test3\_rmd

# Generate data  
N <- 1e3  
# Reference: https://stats.stackexchange.com/questions/70855/generating-random-variables-from-a-mixture-of-normal-distributions  
set.seed(1); u\_sample <- runif(n = N)  
set.seed(1)  
x1 <- sapply(1:N, function(x) {  
 if (u\_sample[x] > 0.6) {  
 return(rnorm(n = 1, mean = 0, sd = 1))  
 } else {  
 return(rnorm(n = 1, mean = 2.5, sd = 2))  
 }  
})  
set.seed(1)  
x2 <- sapply(1:N, function(x) {  
 if (u\_sample[x] > 0.1) {  
 return(rnorm(n = 1, mean = 1, sd = 2))  
 } else {  
 return(rnorm(n = 1, mean = 3, sd = 5))  
 }  
})  
x1x2 <- x1\*x2  
  
y <- 1.5 + 2 \* x1 + 3 \* x2 + 0.5 \* x1x2 + rnorm(n = N, mean = 0, sd = 1)  
par(mfrow=c(2,2))  
plot(density(y));plot(density(x1));plot(density(x2));plot(density(x1x2))  
  
# full model  
df <- as.data.frame(cbind(y, x1, x2, x1x2))  
full\_model <- lm(formula = y~., data = df)  
intercept\_only <- lm(y~1, data = df)  
summary(full\_model)  
  
# all possible regressors  
best <- regsubsets(x = y~., data = df, nvmax = 3)  
res.sum <- summary(best)  
p.m <- 2:4  
aic <- N \* log(res.sum$rss / N) + 2 \* p.m  
MS\_Res <- res.sum$rss / (N - p.m)  
data.frame(  
 R2 = which.max(res.sum$rsq),  
 Adj.R2 = which.max(res.sum$adjr2),  
 CP = which.min(res.sum$cp),  
 BIC = which.min(res.sum$bic),  
 AIC = which.min(aic),  
 MSRes = which.min(MS\_Res)  
)  
  
data.frame(  
 R2 = round(res.sum$rsq[3],4),  
 Adj.R2 = round(res.sum$adjr2[3],4),  
 CP = round(res.sum$cp[3],4),  
 BIC = round(res.sum$bic[3],4),  
 AIC = round(aic[3],4),  
 MSRes = round(MS\_Res[3],4)  
)  
  
# forward selection  
forward <- MASS::stepAIC(intercept\_only,  
 scope = list(upper=full\_model, lower=intercept\_only),  
 direction = c('forward'))  
  
# backward elimination  
backward <- MASS::stepAIC(full\_model,  
 # scope = list(upper=full\_model, lower=intercept\_only),  
 direction = c('backward'))  
  
# stepwise regression  
stepwise <- MASS::stepAIC(intercept\_only,  
 scope = list(upper=full\_model, lower=intercept\_only),  
 direction = c('both'))