

```

libname project 'C:\Users\sxp167931\Desktop\SAS\project';run;

proc means data=project.tgif;
run;

proc standard data=project.tgif mean=0 std=1 out=project.standard;
var
points_ratio email_send email_open_rate email_click_rate email_forward_rate
rest_loc_Merch rest_loc_Open rest_loc_Patio
rest_loc_Rest rest_loc_rm_serv rest_loc_Take_out rest_loc_cafe rest_loc_unkn
time_breakfast time_dinner time_late_nite
time_lunch time_unknown disc_app disc_beverage disc_dessert disc_employee
disc_food disc_other disc_ribs disc_sandwich
disc_ticket disc_type_bogo disc_type_comp disc_type_dolfood disc_type_empl
disc_type_free disc_type_other disc_type_pctfood
disc_chan_comp disc_chan_demo disc_chan_empl disc_chan_entbk disc_chan_gmms
disc_chan_gps disc_chan_laten disc_chan_local
disc_chan_other disc_chan_part disc_chan_smart disc_chan_valc disc_chan_value
disc_pct_tot disc_pct_trans items_tot_distinct
items_tot net_amt_p_item checks_tot net_sales_p_chck net_sales_tot
fd_cat_alcoh fd_cat_app fd_cat_bev fd_cat_brunc fd_cat_buffe
fd_cat_burg fd_cat_combo fd_cat_dess fd_cat_drink fd_cat_h_ent fd_cat_kids
fd_cat_l_ent fd_cat_other fd_cat_side fd_cat_soupsal
fd_cat_steak days_between_trans tenure_day age guests_last_12mo ;
run;

PROC SORT DATA = project.standard;
BY customer_number; RUN;
proc fastclus data = project.standard
maxclusters = 200 out = clus_final outseed=seed2;
var
points_ratio email_send email_open_rate email_click_rate email_forward_rate
rest_loc_Merch rest_loc_Open rest_loc_Patio
rest_loc_Rest rest_loc_rm_serv rest_loc_Take_out rest_loc_cafe rest_loc_unkn
time_breakfast time_dinner time_late_nite
time_lunch time_unknown disc_app disc_beverage disc_dessert disc_employee
disc_food disc_other disc_ribs disc_sandwich
disc_ticket disc_type_bogo disc_type_comp disc_type_dolfood disc_type_empl
disc_type_free disc_type_other disc_type_pctfood
disc_chan_comp disc_chan_demo disc_chan_empl disc_chan_entbk disc_chan_gmms
disc_chan_gps disc_chan_laten disc_chan_local
disc_chan_other disc_chan_part disc_chan_smart disc_chan_valc disc_chan_value
disc_pct_tot disc_pct_trans items_tot_distinct
items_tot net_amt_p_item checks_tot net_sales_p_chck net_sales_tot
fd_cat_alcoh fd_cat_app fd_cat_bev fd_cat_brunc fd_cat_buffe
fd_cat_burg fd_cat_combo fd_cat_dess fd_cat_drink fd_cat_h_ent fd_cat_kids
fd_cat_l_ent fd_cat_other fd_cat_side fd_cat_soupsal
fd_cat_steak days_between_trans tenure_day age guests_last_12mo ;
run;
data seed_final2;
set seed2;
if _freq>650;
run;

```

```

proc fastclus data=project.standard seed=seed_final2 maxc=6 least=1 out=out;
    var points_ratio checks_tot fd_cat_brunc guests_last_12mo items_tot
    email_forward_rate email_click_rate;
run;

```

```

PROC SORT DATA = work.out2; BY customer_number; RUN;

```

```

PROC SORT DATA = project.tgif; BY customer_number; RUN;

```

```

DATA NEW(KEEP = customer_number cluster);
SET work.out;
RUN;

```

```

DATA project.mergedtgif;
MERGE PROJECT.TGIF work.new;
BY CUSTOMER_NUMBER; RUN;

```

```

PROC SORT DATA = project.mergedtgif; BY cluster; RUN;

```

```

DATA project.cluster1;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=1; RUN;

```

```

DATA project.cluster2;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=2; RUN;

```

```

DATA project.cluster3;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=3; RUN;

```

```

DATA project.cluster4;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=4; RUN;

```

```

DATA project.cluster5;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=5; RUN;

```

```

DATA project.cluster6;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=6; RUN;

```

```

**Regression Models;

```

```

proc reg data = project.cluster1;
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct
net_amt_p_item checks_tot net_sales_tot days_between_trans tenure_day
guests_last_12mo /VIF COLLIN;
output out = resid1 p = PUNITS r = RUNITS student = student;

```

```
run;
```

```
proc reg data = project.cluster2;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans net_amt_p_item  
net_sales_tot days_between_trans age/VIF COLLIN;  
output out = resid2 p = PUNITS r = RUNITS student = student;  
run;
```

```
proc reg data = project.cluster3;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct  
net_amt_p_item checks_tot days_between_trans guests_last_12mo/ VIF COLLIN;  
output out = resid3 p = PUNITS r = RUNITS student = student;  
run;
```

```
proc reg data = project.cluster4;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct  
net_amt_p_item checks_tot net_sales_tot days_between_trans  
guests_last_12mo/VIF COLLIN;  
output out = resid4 p = PUNITS r = RUNITS student = student;  
run;
```

```
proc reg data = project.cluster5;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct  
net_amt_p_item net_sales_tot days_between_trans age /VIF COLLIN;  
output out = resid5 p = PUNITS r = RUNITS student = student;  
run;
```

```
proc reg data = project.cluster6;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct  
net_amt_p_item checks_tot net_sales_tot days_between_trans age/VIF COLLIN;  
output out = resid6 p = PUNITS r = RUNITS student = student;  
run;
```

```
data project.cluster11;  
set resid1;  
if student > 3.00 then delete;  
if student < -3.00 then delete;  
run;
```

```
data project.cluster12;  
set resid2;  
if student > 3.00 then delete;  
if student < -3.00 then delete;  
run;
```

```
data project.cluster13;  
set resid3;
```

```
if student > 3.00 then delete;
if student < -3.00 then delete;
run;
```

```
data project.cluster14;
set resid4;
if student > 3.00 then delete;
if student < -3.00 then delete;
run;
```

```
data project.cluster15;
set resid5;
if student > 3.00 then delete;
if student < -3.00 then delete;
run;
```

```
data project.cluster16;
set resid6;
if student > 3.00 then delete;
if student < -3.00 then delete;
run;
```

```
proc reg data = project.cluster11;
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct
net_amt_p_item checks_tot net_sales_tot days_between_trans tenure_day
guests_last_12mo /VIF COLLIN;
output out = resid1 p = PUNITS r = RUNITS student = student;
run;
```

```
proc reg data = project.cluster12;
model net_sales_p_chck = disc_pct_tot disc_pct_trans net_amt_p_item
net_sales_tot days_between_trans age/VIF COLLIN;
output out = resid2 p = PUNITS r = RUNITS student = student;
run;
```

```
proc reg data = project.cluster13;
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct
net_amt_p_item checks_tot days_between_trans guests_last_12mo/ VIF COLLIN;
output out = resid3 p = PUNITS r = RUNITS student = student;
run;
```

```
proc reg data = project.cluster14;
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct
net_amt_p_item checks_tot net_sales_tot days_between_trans
guests_last_12mo/VIF COLLIN;
output out = resid4 p = PUNITS r = RUNITS student = student;
```

```
run;
```

```
proc reg data = project.cluster15;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct  
net_amt_p_item net_sales_tot days_between_trans age /VIF COLLIN;  
output out = resid5 p = PUNITS r = RUNITS student = student;  
run;
```

```
proc reg data = project.cluster16;  
model net_sales_p_chck = disc_pct_tot disc_pct_trans items_tot_distinct  
net_amt_p_item checks_tot net_sales_tot days_between_trans age/VIF COLLIN;  
output out = resid6 p = PUNITS r = RUNITS student = student;  
run;
```

No.of Observations		R square	New R square	New No.of Observations
2119	0.7924	0.8458	2077	
1068	0.7093	0.7809	1049	
2891	0.5471	0.6769	2839	
4309	0.7891	0.8277	4243	
170	0.75	0.7713	167	
1434	0.5845	0.7097	1404	

\*Survival Analysis

```
data project.sal;  
set project.cluster1;  
censored = 0;  
if days_between_trans > 0 then censored = 1;  
run;
```

```
proc lifereg data = project.sal;  
model days_between_trans*censored(0) =  
net_amt_p_item net_sales_p_chck disc_pct_trans email_send  
  
/dist = exponentia;  
output out = out1 p=median std = s;  
run;
```

```
data project.sa2;  
set project.cluster2;  
censored = 0;  
if days_between_trans > 0 then censored = 1;  
run;
```

```
proc lifereg data = project.sa2;
model days_between_trans*censored(0) =
net_amt_p_item net_sales_p_chck disc_pct_trans email_send

/dist = exponential;
output out = out2 p=median std = s;
run;
```

```
data project.sa3;
set project.cluster3;
censored = 0;
if days_between_trans > 0 then censored = 1;
run;
```

```
proc lifereg data = project.sa3;
model days_between_trans*censored(0) =
net_amt_p_item net_sales_p_chck disc_pct_trans email_send

/dist = exponential;
output out = out3 p=median std = s;
run;
```

```
data project.sa4;
set project.cluster4;
censored = 0;
if days_between_trans > 0 then censored = 1;
run;
```

```
proc lifereg data = project.sa4;
model days_between_trans*censored(0) =
net_amt_p_item net_sales_p_chck disc_pct_trans email_send

/dist = exponential;
output out = out4 p=median std = s;
run;
```

```
data project.sa5;
set project.cluster5;
censored = 0;
if days_between_trans > 0 then censored = 1;
run;
```

```
proc lifereg data = project.sa5;
model days_between_trans*censored(0) =
net_amt_p_item net_sales_p_chck disc_pct_trans email_send
```

```

/dist = exponential;
output out = out5 p=median std = s;
run;

```

```

data project.sa6;
set project.cluster6;
censored = 0;
if days_between_trans > 0 then censored = 1;
run;

```

```

proc lifereg data = project.sa6;
model days_between_trans*censored(1) =
net_sales_tot disc_pct_trans email_send

```

```

/dist = exponential;
output out = out6 p=median std = s;
run;

```

Code for Elasticity Model

```

libname project 'H:\Abhinav\Project'; run;
proc standard data=project.tgif mean=0 std=1 out=project.standard;
var
points_ratio email_send email_open_rate email_click_rate email_forward_rate
rest_loc_Merch rest_loc_Open rest_loc_Patio
rest_loc_Rest rest_loc_rm_serv rest_loc_Take_out rest_loc_cafe rest_loc_unkn
time_breakfast time_dinner time_late_nite
time_lunch time_unknown disc_app disc_beverage disc_dessert disc_employee
disc_food disc_other disc_ribs disc_sandwich
disc_ticket disc_type_bogo disc_type_comp disc_type_dolfood disc_type_empl
disc_type_free disc_type_other disc_type_pctfood
disc_chan_comp disc_chan_demo disc_chan_empl disc_chan_entbk disc_chan_gmms
disc_chan_gps disc_chan_laten disc_chan_local
disc_chan_other disc_chan_part disc_chan_smart disc_chan_valc disc_chan_value
disc_pct_tot disc_pct_trans items_tot_distinct
items_tot net_amt_p_item checks_tot net_sales_p_chck net_sales_tot
fd_cat_alcoh fd_cat_app fd_cat_bev fd_cat_brunc fd_cat_buffe
fd_cat_burg fd_cat_combo fd_cat_dess fd_cat_drink fd_cat_h_ent fd_cat_kids
fd_cat_l_ent fd_cat_other fd_cat_side fd_cat_soupsal
fd_cat_steak days_between_trans tenure_day age guests_last_12mo ;
run;
PROC SORT DATA = project.standard;
BY customer_number; RUN;
proc fastclus data = project.standard
maxclusters = 100 out = clus_final outseed=seed2;
var
points_ratio email_send email_open_rate email_click_rate email_forward_rate
rest_loc_Merch rest_loc_Open rest_loc_Patio
rest_loc_Rest rest_loc_rm_serv rest_loc_Take_out rest_loc_cafe rest_loc_unkn
time_breakfast time_dinner time_late_nite
time_lunch time_unknown disc_app disc_beverage disc_dessert disc_employee
disc_food disc_other disc_ribs disc_sandwich
disc_ticket disc_type_bogo disc_type_comp disc_type_dolfood disc_type_empl
disc_type_free disc_type_other disc_type_pctfood

```

```

disc_chan_comp disc_chan_demo disc_chan_empl disc_chan_entbk disc_chan_gmms
disc_chan_gps disc_chan_laten disc_chan_local
disc_chan_other disc_chan_part disc_chan_smart disc_chan_valc disc_chan_value
disc_pct_tot disc_pct_trans items_tot_distinct
items_tot net_amt_p_item checks_tot net_sales_p_chck net_sales_tot
fd_cat_alcoh fd_cat_app fd_cat_bev fd_cat_brunc fd_cat_buffe
fd_cat_burg fd_cat_combo fd_cat_dess fd_cat_drink fd_cat_h_ent fd_cat_kids
fd_cat_l_ent fd_cat_other fd_cat_side fd_cat_soupsal
fd_cat_steak days_between_trans tenure_day age guests_last_12mo ;
run;
  data seed_final2;
    set seed2;
    if _freq_ > 650;
  run;
proc fastclus data=project.standard seed=seed_final2 maxc=5 least=1
out=out2(keep = customer_number cluster);
  var email_open_rate time_dinner time_late_nite
time_lunch disc_sandwich
  disc_type_bogo disc_type_dolfood disc_type_other disc_type_pctfood
  disc_chan_gmms disc_chan_gps disc_chan_value disc_pct_tot disc_pct_trans
items_tot_distinct
items_tot checks_tot net_sales_p_chck net_sales_tot fd_cat_bev
fd_cat_burg fd_cat_kids fd_cat_l_ent fd_cat_soupsal
  days_between_trans tenure_day guests_last_12mo fd_cat_alcoh;
run;
PROC SORT DATA = work.out2; BY customer_number; RUN;

PROC SORT DATA = project.tgif; BY customer_number; RUN;
DATA NEW(KEEP = customer_number cluster);
SET work.out2;
RUN;
DATA project.mergedtgif;
MERGE PROJECT.TGIF work.new;
BY CUSTOMER_NUMBER; RUN;
PROC SORT DATA = project.mergedtgif; BY cluster; RUN;
DATA project.cluster1;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=1; RUN;

DATA project.cluster2;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=2; RUN;

DATA project.cluster3;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=3; RUN;

DATA project.cluster4;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=4; RUN;

DATA project.cluster5;
SET PROJECT.MERGEDTGIF;
WHERE CLUSTER=5; RUN;

proc reg data = project.cluster1;
model items_tot = points_ratio email_open_rate disc_pct_tot disc_pct_trans

```



```

net_amt_p_item
  days_between_trans  tenure_day  guests_last_12mo fd_cat_alcoh /VIF COLLIN;
run;quit;

proc means data = project.cluster1;
var net_amt_p_item items_tot; run;

proc reg data = project.cluster2;
model items_tot = points_ratio email_open_rate  disc_pct_tot disc_pct_trans
net_amt_p_item
  days_between_trans  tenure_day  guests_last_12mo fd_cat_alcoh /VIF COLLIN;
run;quit;

proc means data = project.cluster2;
var net_amt_p_item items_tot; run;
proc reg data = project.cluster3;
model items_tot = points_ratio email_open_rate  disc_pct_tot disc_pct_trans
net_amt_p_item
  days_between_trans  tenure_day  guests_last_12mo fd_cat_alcoh /VIF COLLIN;
run;quit;

proc means data = project.cluster3;
var net_amt_p_item items_tot; run;
proc reg data = project.cluster4;
model items_tot = points_ratio email_open_rate  disc_pct_tot disc_pct_trans
net_amt_p_item
  days_between_trans  tenure_day  guests_last_12mo fd_cat_alcoh /VIF COLLIN;
run;quit;

proc means data = project.cluster4;
var net_amt_p_item items_tot; run;

proc reg data = project.cluster5;
model items_tot = points_ratio email_open_rate  disc_pct_tot disc_pct_trans
net_amt_p_item
days_between_trans  tenure_day  guests_last_12mo fd_cat_alcoh /VIF COLLIN;
run;quit;

proc means data = project.cluster5;
var net_amt_p_item items_tot; run;

proc print data = project.tgif;
sum net_sales_tot;
run;
proc print data = project.cluster1;
sum net_sales_tot;
run;
proc print data = project.cluster2;
sum net_sales_tot;
run;
proc print data = project.cluster3;
sum net_sales_tot;
run;
proc print data = project.cluster4;
sum net_sales_tot;
run;
proc print data = project.cluster5;

```

```
sum net_sales_tot;  
run;
```

### Market BAsket Analysis

```
proc means data = project.cluster3;  
var fd_cat_alcoh fd_cat_app fd_cat_beve fd_cat_brunc fd_cat_buffe  
fd_cat_burg fd_cat_combo fd_cat_dess fd_cat_drink fd_cat_h_ent fd_cat_kids  
fd_cat_l_ent fd_cat_other fd_cat_side fd_cat_soupsal  
fd_cat_steak;  
Run;
```

```
data project.product4;  
set project.cluster4;  
fd_cat_alcoh_1 = 0; fd_cat_app_1 = 0; fd_cat_beve_1 = 0; fd_cat_brunc_1 = 0;  
fd_cat_burg_1 = 0; fd_cat_buffe_1 = 0;  
fd_cat_combo_1 = 0; fd_cat_dess_1 = 0; fd_cat_drink_1 = 0; fd_cat_h_ent_1 =  
0; fd_cat_other_1 = 0;  
fd_cat_kids_1 = 0; fd_cat_l_ent_1 = 0; fd_cat_side_1 = 0; fd_cat_soupsal_1 =  
0; fd_cat_steak_1 = 0;  
if fd_cat_alcoh > 0 then fd_cat_alcoh_1 = 1;  
if fd_cat_app > 0 then fd_cat_app_1 = 1;  
if fd_cat_beve > 0 then fd_cat_beve_1 = 1;  
if fd_cat_brunc > 0 then fd_cat_brunc_1 = 1;  
if fd_cat_burg > 0 then fd_cat_burg_1 = 1;  
if fd_cat_combo > 0 then fd_cat_combo_1 = 1;  
if fd_cat_dess > 0 then fd_cat_dess_1 = 1;  
if fd_cat_drink > 0 then fd_cat_drink_1 = 1;  
if fd_cat_h_ent > 0 then fd_cat_h_ent_1 = 1;  
if fd_cat_other > 0 then fd_cat_other_1 = 1;  
if fd_cat_kids1 > 0 then fd_cat_kids_1 = 1;  
if fd_cat_l_ent > 0 then fd_cat_l_ent_1 = 1;  
if fd_cat_side > 0 then fd_cat_side_1 = 1;  
if fd_cat_soupsal > 0 then fd_cat_soupsal_1 = 1;  
if fd_cat_steak > 0 then fd_cat_steak_1 = 1;  
if fd_cat_buffe > 0 then fd_cat_buffe_1 = 1;  
Run;
```

```
proc logistic descending data = project.product4;  
model fd_cat_soupsal_1 = fd_cat_burg_1  
fd_cat_dess_1 fd_cat_steak_1 fd_cat_alcoh_1 fd_cat_kids_1 fd_cat_other_1  
fd_cat_side_1 fd_cat_beve_1  
fd_cat_app_1; run;
```