

Consider a dataset $D = (\mathbf{x}_i, y_i)^N$ of N data points, where $\mathbf{x}_i = (x_{i1}, x_{i2}, \dots, x_{iM})$ 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:

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

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prediction
vector

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 $\beta_1, \beta_2, \dots, \beta_M$.