How to Perform Power Regression: A Step-by-Step Guide

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Power regression is a type of regression analysis that is used to find the relationship between a dependent variable and one or more independent variables. It is done by fitting a power function of the form y = a*x^b to the data points. The parameters a and b are then estimated using the least squares method. Power regression can be used to model data that follows a power law, and can also be used to model non-linear relationships between variables.

@import url('https://fonts.googleapis.com/css?family=Droid+Serif|Raleway');

h1 {
text-align: center;
font-size: 50px;
margin-bottom: 0px;
font-family: 'Raleway', serif;
}

p {
color: black;
margin-bottom: 15px;
margin-top: 15px;
font-family: 'Raleway', sans-serif;
}

#words {
padding-left: 30px;
color: black;
font-family: Raleway;
max-width: 550px;
margin: 25px auto;
line-height: 1.75;
}

#words_summary {
padding-left: 70px;
color: black;
font-family: Raleway;
max-width: 550px;
margin: 25px auto;
line-height: 1.75;
}

```
#words_text {
color: black;
font-family: Raleway;
max-width: 550px;
margin: 25px auto;
line-height: 1.75;
}

#words_text_area {
display:inline-block;
color: black;
font-family: Raleway;
max-width: 550px;
margin: 25px auto;
line-height: 1.75;
padding-left: 100px;
}

#calcTitle {
text-align: center;
font-size: 20px;
margin-bottom: 0px;
font-family: 'Raleway', serif;
}

#hr_top {
width: 30%;
margin-bottom: 0px;
border: none;
height: 2px;
color: black;
background-color: black;
}

#hr_bottom {
width: 30%;
margin-top: 15px;
border: none;
height: 2px;
color: black;
```

```
background-color: black;
}

#words_table label, input {
display: inline-block;
vertical-align: baseline;
width: 350px;
}

#button {
border: 1px solid;
border-radius: 10px;
margin-top: 20px;

cursor: pointer;
outline: none;
background-color: white;
color: black;
font-family: 'Work Sans', sans-serif;
border: 1px solid grey;
/* Green */
}

#button:hover {
background-color: #f6f6f6;
border: 1px solid black;
}

#words_table {
color: black;
font-family: Raleway;
max-width: 350px;
margin: 25px auto;
line-height: 1.75;
}

#summary_table {
color: black;
font-family: Raleway;
max-width: 550px;
margin: 25px auto;
```

```
line-height: 1.75;
padding-left: 20px;
}

.label_radio {
text-align: center;
}

td, tr, th {
border: 1px solid black;
}
table {
border-collapse: collapse;
}
td, th {
min-width: 50px;
height: 21px;
}
.label_radio {
text-align: center;
}

#text_area_input {
padding-left: 35%;
float: left;
}

svg:not(:root) {
overflow: visible;
}

#a {
font-size:14px;
}
```


This calculator produces a power regression equation based on values for a predictor variable and a response variable.

This equation takes on the following form:

y = axb

To find a power regression equation, simply enter a list of values for a predictor variable and a response variable in the boxes below, then click the Calculate" button:

Predictor values:

6, 7, 7, 8, 12, 14, 15, 16, 16, 19

Response values:

14, 15, 15, 17, 18, 18, 19, 24, 25, 29

Power Regression Equation:

y = 5.4151x0.5184

```
function calc() {

//get input data
var x_hold = document.getElementById('x').value.split(',').map(Number);
var y_hold = document.getElementById('y').value.split(',').map(Number);
var x = ;
var y = ;

for(var i=0; i<y_hold.length; i++) {
y = Math.log10(y_hold);
}

for(var i=0; i<x_hold.length; i++) {
x = Math.log10(x_hold);
}

//check that both lists are equal length
if (x.length - y.length == 0) {
document.getElementById('error_msg').innerHTML = '';

function linearRegression(y,x){
var lr = {};
var n = y.length;
var sum_x = 0;
var sum_y = 0;
var sum_xy = 0;
var sum_xx = 0;
```

```
var sum_yy = 0;

for (var i = 0; i < y.length; i++) {

sum_x += x;
sum_y += y;
sum_xy += (x*y);
sum_xx += (x*x);
sum_yy += (y*y);
}

lr = (n * sum_xy - sum_x * sum_y) / (n*sum_xx - sum_x * sum_x);
lr = (sum_y - lr.slope * sum_x)/n;
lr = Math.pow((n*sum_xy - sum_x*sum_y)/Math.sqrt((n*sum_xx-sum_x*sum_x)*(n*sum_yy-sum_y*sum_y)),2);

return lr;
}
var lr = linearRegression(y, x);
var a = lr.slope;
var b = lr.intercept;

var first = Math.pow(10, b);
var second = Math.pow(10, a);

document.getElementById('a').innerHTML = a.toFixed(4);
document.getElementById('b').innerHTML = first.toFixed(4);
}

//output error message if boths lists are not equal
else {
document.getElementById('error_msg').innerHTML = 'The two lists must be of equal length.';
}

} //end calc function
```