ExperimentDesign.R

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#creating a fractional factorial design  
#2^3-1  
  
#load packages  
library(AlgDesign)  
library(dplyr)  
library(tidyr)  
  
#defining the design  
#define the levels  
levels.design <- c(2,2,2)  
#create a full 2^3 factorial design  
f.design <- gen.factorial(levels = levels.design)  
# create the fractional design from the full design  
pf.design <- optFederov(data = f.design,  
 nTrials = sum(levels.design),  
 approximate = TRUE)  
#extract a dataframe of the design  
pf.design <- pf.design$design  
  
#extra formatting  
#rename columns to reflect factors  
pf.factors <- c("startposition",  
 "obstaclespresent",  
 "populationsize")  
pf.design <- pf.design %>% select(-Rep..)  
colnames(pf.design) <- pf.factors  
#Add extra columns to describe factors  
pf.design <- pf.design %>%  
 mutate("Scenario" = c("S1","S2","S3","S4"),  
 "Starting Position" =   
 ifelse(startposition < 0,"Unconcentrated","Concentrated"),  
 "Obstacles" =   
 ifelse(obstaclespresent < 0, "Not-Present","Present"),  
 "Population Size" =   
 ifelse(populationsize < 0, "Low", "High"))  
   
#create data frame for the design including replications  
#define the number of replications  
n.reps <- 10  
#copy the original design dataframe  
design.dummy <- pf.design  
#concatenate the dataframe n-1 times  
i.reps <- 1  
while (i.reps < n.reps) {  
 pf.design <- pf.design %>%  
 bind\_rows(design.dummy)  
 i.reps <- i.reps +1  
}  
#randomize the trials  
pf.design <- pf.design[sample(1:nrow(pf.design)),]  
#Add trial index  
pf.index <- c(1:nrow(pf.design))  
pf.design <- pf.design %>% mutate("Trial Index" = pf.index)  
  
#one-time print of design-matrix to .csv file  
#write.csv(pf.design, file = "thesis\_design.csv")  
  
#one-time quality check of simulation results  
#four simulation runs were sampled for errors  
#(e.g. incorrect population size, improper distribution, etc.)  
#sample taken after 35 simulation runs had been conducted  
smpl <- sample(c(1:35),4)  
#results are [4,22,14,1], therefore those 4 trials will be checked  
smpl <- c(4,22,14,1)