

A Most Compelling Illustration of the GenIQ Model

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~ 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: To build a continuous profit model with data from Table 1.
I built an ordinary least squares regression model (OLS) for predicting the target variable Profit using two predictor variables, XX1 and XX2.

The OLS equation is:

$$\text{Profit_est} = 2.42925 + 0.16972 * \text{XX1} - 0.06331 * \text{XX2}$$

Table 1

<u>ID</u>	<u>XX1</u>	<u>XX2</u>	<u>Profit</u>
1	45	5	10
2	32	33	9
3	33	38	8
4	32	23	7
5	10	6	6
6	46	38	5
7	25	12	4
8	23	30	3
9	5	5	2
10	12	30	1

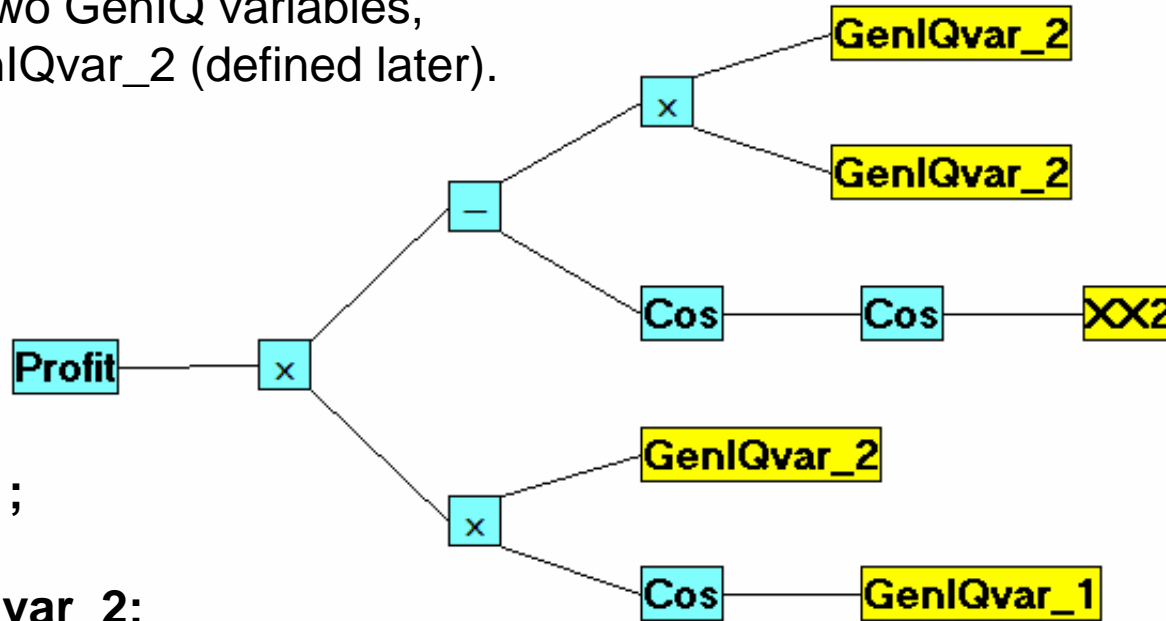
OLS RESULTS: The Profit ranking is not perfect.

The ranking of Profit based on the OLS Profit score, Profit_est, is in Table 2, below. Clearly, the Profit ordering is not perfect.

Table 2

<u>ID</u>	<u>XX1</u>	<u>XX2</u>	<u>Profit</u>	<u>Profit est</u>
1	45	5	10	9.74991
6	46	38	5	7.83047
4	32	23	7	6.40407
7	25	12	4	5.91245
2	32	33	9	5.77099
3	33	38	8	5.62417
8	23	30	3	4.43348
5	10	6	6	3.74656
9	5	5	2	2.96129
10	12	30	1	2.56660

I built a GenIQ Model to predict Profit using XX1 and XX2 with data in Table 1. The GenIQ Model tree display and model equation (code) are below. Note: There are two GenIQ variables, GenIQvar_1, GenIQvar_2 (defined later).



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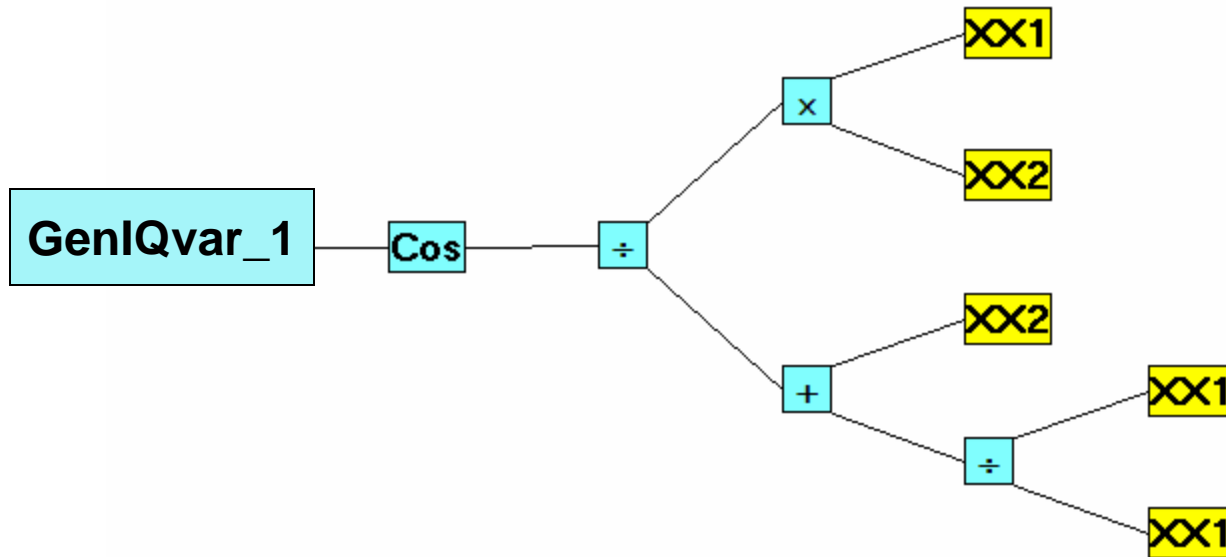
x1 = GenIQvar_1;
x1 = Cos(x1);
x2 = GenIQvar_2;
x1 = x1 * x2;
x2 = XX2;
x2 = Cos(x2);
x2 = Cos(x2);
x3 = GenIQvar_2;
x4 = GenIQvar_2;
x3 = x3 * x4;
x2 = x3 - x2;
x1 = x1 * x2;
GenIQvar = x1;
  
```

GenIQ RESULTS: The Profit ranking is perfect!

The ranking of Profit based on the GenIQ Model score **GenIQvar** (which is a unitless number: the larger the value the greater the contribution of profit) is in Table 3, below. Regarding the “reuse” of the data to build two “sub” GenIQ models in defining the final GenIQ Model is a consequence of the *knottiness* of the seemingly simple, small data in Table 1.

Table 3

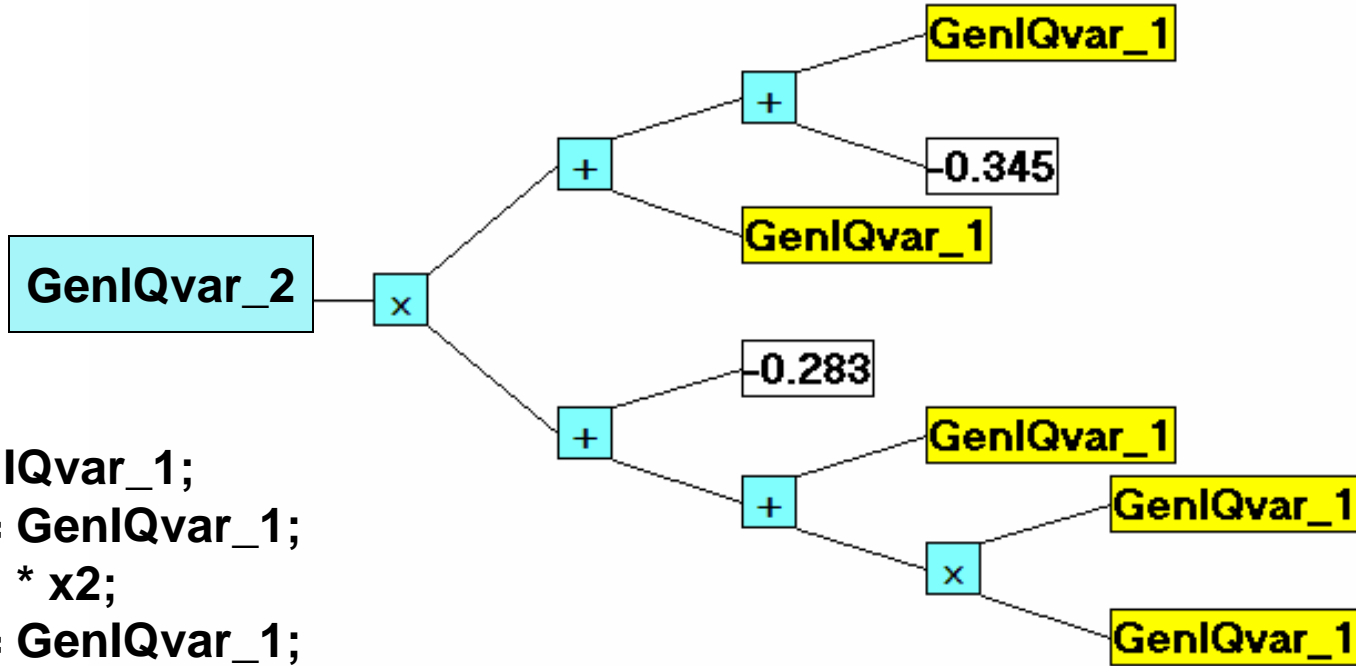
<u>ID</u>	<u>XX1</u>	<u>XX2</u>	<u>Profit</u>	<u>GenIQvar</u>
1	45	5	10	9.27644
2	32	33	9	6.22359
3	33	38	8	0.60790
4	32	23	7	0.29207
5	10	6	6	0.09151
6	46	38	5	0.06930
7	25	12	4	-0.12350
8	23	30	3	-0.19258
9	5	5	2	-0.26727
10	12	30	1	-0.31133



```

x1 = XX1;
  x2 = XX1;
If x1 NE 0 Then x1 = x2 / x1; Else x1 = 1;
  x2 = XX2;
x1 = x1 + x2;
  x2 = XX2;
  x3 = XX1;
  x2 = x2 * x3;
If x1 NE 0 Then x1 = x2 / x1; Else x1 = 1;
x1 = Cos(x1);
GenIQvar_1 = x1;

```



```

x1 = GenIQvar_1;
  x2 = GenIQvar_1;
x1 = x1 * x2;
  x2 = GenIQvar_1;
x1 = x1 + x2;
  x2 = -.2825809;
x1 = x1 + x2;
  x2 = GenIQvar_1;
  x3 = -.3450809;
  x4 = GenIQvar_1;
  x3 = x3 + x4;
  x2 = x2 + x3;
x1 = x1 * x2;
GenIQvar_2 = x1;

```

I would greatly appreciate your comments about this "compelling illustration" of GenIQ. Please [email](#) me. Thank you. Bruce