
How GenIQ Works

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GenIQ[®]

~ The GenIQ Model ~

The GenIQ Model© is a machine learning alternative model to the statistical ordinary least squares and logistic regression models. GenIQ let's the data define the model – automatically data mines for new variables, performs variable selection, and then specifies the model equation – so as to "optimize the decile table," to fill the upper deciles with as much profit/many responses as possible.

In this illustration, GenIQs optimizing of the deciles is equivalent to predicting the best possible ranking (permitted by the data) of the target variable based on the GenIQ Model score **GenIQvar**.

OBJECTIVE #1: To build a **binary response** model with data from Table 1.

I built a logistic regression model (LRM) for predicting the target variable Response using two predictor variables, XX1 and XX2.

The LRM equation is:

$$\text{Logit of Response (=Yes)} = 0.1978 - 0.0328 * \text{XX1} + 0.0308 * \text{XX2}$$

Table 1

<u>ID</u>	<u>XX1</u>	<u>XX2</u>	<u>Response</u>
1	31	38	Yes
2	12	30	No
3	35	21	Yes
4	23	30	No
5	45	37	No
6	16	13	No
7	45	5	Yes
8	30	30	Yes
9	6	10	Yes
10	30	10	No

LRM RESULTS: The Response **ranking is not perfect.**

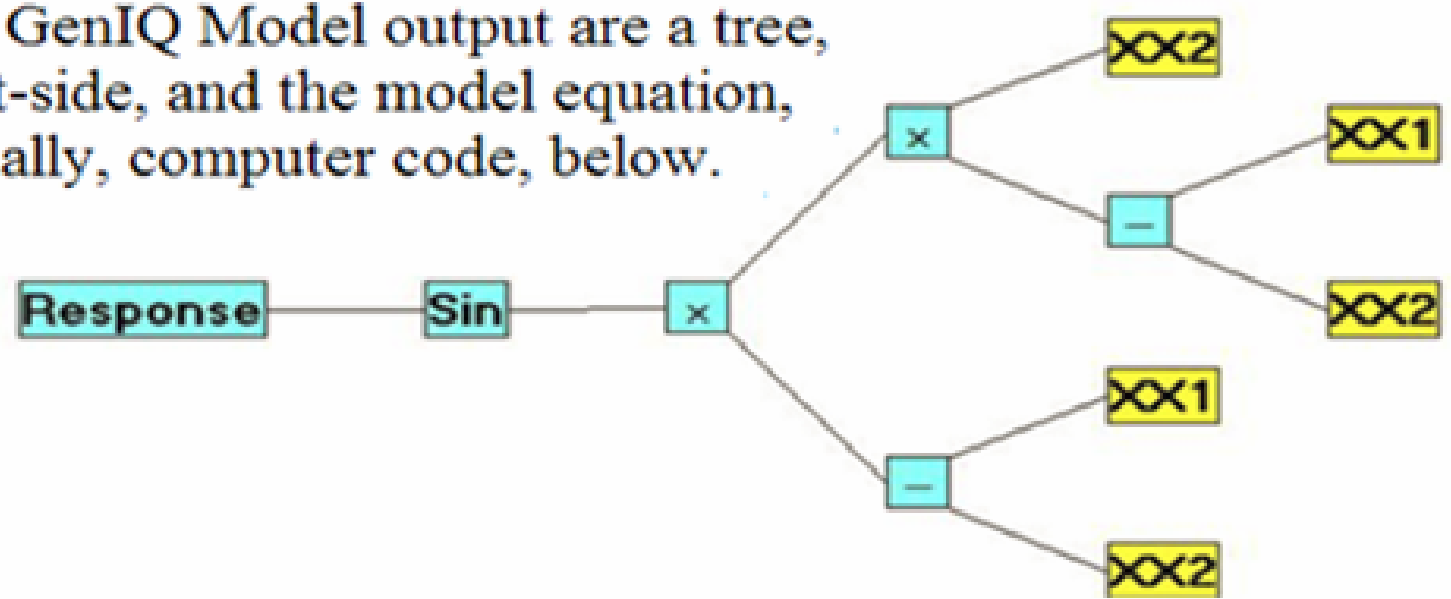
The ranking of Response based on the LRM probability score, Prob_of_Response, which is obtained directly from the LRM logit score, is in Table 2, below. Clearly, the Yes-No ordering is not perfect; amusingly, it seems random!

Table 2

<u>ID</u>	<u>XX1</u>	<u>XX2</u>	<u>Response</u>	<u>Prob_of_Response</u>
7	45	5	Yes	0.75472
10	30	10	No	0.61728
3	35	21	Yes	0.57522
5	45	37	No	0.53452
6	16	13	No	0.48164
8	30	30	Yes	0.46556
9	6	10	Yes	0.42336
1	31	38	Yes	0.41299
4	23	30	No	0.40913
2	12	30	No	0.32557

I built a GenIQ Model to predict Response (=Yes) using XX1, XX2 within data in Table 1.

The GenIQ Model output are a tree, right-side, and the model equation, actually, computer code, below.



```
x1 = XX2;  
    x2 = XX1;  
x1 = x2 - x1;  
    x2 = XX2;  
    x3 = XX1;  
    x2 = x3 - x2;  
    x3 = XX2;  
    x2 = x2 * x3;  
x1 = x1 * x2;  
x1 = Sin(x1);  
GenIQvar = x1;
```

Equivalent expression of the computer-code/ equation, right-side, is:
$$\text{Sin} [(XX2 * (XX1 - XX2)) * (XX1 - XX2)]$$

GenIQ RESULTS: The Response ranking is perfect!

The ranking of Response based on the GenIQ Model score **GenIQvar** (which is a **unitless number**: the larger the value the greater the probability of response) is in Table 3, below. The Yes-No ordering is the best possible: All the Yeses are followed by all the Noes (or Nos). (*Unabridged*. Merriam-Webster, 2002)

Table 3

ID	XX1	XX2	Response	GenIQvar
7	45	5	Yes	0.99784
1	31	38	Yes	0.82173
3	35	21	Yes	0.49134
9	6	10	Yes	0.21943
8	30	30	Yes	0.00000
2	12	30	No	-0.08756
4	23	30	No	-0.26226
10	30	10	No	-0.68350
5	45	37	No	-0.68955
6	16	13	No	-0.68970

I would greatly appreciate your comments about this "compelling illustration" of GenIQ, and a second one (click [here](#)). Please [email](#) me.

Thank you.

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