

SAS Macro for the generation of FORDNE with minimum runs

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The following SAS macro has been developed to generate a class of **First Order Rotatable Designs with Neighbour Effects** (FORDNE) in smaller number of runs as obtained in Varghese *et al.* (2018). Here, user need to **Enter the number of factors as 'k'**. If the user executes the program after entering the value of k, then the SAS Macro will produce the output in the form of a design under the heading **FORDNE in smaller runs**.

```
/* SAS Macro for the generation of FORDNE with minimum runs */
options nodate nonumber;
%let k=3; /* Enter the number of factors*/
ods rtf file= 'output.rtf' startpage=no;
proc iml;
  sss=j (&k,1,2);
  s=j (nrow(sss)-1,1,0); /* 2 level factorial*/
  do i=1 to nrow(s);
    s[i,]=sss[i,];
  end;
  If &k<2 then do;
  print 'The number factor should be >=2';
  end;
  else do;
  s=j (&k,1,2);
  a=j (max(s),nrow(s),0);
  do kk=1 to nrow(s);
  m=mod(s[kk, ],2);
  do i=1 to s[kk, ];
  do j=i to s[kk, ];
  if m=1 then
    do;
    a[j,kk]=-(s[kk, ]-1)/2+(i-1);
    end;
    else
    do;
    if -(s[kk, ]/2)+(i-1)<0 then do;
    a[j,kk]=-(s[kk, ]/2)+(i-1);
    end;
    else do;
    a[j,kk]=-(s[kk, ]/2)+i;
    end;
    end;
  end;
  end;
  end;
  *print a;
  aa=j (s[1, ],1,0);
  do i=1 to s[1, ];
  aa[i,]=a[i,1];
```

```

end;
*print aa;
sum=1;
do j=1 to nrow(s)-1;
do i=1 to nrow(aa);
kk=repeat(aa[i,],s[j+1,],1);
if i=1 then do;
aaa=kk;
end;else do;
aaa=aaa//kk;
end;
end;
*print aaa;
sum=sum*s[j, ];
if mod(sum,2)=0 then do;
ggg=j(s[j+1, ],1,0);
do i=1 to s[j+1, ];
ggg[i,]=a[i,j+1];
end;
ggg1=ggg*-1;
ggg2=ggg//ggg1;
hh=repeat(ggg2, sum/2,1);
aa=aaa||hh;
end;
else do;
ggg=j(s[j+1, ],1,0);
do i=1 to s[j+1, ];
ggg[i,]=a[i,j+1];
end;
ggg1=ggg*-1;
ggg2=ggg//ggg1;
hh1=repeat(ggg2, (sum-1)/2,1);
hh=hh1//ggg;
aa=aaa||hh;
end;
end;
*print aa;
print 'FORDNE in smaller runs';
Run_Sequence=aa;
print Run_sequence;
end;
run;
ods rtf close;
quit;

```

SAS Output

The SAS System

Run_Sequence		
-1	-1	-1
-1	-1	1
-1	1	1
-1	1	-1
1	1	-1
1	1	1
1	-1	1
1	-1	-1

Reference

Varghese, E., Kumar J., Jaggi, S., Varghese, C. and **Bhowmik, A.** (2018). A note on constructing small rotatable designs under first order response surface interference model. *Utilitas Mathematica*. **115**, 171-180.