

Consider a dataset $D = \{(x_i, y_i)\}^N$ of N data points, where $x_i = (x_{i1}, x_{i2}, \dots, x_{iM})$ is a feature vector with M features, and y_i is the target, i.e., the response, variable. Let x_j denote the j th variable in feature space. A typical linear regression model can then be expressed mathematically as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_M x_M$$

This model assumes that the relationships between the target variable y_i and features x_j are linear and can be captured in slope terms $\beta_1, \beta_2, \dots, \beta_M$.

```
$y$ { color: red }
```

Consider a dataset $D = \{(x_i, \mathbf{y}_i)\}^N$ of N data points, where $x_i = (x_{i1}, x_{i2}, \dots, x_{iM})$ is a feature vector with M features, and \mathbf{y}_i is the target, i.e., the response, variable. Let x_j denote the j th variable in feature space. A typical linear regression model can then be expressed mathematically as:

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This model assumes that the relationships between the target variable \mathbf{y}_i and features x_j are linear and can be captured in slope terms $\beta_1, \beta_2, \dots, \beta_M$.

```
$y$, *.target { color: red }
```

features, and y is the target, i.e., the response, variable. Let

```
$y$, *.target { color: DarkRedCrimson }
```

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```
$y$, $y_*$$, *.target { color: Crimson }
```


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```
$y_?$, $y$, *.target { color: Crimson }  
$x_*$, *.feat { color: DodgerBlue }  
$\beta_*$, *.slope { color: MediumPurple }
```

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```
$y_?$, $y$, *.target { color: Crimson      }  
$x_*$, *.feat          { color: DodgerBlue   }  
$\beta_*$, *.slope     { color: MediumPurple }  
$\beta_0$              { color: inherit      }
```

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_M x_M$$

```
$y$ { label: target }
```

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_M x_M$$

|

target

```
$y$           { label: target      }
$\beta_0$      { label: intercept  }
$\beta_{?}^{nth(1)}$ { label: slope term }
$x_1$ {
    label: feature;
    label-position: below
}
$M$ { label: # of features }
```


$$\begin{array}{ccccccc}
 & & \text{intercept} & & \text{slope} & & \\
 & & & & \text{term} & & \\
 & \diagdown & & \diagup & & & \\
 y = & \beta_0 & + & \beta_1 x_1 & + & \beta_2 x_2 & + \cdots + \beta_M x_M \\
 | & & & | & & & | \\
 \text{target} & & & \text{feature} & & & \# \text{ of} \\
 & & & & & & \text{features}
 \end{array}$$