                        },
                        backgroundColor: 'midnightblue',
                        bodyColor: 'orange',
                        bodyAlign: 'center',
                        bodyFont: {
                            weight: 'italic'
                        },
                        callbacks: {
                            labelPointStyle: function(context)
{
                                return {
                                    pointStyle: 'circle',
                                    rotation: 0
                                };
                            },

                        }
                    }
                }
            },
        });
    </script>
</body>

</html>
```

Use the "Edit and Run" option to execute the code online and then hover the mouse over the bars and observe the styling of the tooltips.

Output

The following output chart shows the various Tooltip configurations:



12. Chart.js – Line Chart

Chart.js line chart, as name implies is a method to plot the data points on a line. In most of the case, line charts are used to show the trend of data or a comparison between data sets.

Following are the namespaces to be used in line chart for dataset properties:

- **data.datasets[index] :** It provides options for this dataset only.
- **options.datasets.line :** It provides options for all the line datasets.
- **options.elements.line:** It provides options for all the line elements.
- **options.elements.point:** It provides options for all the point elements.
- **Options:** It provides options for the whole chart

We need to use **"type: line"** for creating the line chart.

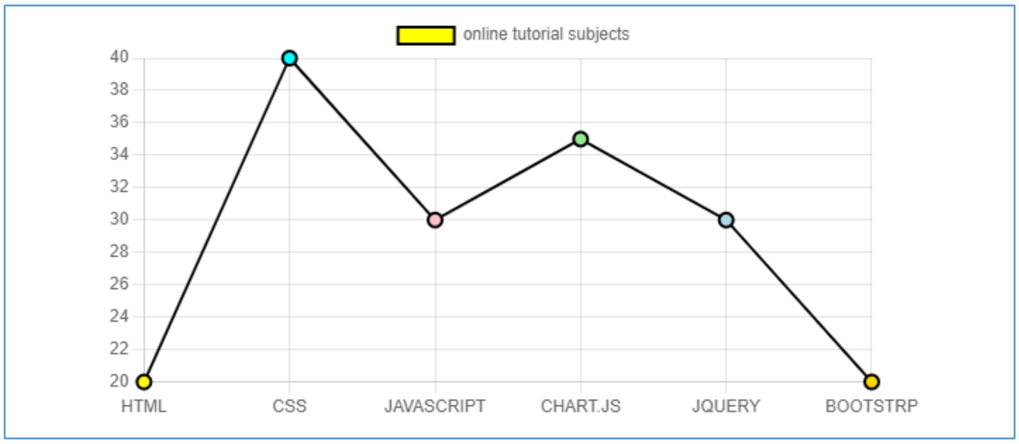
Example

Let's take an example with the help of which we will create a line chart:

```
<!DOCTYPE>
<html>
<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title>chart.js</title>
</head>
<body>
    <canvas id="chartId" aria-label="chart" heigth="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'line',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],
                    borderColor: ['black'],
                    borderWidth: 2,
                    pointRadius: 5,
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>
</html>
```

Output

The following output shows the creation of a line chart:



13. Chart.js – Bar Chart

Chart.js bar chart, as the name implies, is a method to plot the data values as vertical bars. In most of the case, line charts are used to show the trend of data and a comparison between more than two data sets side by side.

Below are the namespaces to be used in bar chart for dataset properties:

- **data.datasets[index]:** It provides options for this dataset only.
- **options.datasets.bar:** It provides options for all the bar datasets.
- **options.elements.bar:** It provides options for all the bar elements.
- **Options:** It provides options for the whole chart

We need to use type: 'bar' for creating the bar chart.

Example

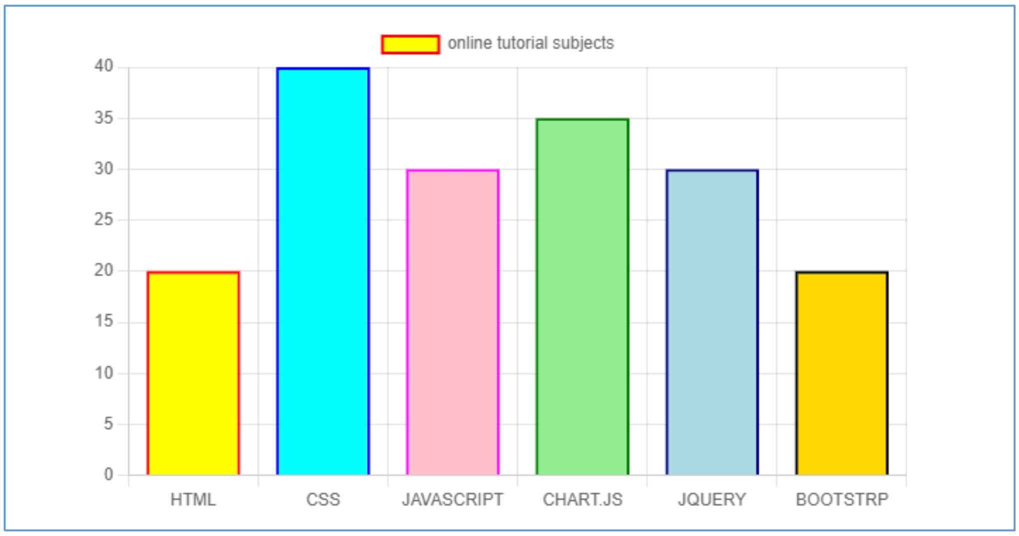
Let's take an example with the help of which we will create a bar chart:

```
<!DOCTYPE>
<html>

<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>

<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/hel
pers.esm.min.js">
```

```
    </script>
    <script>
        var chrt = 
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT", 
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['yellow', 'aqua', 
'pink', 'lightgreen', 'lightblue', 'gold'],
                    borderColor: ['red', 'blue', 'fuchsia', 
'green', 'navy', 'black'],
                    borderWidth: 2,
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>


</html>
```

Output

By executing the above code, we will get the following output chart:


online tutorial subjects
40
35
30
25
20
15
10
5
0
HTML
CSS
JAVASCRIPT
CHART.JS
JQUERY
BOOTSTRP

14. Chart.js – Radar Chart

Chart.js radar chart, as the name implies, is used to show multiple data points and the difference between those data points. With the help of radar chart, we can easily compare the points of two or more different datasets.

Following are the namespaces to be used in radar chart for dataset properties:

- **data.datasets[index]:** It provides options for this dataset only.
- **options.datasets.line:** It provides options for all the line datasets.
- **options.elements.line:** It provides options for all the line elements.
- **options.elements.point:** It provides options for all the point elements.
- **Options:** It provides options for the whole chart

We need to use **type: "radar"** for creating the radar chart.

Example

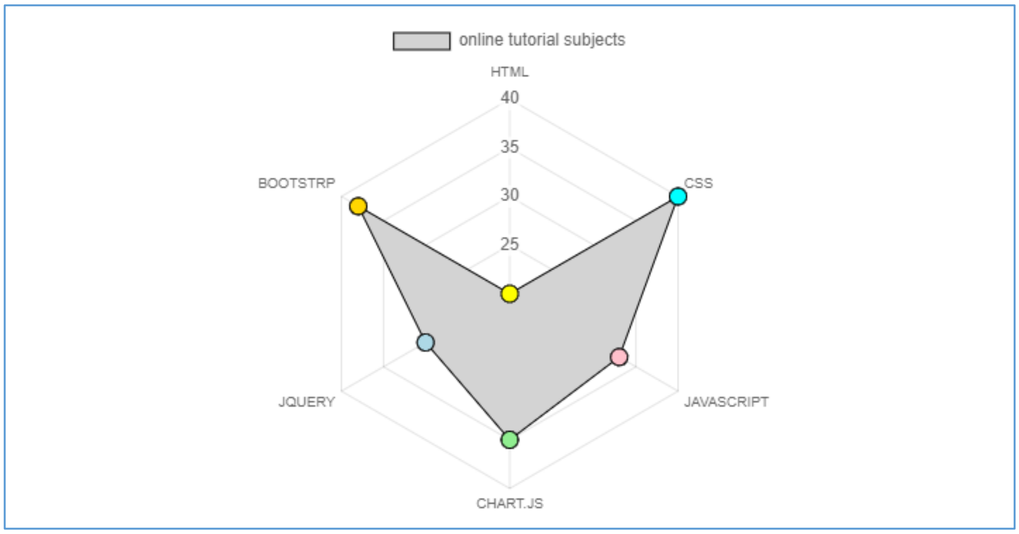
Let’s take an example with the help of which we will create a radar chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
```

```
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'radar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 33, 35, 30, 38],
                    backgroundColor: ['lightgrey'],
                    pointBackgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],
                    borderColor: ['black'],
                    borderWidth: 1,
                    pointRadius: 6,
                }],
            },
            options: {
                responsive: false,
                elements: {
                    line: {
                        borderWidth: 3
                    }
                }
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following output chart:



15. Chart.js – Doughnut Chart

Chart.js doughnut chart is one of the most used charts to represent the data sets. Doughnut charts divided into various segments in which the arc of each segment shows the proportional value of each piece of data. If you want to show the relational proportions between data, doughnut chart is an excellent choice.

Following are the namespaces to be used in doughnut chart for dataset properties:

- **data.datasets[index] :** It provides options for this dataset only.
- **options.datasets.doughnut :** It provides options for all doughnut datasets.
- **options.elements.arc:** It provides options for all the arc elements.
- **Options:** It provides options for the whole chart

We need to use type: ’doughnut’ for creating the doughnut chart.

Example

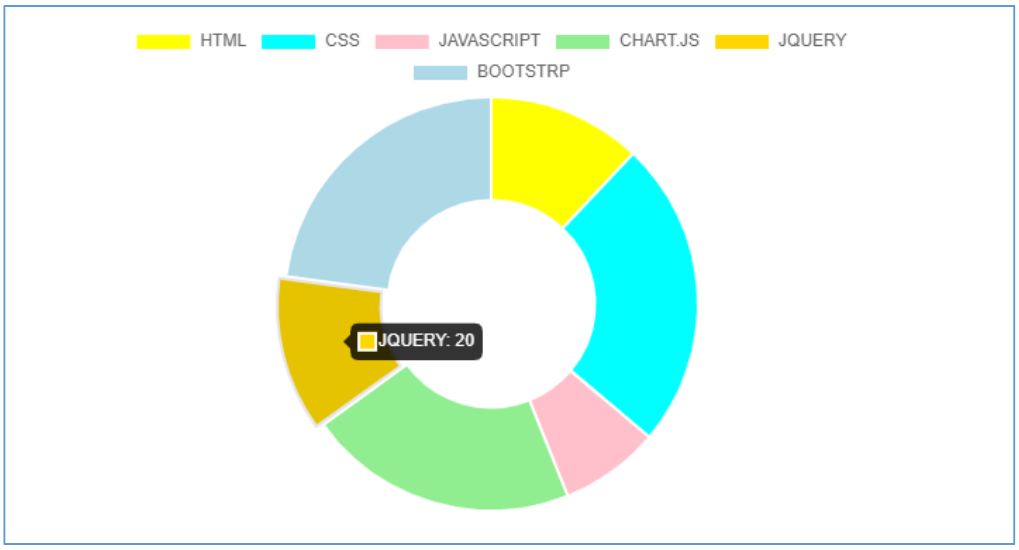
Let’s take an example with the help of which we will create a doughnut chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
```

```
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'doughnut',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 13, 35, 20, 38],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                    hoverOffset: 5
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following output chart:


HTML
CSS
JAVASCRIPT
CHART.JS
JQUERY
BOOTSTRP
JQUERY: 20

16. Chart.js – Pie Chart

Chart.js pie chart is another most used charts to represent the data sets. Like doughnut charts, pie charts are also divided into various segments in which the arc of each segment shows the proportional value of each piece of data. If you want to show the relational proportions between data, pie chart is also an excellent choice.

The difference between doughnut and pie chart is in their value of **cutout** that equates to what portion of the inner should be cut out. For pie charts, the default value of **cutout** is 0, whereas for doughnut charts, it is 50%.

Following are the namespaces to be used in pie chart for dataset properties:

- **data.datasets[index]:** It provides options for this dataset only.
- **options.datasets.pie:** It provides options for all pie datasets.
- **options.elements.arc:** It provides options for all the arc elements.
- **Options:** It provides options for the whole chart

We need to use **type: "pie"** for creating the pie chart.

Example

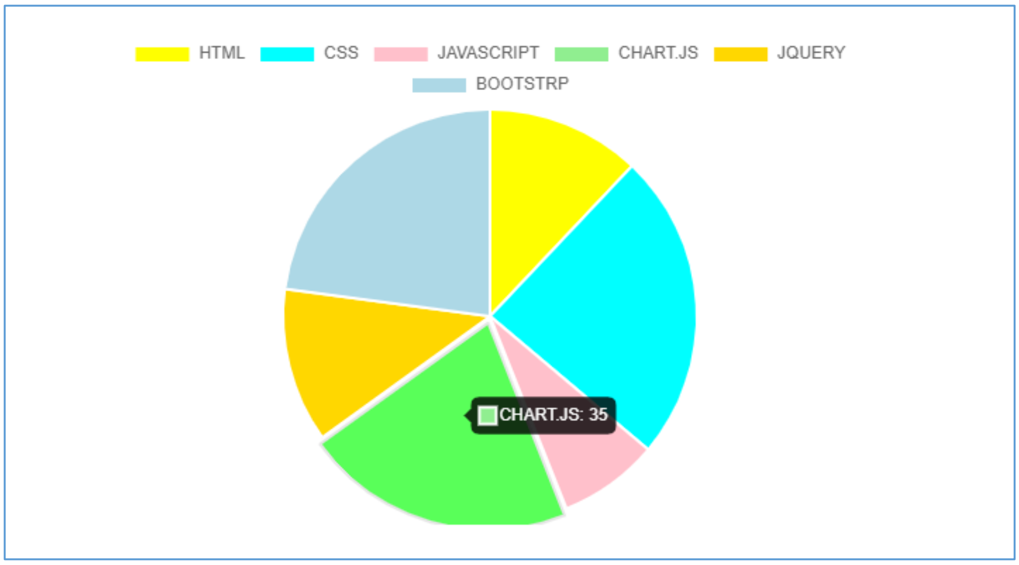
Let's take an example with the help of which we will create a pie chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
```

```
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>


    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'pie',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 13, 35, 20, 38],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                    hoverOffset: 5
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following pie chart as the output:


HTML
CSS
JAVASCRIPT
CHART.JS
JQUERY
BOOTSTRP
CHART.JS: 35

17. Chart.js – Polar Area Chart

Chart.js polar area charts are like pie charts. The only difference is that in polar area charts, each segment has the same angle i.e., the radius of the segment differs according to the value. If you want to show a comparison between data but also want to show a scale of values for context, polar area chart is an excellent choice.

Below are the namespaces to be used in polar area chart for dataset properties:

- **data.datasets[index]:** It provides options for this dataset only.
- **options.datasets.polarArea:** It provides options for all polarArea datasets.
- **options.elements.arc:** It provides options for all the arc elements.
- **Options:** It provides options for the whole chart

We need to use **type: "polar"** for creating the polar area chart.

Example

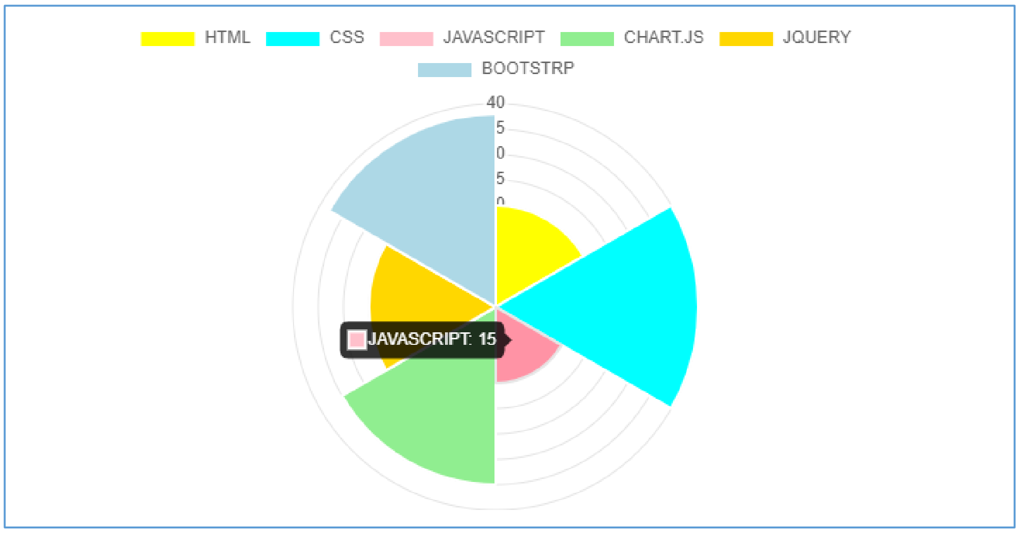
Let’s take an example with the help of which we will create a polar area chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="350"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
```

```
        var chartId = new Chart(chrt, {
            type: 'polarArea',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 15, 35, 25, 38],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following output:



18. Chart.js – Bubble Chart

Chart.js provides us a way to display three dimensional of data at the same time with the help of bubble chart. First two dimensions of the bubble and corresponding horizontal and vertical axes determines the location of the bubble in chart. Whereas the third dimension is represented by the size of the bubble.

Below are the namespaces to be used in bubble chart for dataset properties:

- **`data.datasets[index]`**: It provides options for this dataset only.
- **`options.datasets.bubble`**: It provides options for all bubble datasets.
- **`options.elements.point`**: It provides options for all the point elements.
- **`Options`**: It provides options for the whole chart

We need to use **type: "bubble"** for creating the bubble chart.

Example

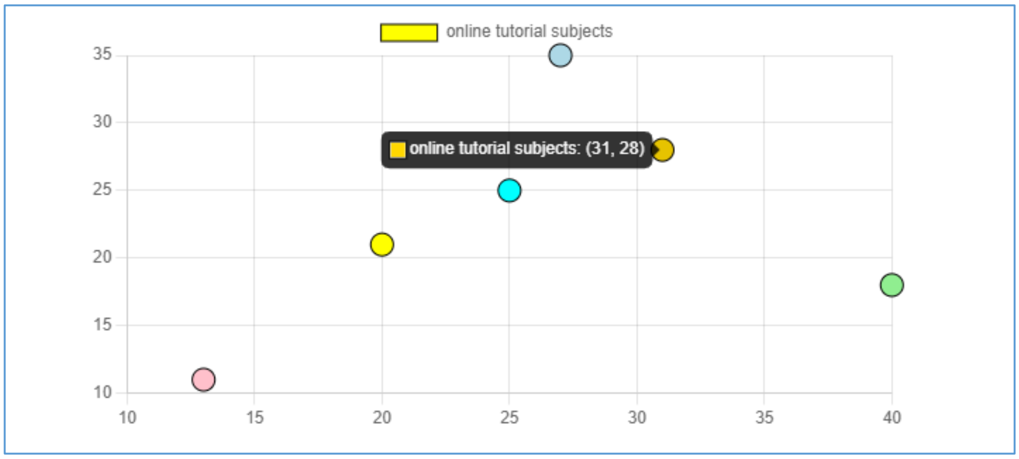
Let's take an example with the help of which we will create a bubble chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="300"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>


    <script>
```

```
        var chrt = 
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bubble',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT", 
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [{
                            x: 20,
                            y: 21,
                            z: 20
                        },
                        {
                            x: 25,
                            y: 25,
                            z: 25
                        },
                        {
                            x: 13,
                            y: 11,
                            z: 25
                        },
                        {
                            x: 40,
                            y: 18,
                            z: 25
                        },
                        {
                            x: 31,
                            y: 28,
                            z: 25
                        },
                        {
                            x: 27,
                            y: 35,
                            z: 35
                        }
                    ],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                    borderColor: ['black'],
                    radius: 8,
                }],
            },
            options: {
                responsive: false,
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following output:



19. Chart.js – Scatter Chart

Chart.js scatter charts are basically based on simple line charts but their X-axis is changed to a linear axis. While creating a scatter chart, you must pass the data as objects containing X and Y properties.

Following are the namespaces to be used in bubble chart for dataset properties:

- **data.datasets[index]:** It provides options for this dataset only.
- **options.datasets.scatter:** It provides options for all scatter datasets.
- **options.datasets.line:** It provides options for all line datasets.
- **options.elements.point:** It provides options for all the point elements.
- **Options:** It provides options for the whole chart

We need to use **type: "scatter"** for creating the scatter chart.

Example

Let's take an example with the help of which we will create a scatter chart:

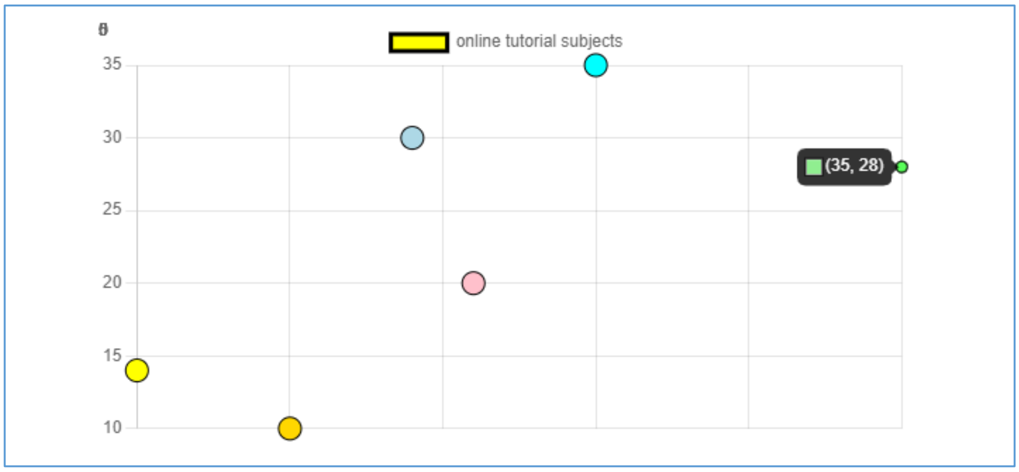
```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="300"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
```

```
        var chrt = 
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'scatter',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [
                        {x: 10, y: 14},
                        {x: 25, y: 35},
                        {x: 21, y: 20},
                        {x: 35, y: 28}
                        {x: 15, y: 10},
                        {x: 19, y: 30}
                    ],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                    borderColor: ['black'],
                    radius: 8,
                }],
            },
            options: {
                responsive: false,
                scales: {
                    x: {
                        type: 'linear',
                        position: 'bottom,'
                    }<!DOCTYPE>
<html>


<head>
```

```
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="300"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'scatter',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [
                        {x:10, y:14},
                        {x:25, y:35},
                        {x:21, y:20},
                        {x:35, y:28},
                        {x:15, y:10},
                        {x:19, y:30},
                    ],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                    borderColor: ['black'],
                    radius: 8,
                }],
            },
            options: {
                responsive: false,
                scales: {
                    x: {
                        type: 'linear',
                        position: 'bottom,'
                    }
                }
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following output:



20. Chart.js – Mixed Chart

Chart.js also provides us a facility to create charts having combination of two or different chart types. Such charts are called mixed charts. One of the most common examples of chart.js mixed chart is a bar chart including a line dataset.

Syntax

The syntax for creating a mixed chart is given below:

```
type: 'scatter',
datasets: [
    { type: 'scatter', data: value, },
    { type: 'bar', data: value, },
]
```

Example

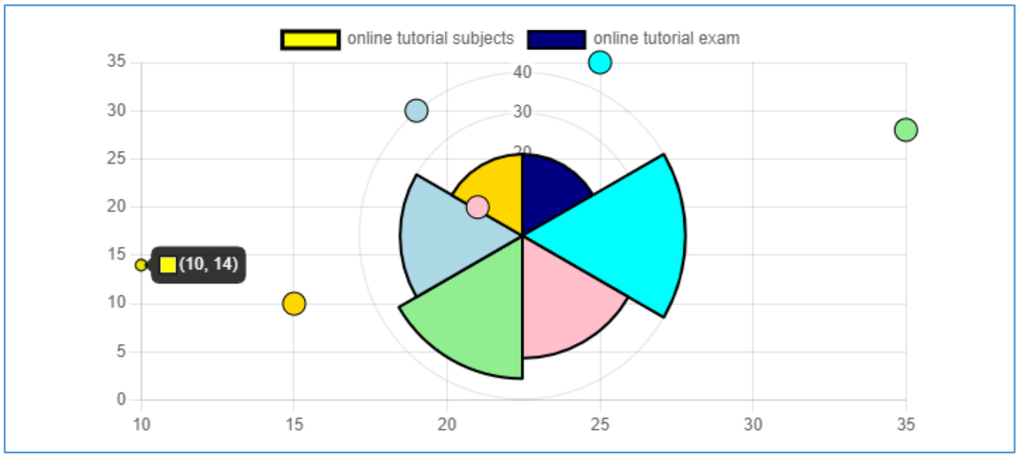
Let's take an example with the help of which we will create a mixed chart:

```
<!DOCTYPE>
<html>

<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width, 
initial-scale=1" />
    <title>chart.js</title>
</head>

<body>

    <canvas id="chartId" aria-label="chart" height="300" 
width="580"></canvas>
```

```
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>


    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'scatter',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                        type: 'scatter',
                        label: "online tutorial subjects",
                        data: [
                            {x:10, y:14},
                            {x:25, y:35},
                            {x:21, y:20},
                            {x:35, y:28},
                            {x:15, y:10},
                            {x:19, y:30}
                        ],
                        backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'gold', 'lightblue'],
                        borderColor: ['black'],
                        radius: 8,
                    },
                    {
                        type: 'polarArea',
                        label: "online tutorial exam",
                        data: [20, 40, 30, 35, 30, 20],
                        backgroundColor: ['navy', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],
                        borderColor: ['black'],
                        borderWidth: 2,
                        pointRadius: 5,
                    }
                ],
            },
            options: {
                responsive: false,
                scales: {
                    y: {
                        beginAtZero: true
                    }
                }
            },
        });
    </script>
</body>
</html>
```

Output

It will produce the following output:



21. Chart.js – Cartesian Axis

For any chart or graph, axes are an integral part. Basically, axes are used to determine how our data maps to a pixel value on the chart. A cartesian chart uses 1 or more X-axis and 1 or more Y-axis to map the data points on to two-dimensional (2-D) canvas. These axes are called cartesian axes.

Cartesian axis uses "**options.scales.axis"** namespace. The syntax of using cartesian axes is given below:

```
scales: {
    x: {
        grid: {
            color: 'orange',
            borderColor: 'orange',
        }
    }
}
```

Example

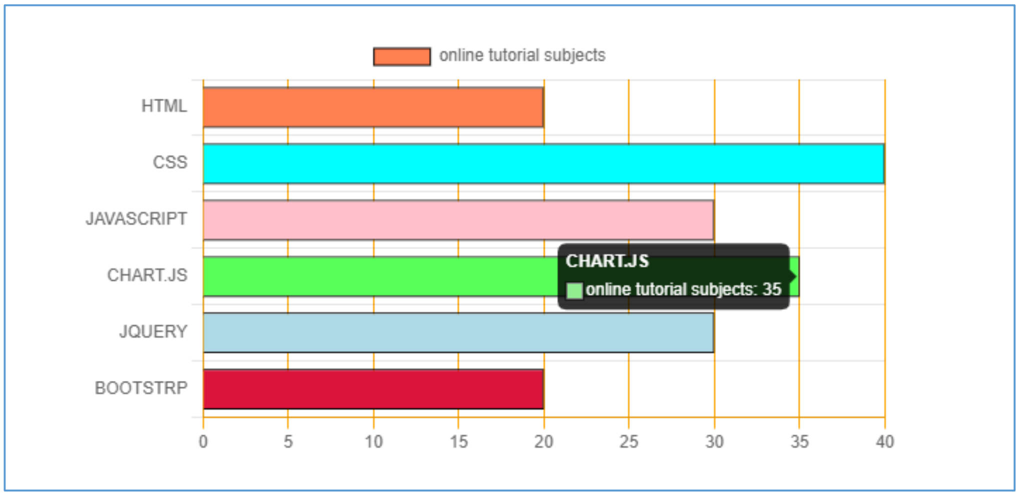
Let's take an example in which we will use Cartesian axes for creating a chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="300"
width="580"></canvas>
```

```
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>


    </script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['coral', 'aqua', 'pink',
'lightgreen', 'lightblue', 'crimson'],
                    borderColor: ['black'],
                    borderWidth: 1,
                    pointRadius: 4,
                }],
            },
            options: {
                responsive: false,
                indexAxis: 'y',
                scales: {
                    x: {
                        grid: {
                            color: 'orange',
                            borderColor: 'orange',


                        }
                    }
                }
            },
        });
    </script>
</body>

</html>
```

Output

It will produce the following output:



22. Chart.js – Category Axis

Axes are an integral part of any chart or graph. Like Cartesian axes, category axes are also an essential part of a chart.

The syntax of defining category axes **globally** is given below:

```
let chart = new Chart(ctx, {
    type: ...
    data: {
        labels: ['January', 'February', 'March', 'April',
'May', 'June'],
        datasets: ...
    }
});
```

We can define category axes **as a part of** axis as follows:

```
let chart = new Chart(ctx, {
    type: ...
    data: ...
    options: {
        scales: {
            x: {
                type: 'category',
                labels: ['January', 'February', 'March',
'April', 'May', 'June']
            }
        }
    }
});
```

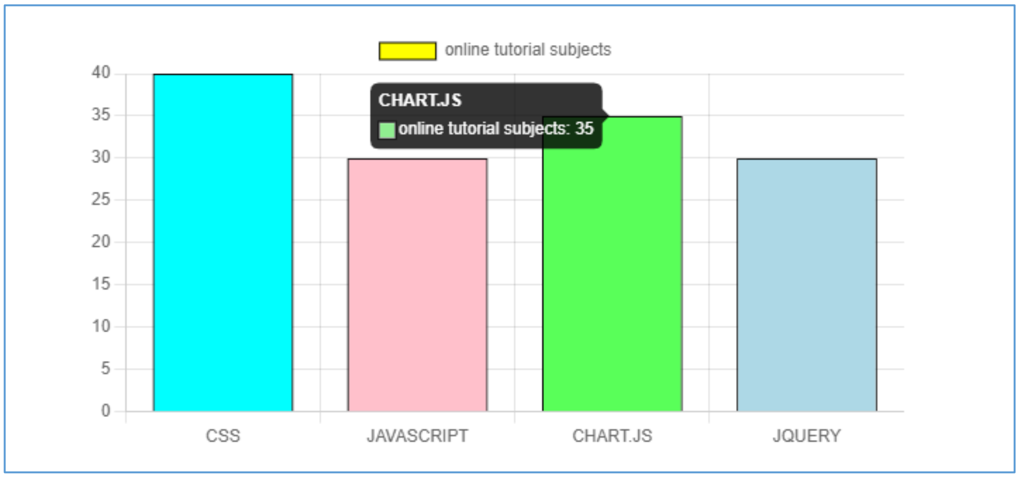
Example

Let’s take an example in which we will use category axes for creating a chart:

```
<!DOCTYPE>
<html>


<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>


<body>
    <canvas id="chartId" aria-label="chart" height="300"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/hel
pers.esm.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'bar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 30, 35, 30, 20],
                    backgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],
                    borderColor: ['black'],
                    borderWidth: 1,
                    pointRadius: 4,
                }],
            },
            options: {
                responsive: false,
                scales: {
                    x: {
                        min: 'CSS',
                        max: 'JQUERY'
                    }
                }
            },
        });
    </script>
</body>

</html>
```

Output

It will produce the following output:



23. Chart.js – Radial Axis

Radial axis is used in a radial chart such as a radar chart or polar area chart. This radial axis is basically a single axis that maps points in the angular and radial directions. Rather than being positioned on one of the edges of chart, radial axes overlay the chart area.

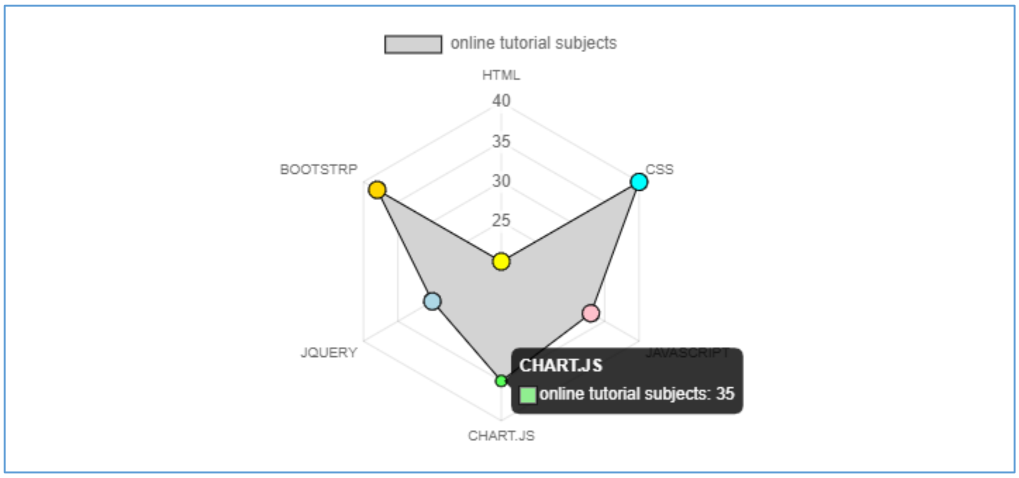
Example

Let's take an example in which we will use radial axes for creating a chart:

```
<!DOCTYPE>
<html>

<head>
    <meta charset- "UTF-8" />
    <meta name="viewport" content="width=device-width,
initial-scale=1" />
    <title>chart.js</title>
</head>

<body>
    <canvas id="chartId" aria-label="chart" height="300"
width="580"></canvas>
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.1.1/cha
rt.min.js"></script>
    <script>
        var chrt =
document.getElementById("chartId").getContext("2d");
        var chartId = new Chart(chrt, {
            type: 'radar',
            data: {
                labels: ["HTML", "CSS", "JAVASCRIPT",
"CHART.JS", "JQUERY", "BOOTSTRP"],
                datasets: [{
                    label: "online tutorial subjects",
                    data: [20, 40, 33, 35, 30, 38],
                    backgroundColor: ['lightgrey'],
                    pointBackgroundColor: ['yellow', 'aqua',
'pink', 'lightgreen', 'lightblue', 'gold'],
                    borderColor: ['black'],
                    borderWidth: 1,
                    pointRadius: 6,
                }],
            },
            options: {
                responsive: false,
                scales: {
                    r: {
                        suggestedMin: 40,
                        suggestedMax: 40
                    }
                }
            },
        });
    </script>
</body>

</html>
```

Output

It will produce the following output:


online tutorial subjects
HTML
40
35
30
25
CSS
BOOTSTRP
JQUERY
JAVASCRIPT
CHART.JS
CHART.JS
online tutorial subjects: 35