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#dimensions of Park and Parkclean
dim(park)
dim(parkclean)

#Installing the olsrr package
install.packages("olsrr")
library(olsrr)

#backward selection using p value
fullmodel <- lm(formula = total_UPDRS ~ age + sex + test_time + motor_UPDRS + Jitter + Jitter.Abs + Jitter.RAP +
  Jitter.PPQ5 + Jitter.DDP + Shimmer + Shimmer.dB + Shimmer.APQ3 + Shimmer.APO5 +
  Shimmer.APQ11 + Shimmer.DDA + HNR + HNR + RPDE + DFA + PPE, data= parkclean)

model1<-ols_step_backward_p(fullmodel,prem=.05, details = TRUE)
model1

#Forward selection using p value
fullmodel <- lm(formula = total_UPDRS ~ age + sex + test_time + motor_UPDRS + Jitter + Jitter.Abs + Jitter.RAP +
  Jitter.PPQ5 + Jitter.DDP + Shimmer + Shimmer.dB + Shimmer.APQ3 + Shimmer.APO5 +
  Shimmer.APQ11 + Shimmer.DDA + HNR + HNR + RPDE + DFA + PPE, data= parkclean)

model2<-ols_step_forward_p(fullmodel,penter=.05, details = TRUE)
model2

#Step wise selection using p value
fullmodel <- lm(formula = total_UPDRS ~ age + sex + test_time + motor_UPDRS + Jitter + Jitter.Abs + Jitter.RAP +
  Jitter.PPQ5 + Jitter.DDP + Shimmer + Shimmer.dB + Shimmer.APQ3 + Shimmer.APO5 +
  Shimmer.APQ11 + Shimmer.DDA + HNR + HNR + RPDE + DFA + PPE, data= parkclean)

model3<-ols_step_both_p(fullmodel,pent=.05,prem=.05, details = TRUE)
model3

#final model of the three methods
finalmodel <-lm(formula = total_UPDRS ~ age + sex + test_time + motor_UPDRS + Jitter + Jitter.Abs + Jitter.RAP
  + Shimmer + Shimmer.APO5 +Shimmer.APQ11 + HNR + RPDE + DFA + PPE, data= parkclean)
summary(finalmodel)

#calculating AIC and BIC for model1,2 and 3
AIC(finalmodel)
BIC(finalmodel)

#cor matrix for the stepwise model
colll <- parkclean
colll[, c('X','subject','sex', 'test_time_hr', 'test_time_min', 'Jitter.PPQ5','Jitter.DDP',
  'Shimmer.dB','Shimmer.APQ3','Shimmer.DDA', 'total_UPDRS', 'HNR')] <- list(NULL)
library(ggpubr)
library(complot)
library(corrplot)
M <- cor(colll)
corrplot(M, method = 'number')

#VIF for the stepwise model
library(car)
vif(finalmodel)

#summary of final model for identifying High stanbdard errors
summary(finalmodel)

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