**Output-**

> dim(glass)

[1] 214 10

> table(glass$Type)

1 2 3 5 6 7

70 76 17 13 9 29

> str(glass)

'data.frame': 214 obs. of 10 variables:

$ RI : num 1.52 1.52 1.52 1.52 1.52 ...

$ Na : num 13.6 13.9 13.5 13.2 13.3 ...

$ Mg : num 4.49 3.6 3.55 3.69 3.62 3.61 3.6 3.61 3.58 3.6 ...

$ Al : num 1.1 1.36 1.54 1.29 1.24 1.62 1.14 1.05 1.37 1.36 ...

$ Si : num 71.8 72.7 73 72.6 73.1 ...

$ K : num 0.06 0.48 0.39 0.57 0.55 0.64 0.58 0.57 0.56 0.57 ...

$ Ca : num 8.75 7.83 7.78 8.22 8.07 8.07 8.17 8.24 8.3 8.4 ...

$ Ba : num 0 0 0 0 0 0 0 0 0 0 ...

$ Fe : num 0 0 0 0 0 0.26 0 0 0 0.11 ...

$ Type: int 1 1 1 1 1 1 1 1 1 1 ...

> glass$Type <- factor(glass$Type, levels = c('1','2','3','5','6','7'), labels=c('building\_windows\_float\_processed','building\_windows\_non\_float\_processed','vehicle\_windows\_float\_processed','containers','tableware','headlamps'))

> str(glass)

'data.frame': 214 obs. of 10 variables:

$ RI : num 1.52 1.52 1.52 1.52 1.52 ...

$ Na : num 13.6 13.9 13.5 13.2 13.3 ...

$ Mg : num 4.49 3.6 3.55 3.69 3.62 3.61 3.6 3.61 3.58 3.6 ...

$ Al : num 1.1 1.36 1.54 1.29 1.24 1.62 1.14 1.05 1.37 1.36 ...

$ Si : num 71.8 72.7 73 72.6 73.1 ...

$ K : num 0.06 0.48 0.39 0.57 0.55 0.64 0.58 0.57 0.56 0.57 ...

$ Ca : num 8.75 7.83 7.78 8.22 8.07 8.07 8.17 8.24 8.3 8.4 ...

$ Ba : num 0 0 0 0 0 0 0 0 0 0 ...

$ Fe : num 0 0 0 0 0 0.26 0 0 0 0.11 ...

$ Type: Factor w/ 6 levels "building\_windows\_float\_processed",..: 1 1 1 1 1 1 1 1 1 1 ...

> #testing of norm data

> norm(c(1,2,3,8))

[1] 0.0000000 0.1428571 0.2857143 1.0000000

> knn1 <- knn(Train[1:9],Test[1:9], Train$Type,k=3)

> mean(knn1==Test$Type)

[1] 0.6393443

> Train\_acc <- NULL

> Test\_acc <- NULL

> for (i in 1:20) {

+ Train\_acc <-knn(Train[1:9],Test[1:9], Train$Type,k=i)

+ Test\_acc <- c(Test\_acc,mean(Train\_acc==Test$Type))

+

+ }

> KNNFInal\_model <- knn(Train[1:9],Test[1:9], Train$Type,k=6)

> mean(KNNFInal\_model==Test$Type)

[1] 0.5737705