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1.For a 3 way table What would the calculation look like in terms for breaking it into a series of 1 way anova and calculating SS. (HINT: SSE2 for each 2 way table isn't SSE for 3 way table or for each other, but subtraction works if you keep carefull track!)

$SS_{AB} = SST_{AB} - SS_A - SS_B - SSE(2way)$
$SS_{BC} = SST_{BC} - SS_B - SS_C - SSE(2way)$
$SS_{AC} = SST_{AC} - SS_A - SS_C - SSE(2way)$

$SS_{ABC} = SST_{ABC} - SS_A - SS_B - SS_C - SS_{AB} - SS_{BC} - SS_{AC} - SS_{ABC} - SSE(3way)$

$SST = SS_A + SS_B + SS_C + SS_{AB} + SS_{BC} + SS_{AC} + SS_{ABC} + SSE$

2.In a k-way anova: (k>3)

a)How many 2 way interactions are possible

b)How many 3 way interactions are possible

For two way interactions, there are k choices for the first variable and k-1 choices for the second variable. By multiplying them together, we get the total number of two way combinations. However, each interaction is counted twice because its reverse is counted (ex: AB and BA are both counted, but they both represent the same interaction effect between variables A and B). Therefore, we divide by 2 to get the total number of unique combinations.
Two way interactions:

$$\frac{k(k-1)}{2}$$

For three way interactions, there are k choices for the first variable, k-1 choices for the second variable, and k-2 choices for the third variable. By multiplying them together, we get the total number of three way combinations. However, each interaction is counted six times because of order differences (ex: ABC is also counted as ACB, BAC, BCA, CAB, CBA, but they all represent the same interaction effect between variables A, B, and C). Therefore, we divide by 6 to get the total number of unique combinations.
Three way interactions:

$$\frac{k(k-1)(k-2)}{6}$$

3.Using mquiz, the first two columns are the factors, the rest are characteristics of cars. Analyze

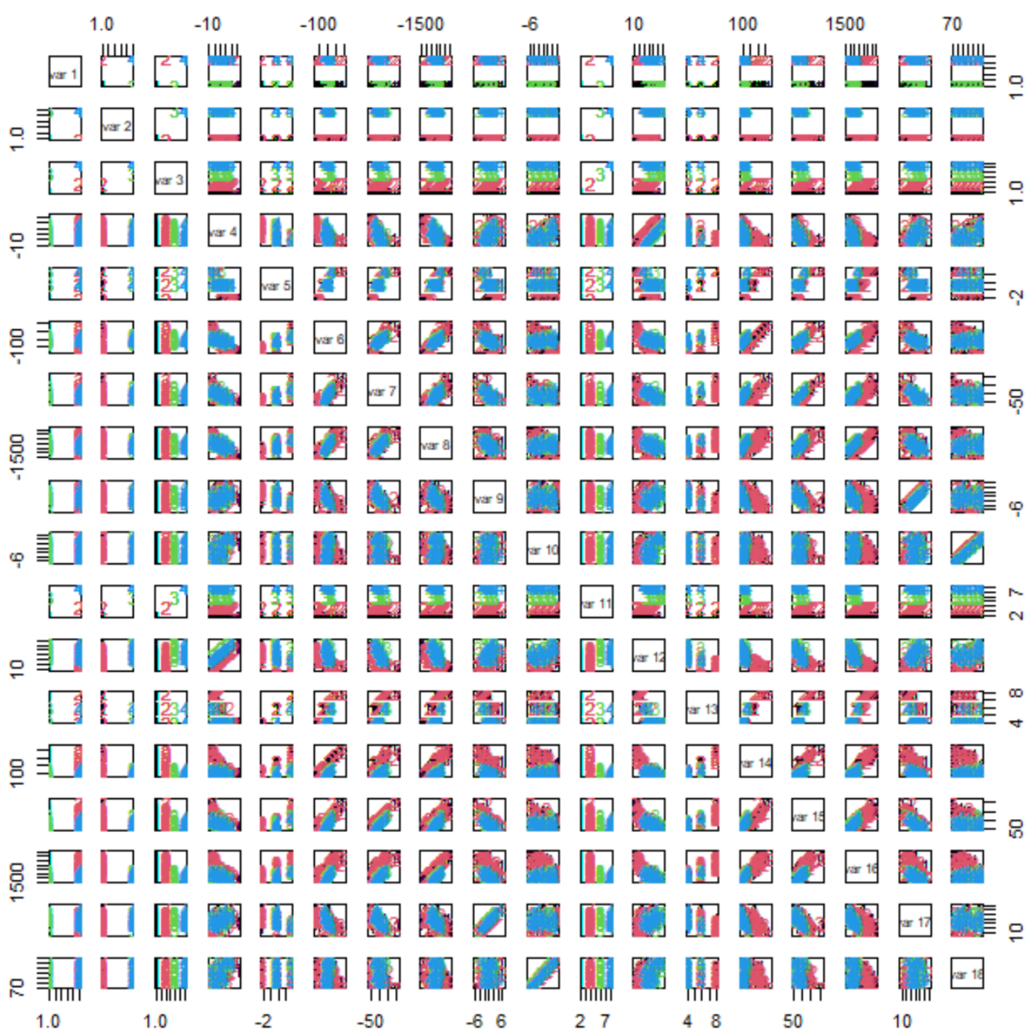
a)Find significant terms in the manova

b)Examine residual and residual vs mean plots for anything interesting (don't show every one but look through some to see if any patterns jump at you),

```
> dum<-gui.multiway.manova.test.portmanteau()
[1] "mquiz"  "c(1:2)" "10000"
> dum$p
$p
[1] 0.9898 0.0000 0.0686
>dum$cp
$cp
[1] 0.9898 0.0000 0.0686
```

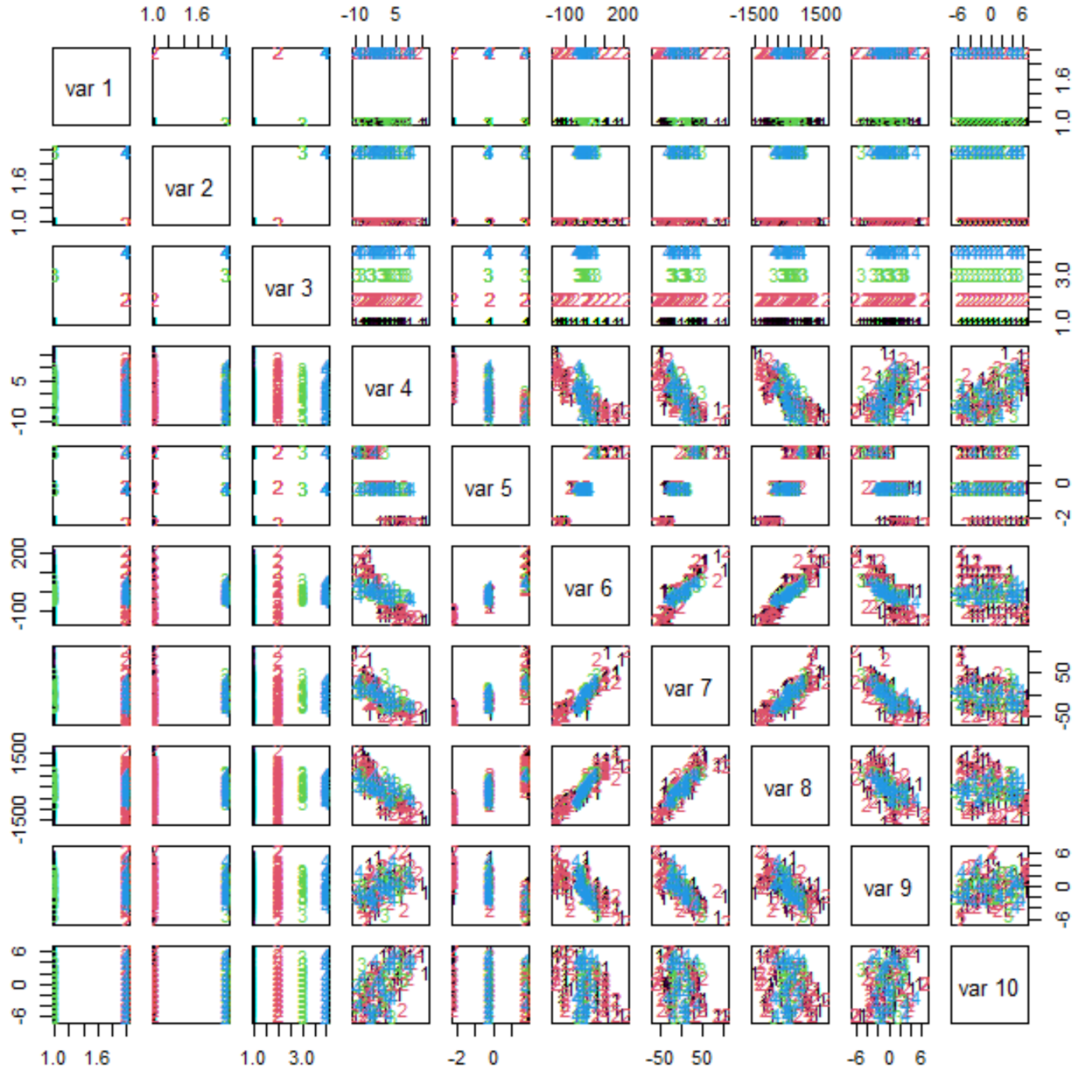
The p values at significance value of 0.05 show that col 2s effect and the interaction effect between the two col is significant.

Resid Mean Plot:



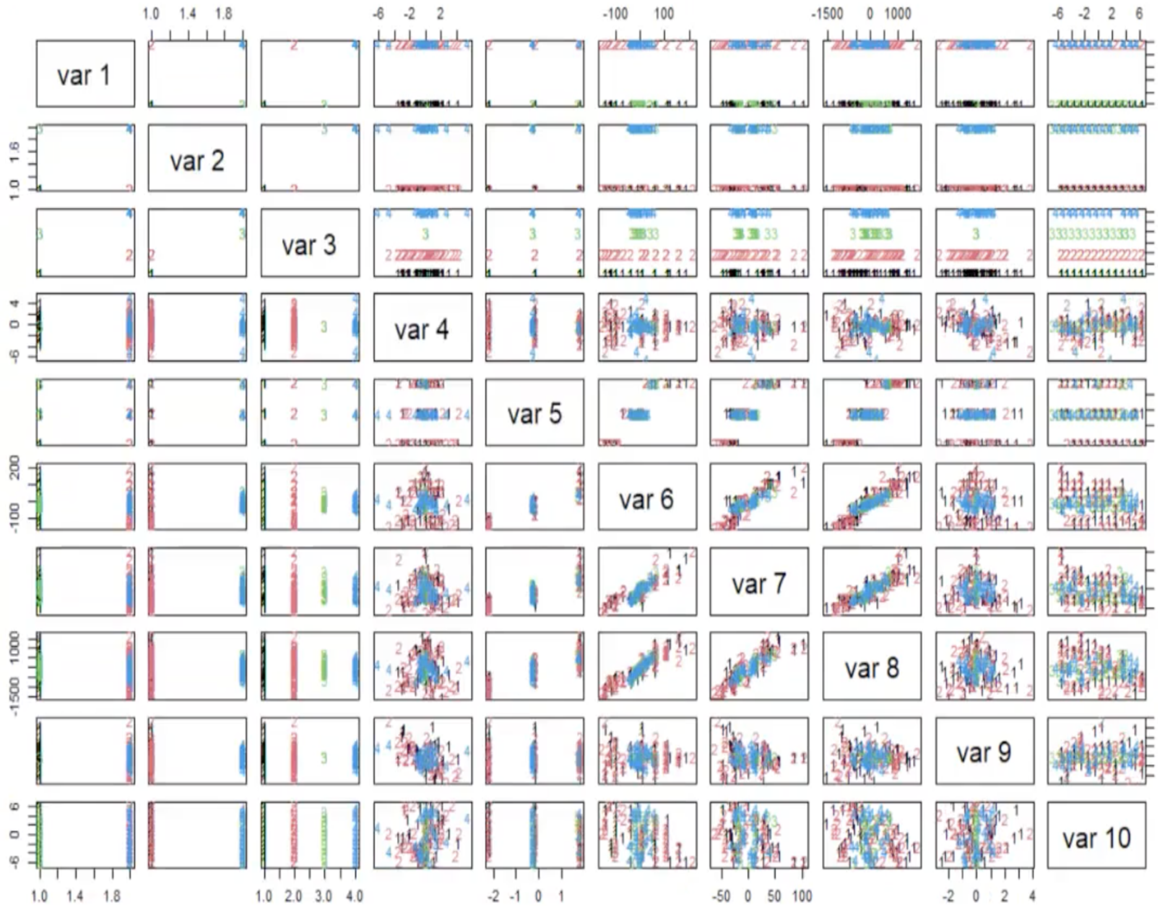
Difficult to read/use to observe any interesting interactions. Move on to Residplot2

> out<-Residplot2(dum,mquiz,c(1,2),1)



Gui pops up and input the following:
[1] "m99a3" "c(4,9)" "c(6,8)" "3"

After choosing the x and y columns in the grid that depict interesting behavior like curvature and running the gui, We are left with the following plot, all the interesting points have been removed and the interactions have become more normal and the curvature that they had at first exhibited have been removed. After the permutations have been completed, the SSE values for the smooth are much smaller than the linear reg because smooth does a better job fitting plots.


var 1
var 2
var 3
var 4
var 5
var 6
var 7
var 8
var 9
var 10