

How we cleaned our data and what process we have been through

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This is how we cleaned our data.

With this data we got the lowest MSE

Lowest MSE model data cleaning (lm + polynomial degree of 5)

```
test<- read.csv("~/Downloads/testing.without.response.txt")
```

```
train <- read.csv("~/Downloads/lafdtraining updated (1).csv")
```

```
library(class)
```

```
library(FNN)
```

```
library(KRLS)
```

```
attach(train)
```

```
attach(test)
```

```
train=train[,-c(1:2)]
```

```
train=train[complete.cases(train),]
```

```
train <- subset(train,! (train$elapsed_time[Incident.Creation.Time..GMT.] >
```

```
quantile(train$elapsed_time[Incident.Creation.Time..GMT.], probs=c(.01, .99))[2] |
```

```
train$elapsed_time[Incident.Creation.Time..GMT.] <
```

```
quantile(train$elapsed_time[Incident.Creation.Time..GMT.], probs=c(.01, .99))[1]) )
```

```
train <- subset(train,! (train$elapsed_time[year] > quantile(train$elapsed_time[year], probs=c(.01,
```

```
.99))[2] | train$elapsed_time[year] < quantile(train$elapsed_time[year], probs=c(.01, .99))[1]) )
```

```
train <- subset(train,! (train$elapsed_time[Dispatch.Sequence] >
```

```
quantile(train$elapsed_time[Dispatch.Sequence], probs=c(.01, .99))[2] |
```

```
train$elapsed_time[Dispatch.Sequence] < quantile(train$elapsed_time[Dispatch.Sequence],  
probs=c(.01, .99))[1]) )
```

```
train <- subset(train,! (train$elapsed_time[PPE.Level] > quantile(train$elapsed_time[PPE.Level],  
probs=c(.01, .99))[2] | train$elapsed_time[PPE.Level] <
```

```
quantile(train$elapsed_time[PPE.Level], probs=c(.01, .99))[1]) )
```

```
train <- subset(train,! (train$elapsed_time[Dispatch.Sequence] >
```

```
quantile(train$elapsed_time[Dispatch.Sequence], probs=c(.01, .99))[2] |
```

```
train$elapsed_time[Dispatch.Sequence] < quantile(train$elapsed_time[Dispatch.Sequence],  
probs=c(.01, .99))[1]) )
```

```
train <- subset(train,! (train$elapsed_time[Unit.Type] > quantile(train$elapsed_time[Unit.Type],
```

```
probs=c(.01, .99))[2] | train$elapsed_time[Unit.Type] < quantile(train$elapsed_time[Unit.Type],
```

```
probs=c(.01, .99))[1]) )
```

```

train$year=as.factor(train$year)
train$First.in.District=as.factor(train$First.in.District)
train$Dispatch.Sequence=as.numeric(train$Dispatch.Sequence)
train$Incident.Creation.Time..GMT.=as.numeric(train$Incident.Creation.Time..GMT.)

train=train[,-3]
View(train)
str(train$Dispatch.Status)
str(test$Dispatch.Status)

View(test)

test=test[,-c(2)]

test$Incident.Creation.Time..GMT.=as.numeric(test$Incident.Creation.Time..GMT.)
test$year=as.factor(test$year)
test$Dispatch.Status=as.factor(test$Dispatch.Status)
test$First.in.District=as.factor(test$First.in.District)
test=test[,-4]
test[is.na(test$Dispatch.Sequence),]$Dispatch.Sequence= mean(test$Dispatch.Sequence,na.rm =
T)
test[test$Unit.Type=="RP - Rehab Plug Buggy",]$Unit.Type="RA - ALS Rescue Ambulance"

head(train)
head(test)
#5 factors , 2 continuous

sub_index=sample(1:nrow(train),size = length(train$year), replace=F)
subdat=train[sub_index,]
subtrain_index=sample(1:nrow(subdat),size = nrow(subdat)/2,replace = F)
subtrain=subdat[subtrain_index,]
subtest=subdat[-subtrain_index,]

ptm<-proc.time()
fitpoly=lm(elapsed_time~year+Dispatch.Status+Unit.Type+PPE.Level+First.in.District

+polym(Dispatch.Sequence,log(Incident.Creation.Time..GMT.),degree=5,raw=T),data=subdat)
proc.time()-ptm
lmpr=predict(fitpoly,test)
submit<-data.frame(row.id = test$row.id, elapsed_time = lmpr)
write.csv(submit,file = "gg.csv",row.names = F)
gg <- read.csv("~/gg.csv")
names(gg)[2] <- paste("prediction")

write.csv(gg,file = "gg.csv",row.names = F)

```

TRIALS (LONG JOURNEY) THAT WE HAVE GONE THROUGH

Additionally, we have tried many times to change and manipulate the data set
in order to improve our kaggle score. For instance, we searched each fire station
district in LA and the dispatch time, arrival time and response time of the station
district is replaced with the mean time of each variable. In addition,
we also tried to drop the levels of dispatch.status. The HSP,NAV and ONS levels of
Dispatch.Status are merged to ENR,TSP and AVI. Also, we include zip-code of
all the firestation and see whether is significant effect on elapsed time.

(1) When it comes to data cleaning we first replaced all the outlier to
the median value of that variable.

```
# data with outliers = median
# elapsed time
median(df$elapsed_time)
upperw <- boxplot.stats(df_train$elapsed_time)$stats[5]
filter <- df$elapsed_time > upperw
head(filter,100)
df$elapsed_time[filter] <- upperw
# First in district
median(df$norm_First_District)
upperw <- boxplot.stats(df_train$norm_First_District)$stats[5]
filter <- df$norm_First_District < upperw
df$norm_First_District[filter == "False"] <- NA
df$norm_First_District[df$elapsed_time == "0"] <- 0.1443542
head(df$norm_First_District,100)
# Dispatch sequence
median(df$norm_Dispatch_Seq)
upperw <- boxplot.stats(df_train$norm_Dispatch_Seq)$stats[5]
filter <- df$norm_Dispatch_Seq < upperw
df$norm_Dispatch_Seq[filter == "False"] <- NA
df$norm_Dispatch_Seq[df$elapsed_time == "0"] <- -0.07658898
head(df$norm_Dispatch_Seq,100)
# Incident Time
median(df$norm_Incident_Time)
upperw <- boxplot.stats(df_train$norm_Incident_Time)$stats[5]
filter <- df$norm_Incident_Time < upperw
df$norm_Incident_Time[filter == "False"] <- NA
df$norm_Incident_Time[df$elapsed_time == "0"] <- 0.1901404
head(df$norm_Incident_Time,100)
```

- We found external data from the LAFD open data website
and add the average traveled time depend on EMS and Non-EMS for the
each district of the fire station

EMS

```
train$avg_travel_time[First.in.District == "1" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "1"])  
train$avg_travel_time[First.in.District == "2" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "2"])  
train$avg_travel_time[First.in.District == "3" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "3"])  
train$avg_travel_time[First.in.District == "4" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "4"])  
train$avg_travel_time[First.in.District == "5" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "5"])  
train$avg_travel_time[First.in.District == "6" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "6"])  
train$avg_travel_time[First.in.District == "7" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "7"])  
train$avg_travel_time[First.in.District == "8" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "8"])  
train$avg_travel_time[First.in.District == "9" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "9"])  
train$avg_travel_time[First.in.District == "10" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "10"])  
train$avg_travel_time[First.in.District == "11" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "11"])  
train$avg_travel_time[First.in.District == "12" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "12"])  
train$avg_travel_time[First.in.District == "13" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "13"])  
train$avg_travel_time[First.in.District == "14" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "14"])  
train$avg_travel_time[First.in.District == "15" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "15"])
```

```

train$avg_travel_time[First.in.District == "16" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "16"])
train$avg_travel_time[First.in.District == "17" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "17"])
train$avg_travel_time[First.in.District == "18" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "18"])
train$avg_travel_time[First.in.District == "19" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "19"])
train$avg_travel_time[First.in.District == "20" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "20"])
train$avg_travel_time[First.in.District == "21" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "21"])

```

```

train$avg_travel_time[First.in.District == "23" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "23"])
train$avg_travel_time[First.in.District == "24" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "24"])
train$avg_travel_time[First.in.District == "25" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "25"])
train$avg_travel_time[First.in.District == "26" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "26"])

```

```

train$avg_travel_time[First.in.District == "28" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "28"])
train$avg_travel_time[First.in.District == "29" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "29"])

```

```

train$avg_travel_time[First.in.District == "33" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "33"])
train$avg_travel_time[First.in.District == "34" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "34"])

```

```

train$avg_travel_time[First.in.District == "35" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "35"])
train$avg_travel_time[First.in.District == "36" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "36"])
train$avg_travel_time[First.in.District == "37" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "37"])
train$avg_travel_time[First.in.District == "38" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "38"])
train$avg_travel_time[First.in.District == "39" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "39"])

```

```

train$avg_travel_time[First.in.District == "41" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "41"])
train$avg_travel_time[First.in.District == "42" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "42"])
train$avg_travel_time[First.in.District == "43" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "43"])
train$avg_travel_time[First.in.District == "44" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "44"])

```

```

train$avg_travel_time[First.in.District == "46" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "46"])
train$avg_travel_time[First.in.District == "47" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "47"])

```

```

train$avg_travel_time[First.in.District == "55" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "55"])
train$avg_travel_time[First.in.District == "56" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "56"])
train$avg_travel_time[First.in.District == "57" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "57"])

```

```

train$avg_travel_time[First.in.District == "58" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "58"])
train$avg_travel_time[First.in.District == "59" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "59"])
train$avg_travel_time[First.in.District == "60" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "60"])
train$avg_travel_time[First.in.District == "61" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "61"])
train$avg_travel_time[First.in.District == "62" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "62"])
train$avg_travel_time[First.in.District == "63" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "63"])
train$avg_travel_time[First.in.District == "64" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "64"])

```

```

train$avg_travel_time[First.in.District == "65" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "65"])
train$avg_travel_time[First.in.District == "66" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "66"])
train$avg_travel_time[First.in.District == "67" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "67"])
train$avg_travel_time[First.in.District == "68" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "68"])
train$avg_travel_time[First.in.District == "69" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "69"])
train$avg_travel_time[First.in.District == "70" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "70"])
train$avg_travel_time[First.in.District == "71" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "71"])
train$avg_travel_time[First.in.District == "72" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "72"])

```

```

train$avg_travel_time[First.in.District == "73" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "73"])
train$avg_travel_time[First.in.District == "74" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "74"])
train$avg_travel_time[First.in.District == "75" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "75"])
train$avg_travel_time[First.in.District == "76" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "76"])
train$avg_travel_time[First.in.District == "77" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "77"])

```

```

train$avg_travel_time[First.in.District == "78" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "78"])
train$avg_travel_time[First.in.District == "79" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "79"])
train$avg_travel_time[First.in.District == "80" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "80"])

```

```

train$avg_travel_time[First.in.District == "81" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "81"])
train$avg_travel_time[First.in.District == "82" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "82"])
train$avg_travel_time[First.in.District == "83" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "83"])
train$avg_travel_time[First.in.District == "84" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "84"])
train$avg_travel_time[First.in.District == "85" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "85"])
train$avg_travel_time[First.in.District == "86" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "86"])

```



```

train$avg_travel_time[First.in.District == "87" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "87"])
train$avg_travel_time[First.in.District == "88" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "88"])
train$avg_travel_time[First.in.District == "89" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "89"])
train$avg_travel_time[First.in.District == "90" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "90"])
train$avg_travel_time[First.in.District == "91" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "91"])
train$avg_travel_time[First.in.District == "92" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "92"])
train$avg_travel_time[First.in.District == "93" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "93"])
train$avg_travel_time[First.in.District == "94" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "94"])
train$avg_travel_time[First.in.District == "95" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "95"])
train$avg_travel_time[First.in.District == "96" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "96"])
train$avg_travel_time[First.in.District == "97" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "97"])
train$avg_travel_time[First.in.District == "98" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "98"])
train$avg_travel_time[First.in.District == "99" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "99"])
train$avg_travel_time[First.in.District == "100" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "100"])

train$avg_travel_time[First.in.District == "102" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "102"])

```

```

train$avg_travel_time[First.in.District == "103" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "103"])
train$avg_travel_time[First.in.District == "104" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "104"])
train$avg_travel_time[First.in.District == "105" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "105"])
train$avg_travel_time[First.in.District == "106" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "106"])
train$avg_travel_time[First.in.District == "107" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "107"])
train$avg_travel_time[First.in.District == "108" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "108"])
train$avg_travel_time[First.in.District == "109" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "109"])
train$avg_travel_time[First.in.District == "110" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "110"])

```

Non-EMS

```

All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DISTRICT...N
on.EMS<-
as.numeric(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DI
STRICK...Non.EMS)
train$avg_travel_time[First.in.District == "1" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "1"])
train$avg_travel_time[First.in.District == "2" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "2"])
train$avg_travel_time[First.in.District == "3" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "3"])
train$avg_travel_time[First.in.District == "4" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "4"])
train$avg_travel_time[First.in.District == "5" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "5"])

```

```

train$avg_travel_time[First.in.District == "6" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "6"])
train$avg_travel_time[First.in.District == "7" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "7"])
train$avg_travel_time[First.in.District == "8" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "8"])
train$avg_travel_time[First.in.District == "9" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "9"])
train$avg_travel_time[First.in.District == "10" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "10"])
train$avg_travel_time[First.in.District == "11" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "11"])
train$avg_travel_time[First.in.District == "12" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "12"])
train$avg_travel_time[First.in.District == "13" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "13"])
train$avg_travel_time[First.in.District == "14" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "14"])
train$avg_travel_time[First.in.District == "15" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "15"])
train$avg_travel_time[First.in.District == "16" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "16"])
train$avg_travel_time[First.in.District == "17" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "17"])
train$avg_travel_time[First.in.District == "18" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "18"])
train$avg_travel_time[First.in.District == "19" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "19"])
train$avg_travel_time[First.in.District == "20" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "20"])

```

```
train$avg_travel_time[First.in.District == "21" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "21"])
```

```
train$avg_travel_time[First.in.District == "23" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "23"])  
train$avg_travel_time[First.in.District == "24" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "24"])  
train$avg_travel_time[First.in.District == "25" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "25"])  
train$avg_travel_time[First.in.District == "26" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "26"])
```

```
train$avg_travel_time[First.in.District == "28" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "28"])  
train$avg_travel_time[First.in.District == "29" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "29"])
```

```
train$avg_travel_time[First.in.District == "33" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "33"])  
train$avg_travel_time[First.in.District == "34" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "34"])  
train$avg_travel_time[First.in.District == "35" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "35"])  
train$avg_travel_time[First.in.District == "36" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "36"])  
train$avg_travel_time[First.in.District == "37" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "37"])  
train$avg_travel_time[First.in.District == "38" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "38"])  
train$avg_travel_time[First.in.District == "39" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "39"])
```

```
train$avg_travel_time[First.in.District == "41" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "41"])  
train$avg_travel_time[First.in.District == "42" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "42"])  
train$avg_travel_time[First.in.District == "43" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "43"])  
train$avg_travel_time[First.in.District == "44" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "44"])
```

```
train$avg_travel_time[First.in.District == "46" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "46"])  
train$avg_travel_time[First.in.District == "47" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "47"])
```

```
train$avg_travel_time[First.in.District == "55" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "55"])  
train$avg_travel_time[First.in.District == "56" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "56"])  
train$avg_travel_time[First.in.District == "57" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "57"])
```

```
train$avg_travel_time[First.in.District == "58" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "58"])  
train$avg_travel_time[First.in.District == "59" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "59"])  
train$avg_travel_time[First.in.District == "60" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "60"])  
train$avg_travel_time[First.in.District == "61" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "61"])  
train$avg_travel_time[First.in.District == "62" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "62"])
```

```

train$avg_travel_time[First.in.District == "63" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "63"])
train$avg_travel_time[First.in.District == "64" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "64"])

train$avg_travel_time[First.in.District == "65" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "65"])
train$avg_travel_time[First.in.District == "66" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "66"])
train$avg_travel_time[First.in.District == "67" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "67"])
train$avg_travel_time[First.in.District == "68" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "68"])
train$avg_travel_time[First.in.District == "69" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "69"])
train$avg_travel_time[First.in.District == "70" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "70"])
train$avg_travel_time[First.in.District == "71" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "71"])
train$avg_travel_time[First.in.District == "72" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "72"])
train$avg_travel_time[First.in.District == "73" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "73"])
train$avg_travel_time[First.in.District == "74" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "74"])
train$avg_travel_time[First.in.District == "75" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "75"])
train$avg_travel_time[First.in.District == "76" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "76"])
train$avg_travel_time[First.in.District == "77" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "77"])

```

```
train$avg_travel_time[First.in.District == "78" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "78"])  
train$avg_travel_time[First.in.District == "79" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "79"])  
train$avg_travel_time[First.in.District == "80" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "80"])
```

```
train$avg_travel_time[First.in.District == "81" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "81"])  
train$avg_travel_time[First.in.District == "82" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "82"])  
train$avg_travel_time[First.in.District == "83" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "83"])  
train$avg_travel_time[First.in.District == "84" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "84"])  
train$avg_travel_time[First.in.District == "85" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "85"])  
train$avg_travel_time[First.in.District == "86" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "86"])  
train$avg_travel_time[First.in.District == "87" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "87"])  
train$avg_travel_time[First.in.District == "88" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "88"])  
train$avg_travel_time[First.in.District == "89" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "89"])  
train$avg_travel_time[First.in.District == "90" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "90"])  
train$avg_travel_time[First.in.District == "91" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "91"])
```

```

train$avg_travel_time[First.in.District == "92" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "92"])
train$avg_travel_time[First.in.District == "93" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "93"])
train$avg_travel_time[First.in.District == "94" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "94"])
train$avg_travel_time[First.in.District == "95" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "95"])
train$avg_travel_time[First.in.District == "96" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "96"])
train$avg_travel_time[First.in.District == "97" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "97"])
train$avg_travel_time[First.in.District == "98" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "98"])
train$avg_travel_time[First.in.District == "99" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "99"])
train$avg_travel_time[First.in.District == "100" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "100"])

```

```

train$avg_travel_time[First.in.District == "102" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "102"])
train$avg_travel_time[First.in.District == "103" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "103"])
train$avg_travel_time[First.in.District == "104" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "104"])
train$avg_travel_time[First.in.District == "105" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "105"])
train$avg_travel_time[First.in.District == "106" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "106"])
train$avg_travel_time[First.in.District == "107" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "107"])

```



```

train$avg_travel_time[First.in.District == "108" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DISTRICT...Non.EMS[DISTRICT == "108"])
train$avg_travel_time[First.in.District == "109" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DISTRICT...Non.EMS[DISTRICT == "109"])
train$avg_travel_time[First.in.District == "110" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DISTRICT...Non.EMS[DISTRICT == "110"])

```

```

# For the Test dataset
avg_travel_time <- rep(NA,length(test$year))
test <- cbind(avg_travel_time,test)

```

```

test$avg_travel_time[First.in.District == "1" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "1"])
test$avg_travel_time[First.in.District == "2" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "2"])
test$avg_travel_time[First.in.District == "3" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "3"])
test$avg_travel_time[First.in.District == "4" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "4"])
test$avg_travel_time[First.in.District == "5" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "5"])
test$avg_travel_time[First.in.District == "6" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "6"])
test$avg_travel_time[First.in.District == "7" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "7"])
test$avg_travel_time[First.in.District == "8" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "8"])
test$avg_travel_time[First.in.District == "9" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "9"])
test$avg_travel_time[First.in.District == "10" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTRICT...EMS[DISTRICT == "10"])

```

```

test$avg_travel_time[First.in.District == "11" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "11"])
test$avg_travel_time[First.in.District == "12" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "12"])
test$avg_travel_time[First.in.District == "13" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "13"])
test$avg_travel_time[First.in.District == "14" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "14"])
test$avg_travel_time[First.in.District == "15" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "15"])
test$avg_travel_time[First.in.District == "16" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "16"])
test$avg_travel_time[First.in.District == "17" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "17"])
test$avg_travel_time[First.in.District == "18" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "18"])
test$avg_travel_time[First.in.District == "19" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "19"])
test$avg_travel_time[First.in.District == "20" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "20"])
test$avg_travel_time[First.in.District == "21" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "21"])

test$avg_travel_time[First.in.District == "23" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "23"])
test$avg_travel_time[First.in.District == "24" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "24"])
test$avg_travel_time[First.in.District == "25" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "25"])
test$avg_travel_time[First.in.District == "26" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "26"])

```

```
test$avg_travel_time[First.in.District == "28" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "28"])  
test$avg_travel_time[First.in.District == "29" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "29"])
```

```
test$avg_travel_time[First.in.District == "33" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "33"])  
test$avg_travel_time[First.in.District == "34" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "34"])  
test$avg_travel_time[First.in.District == "35" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "35"])  
test$avg_travel_time[First.in.District == "36" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "36"])  
test$avg_travel_time[First.in.District == "37" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "37"])  
test$avg_travel_time[First.in.District == "38" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "38"])  
test$avg_travel_time[First.in.District == "39" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "39"])
```

```
test$avg_travel_time[First.in.District == "41" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "41"])  
test$avg_travel_time[First.in.District == "42" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "42"])  
test$avg_travel_time[First.in.District == "43" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "43"])  
test$avg_travel_time[First.in.District == "44" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "44"])
```

```
test$avg_travel_time[First.in.District == "46" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "46"])
```

```
test$avg_travel_time[First.in.District == "47" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "47"])
```

```
test$avg_travel_time[First.in.District == "55" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "55"])
```

```
test$avg_travel_time[First.in.District == "56" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "56"])
```

```
test$avg_travel_time[First.in.District == "57" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "57"])
```

```
test$avg_travel_time[First.in.District == "58" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "58"])
```

```
test$avg_travel_time[First.in.District == "59" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "59"])
```

```
test$avg_travel_time[First.in.District == "60" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "60"])
```

```
test$avg_travel_time[First.in.District == "61" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "61"])
```

```
test$avg_travel_time[First.in.District == "62" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "62"])
```

```
test$avg_travel_time[First.in.District == "63" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "63"])
```

```
test$avg_travel_time[First.in.District == "64" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "64"])
```

```
test$avg_travel_time[First.in.District == "65" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "65"])
```

```
test$avg_travel_time[First.in.District == "66" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "66"])
```

```
test$avg_travel_time[First.in.District == "67" & PPE.Level == "EMS"] <-  
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR  
ICT...EMS[DISTRICT == "67"])
```

```

test$avg_travel_time[First.in.District == "68" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "68"])
test$avg_travel_time[First.in.District == "69" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "69"])
test$avg_travel_time[First.in.District == "70" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "70"])
test$avg_travel_time[First.in.District == "71" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "71"])
test$avg_travel_time[First.in.District == "72" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "72"])
test$avg_travel_time[First.in.District == "73" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "73"])
test$avg_travel_time[First.in.District == "74" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "74"])
test$avg_travel_time[First.in.District == "75" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "75"])
test$avg_travel_time[First.in.District == "76" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "76"])
test$avg_travel_time[First.in.District == "77" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "77"])

test$avg_travel_time[First.in.District == "78" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "78"])
test$avg_travel_time[First.in.District == "79" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "79"])
test$avg_travel_time[First.in.District == "80" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "80"])

test$avg_travel_time[First.in.District == "81" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_.2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "81"])

```

```

test$avg_travel_time[First.in.District == "82" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "82"])
test$avg_travel_time[First.in.District == "83" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "83"])
test$avg_travel_time[First.in.District == "84" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "84"])
test$avg_travel_time[First.in.District == "85" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "85"])
test$avg_travel_time[First.in.District == "86" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "86"])
test$avg_travel_time[First.in.District == "87" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "87"])
test$avg_travel_time[First.in.District == "88" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "88"])
test$avg_travel_time[First.in.District == "89" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "89"])
test$avg_travel_time[First.in.District == "90" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "90"])
test$avg_travel_time[First.in.District == "91" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "91"])
test$avg_travel_time[First.in.District == "92" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "92"])
test$avg_travel_time[First.in.District == "93" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "93"])
test$avg_travel_time[First.in.District == "94" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "94"])
test$avg_travel_time[First.in.District == "95" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "95"])
test$avg_travel_time[First.in.District == "96" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "96"])

```

```

test$avg_travel_time[First.in.District == "97" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "97"])
test$avg_travel_time[First.in.District == "98" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "98"])
test$avg_travel_time[First.in.District == "99" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "99"])
test$avg_travel_time[First.in.District == "100" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "100"])

test$avg_travel_time[First.in.District == "102" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "102"])
test$avg_travel_time[First.in.District == "103" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "103"])
test$avg_travel_time[First.in.District == "104" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "104"])
test$avg_travel_time[First.in.District == "105" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "105"])
test$avg_travel_time[First.in.District == "106" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "106"])
test$avg_travel_time[First.in.District == "107" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "107"])
test$avg_travel_time[First.in.District == "108" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "108"])
test$avg_travel_time[First.in.District == "109" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "109"])
test$avg_travel_time[First.in.District == "110" & PPE.Level == "EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME.IN.DISTR
ICT...EMS[DISTRICT == "110"])
#non ems
test$avg_travel_time[First.in.District == "1" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DISTR
ICT...Non.EMS[DISTRICT == "1"])

```

```

test$avg_travel_time[First.in.District == "2" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "2"])
test$avg_travel_time[First.in.District == "3" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "3"])
test$avg_travel_time[First.in.District == "4" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "4"])
test$avg_travel_time[First.in.District == "5" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "5"])
test$avg_travel_time[First.in.District == "6" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "6"])
test$avg_travel_time[First.in.District == "7" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "7"])
test$avg_travel_time[First.in.District == "8" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "8"])
test$avg_travel_time[First.in.District == "9" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "9"])
test$avg_travel_time[First.in.District == "10" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "10"])
test$avg_travel_time[First.in.District == "11" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "11"])
test$avg_travel_time[First.in.District == "12" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "12"])
test$avg_travel_time[First.in.District == "13" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "13"])
test$avg_travel_time[First.in.District == "14" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "14"])
test$avg_travel_time[First.in.District == "15" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "15"])
test$avg_travel_time[First.in.District == "16" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "16"])

```



```
test$avg_travel_time[First.in.District == "17" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "17"])  
test$avg_travel_time[First.in.District == "18" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "18"])  
test$avg_travel_time[First.in.District == "19" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "19"])  
test$avg_travel_time[First.in.District == "20" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "20"])  
test$avg_travel_time[First.in.District == "21" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "21"])
```

```
test$avg_travel_time[First.in.District == "23" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "23"])  
test$avg_travel_time[First.in.District == "24" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "24"])  
test$avg_travel_time[First.in.District == "25" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "25"])  
test$avg_travel_time[First.in.District == "26" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "26"])
```

```
test$avg_travel_time[First.in.District == "28" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "28"])  
test$avg_travel_time[First.in.District == "29" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "29"])
```

```
test$avg_travel_time[First.in.District == "33" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "33"])  
test$avg_travel_time[First.in.District == "34" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "34"])  
test$avg_travel_time[First.in.District == "35" & PPE.Level == "Non-EMS"] <-  
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST  
RICT...Non.EMS[DISTRICT == "35"])
```

```
test$avg_travel_time[First.in.District == "36" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "36"])
test$avg_travel_time[First.in.District == "37" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "37"])
test$avg_travel_time[First.in.District == "38" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "38"])
test$avg_travel_time[First.in.District == "39" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "39"])
```

```
test$avg_travel_time[First.in.District == "41" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "41"])
test$avg_travel_time[First.in.District == "42" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "42"])
test$avg_travel_time[First.in.District == "43" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "43"])
test$avg_travel_time[First.in.District == "44" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "44"])
```

```
test$avg_travel_time[First.in.District == "46" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "46"])
test$avg_travel_time[First.in.District == "47" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "47"])
```

```
test$avg_travel_time[First.in.District == "55" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "55"])
test$avg_travel_time[First.in.District == "56" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "56"])
test$avg_travel_time[First.in.District == "57" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "57"])
```

```
test$avg_travel_time[First.in.District == "58" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "58"])
```

```

test$avg_travel_time[First.in.District == "59" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "59"])
test$avg_travel_time[First.in.District == "60" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "60"])
test$avg_travel_time[First.in.District == "61" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "61"])
test$avg_travel_time[First.in.District == "62" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "62"])
test$avg_travel_time[First.in.District == "63" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "63"])
test$avg_travel_time[First.in.District == "64" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "64"])

test$avg_travel_time[First.in.District == "65" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "65"])
test$avg_travel_time[First.in.District == "66" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "66"])
test$avg_travel_time[First.in.District == "67" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "67"])
test$avg_travel_time[First.in.District == "68" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "68"])
test$avg_travel_time[First.in.District == "69" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "69"])
test$avg_travel_time[First.in.District == "70" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "70"])
test$avg_travel_time[First.in.District == "71" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "71"])
test$avg_travel_time[First.in.District == "72" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "72"])
test$avg_travel_time[First.in.District == "73" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "73"])

```

```

test$avg_travel_time[First.in.District == "74" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "74"])
test$avg_travel_time[First.in.District == "75" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "75"])
test$avg_travel_time[First.in.District == "76" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "76"])
test$avg_travel_time[First.in.District == "77" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "77"])

test$avg_travel_time[First.in.District == "78" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "78"])
test$avg_travel_time[First.in.District == "79" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "79"])
test$avg_travel_time[First.in.District == "80" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "80"])

test$avg_travel_time[First.in.District == "81" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "81"])
test$avg_travel_time[First.in.District == "82" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "82"])
test$avg_travel_time[First.in.District == "83" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "83"])
test$avg_travel_time[First.in.District == "84" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "84"])
test$avg_travel_time[First.in.District == "85" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "85"])
test$avg_travel_time[First.in.District == "86" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "86"])
test$avg_travel_time[First.in.District == "87" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "87"])

```

```

test$avg_travel_time[First.in.District == "88" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "88"])
test$avg_travel_time[First.in.District == "89" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "89"])
test$avg_travel_time[First.in.District == "90" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "90"])
test$avg_travel_time[First.in.District == "91" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "91"])
test$avg_travel_time[First.in.District == "92" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "92"])
test$avg_travel_time[First.in.District == "93" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "93"])
test$avg_travel_time[First.in.District == "94" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "94"])
test$avg_travel_time[First.in.District == "95" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "95"])
test$avg_travel_time[First.in.District == "96" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "96"])
test$avg_travel_time[First.in.District == "97" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "97"])
test$avg_travel_time[First.in.District == "98" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "98"])
test$avg_travel_time[First.in.District == "99" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "99"])
test$avg_travel_time[First.in.District == "100" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "100"])

test$avg_travel_time[First.in.District == "102" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "102"])
test$avg_travel_time[First.in.District == "103" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "103"])

```

```

test$avg_travel_time[First.in.District == "104" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "104"])
test$avg_travel_time[First.in.District == "105" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "105"])
test$avg_travel_time[First.in.District == "106" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "106"])
test$avg_travel_time[First.in.District == "107" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "107"])
test$avg_travel_time[First.in.District == "108" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "108"])
test$avg_travel_time[First.in.District == "109" & PPE.Level == "Non-EMS"] <-
median(All_Stations_Response_Metrics_._2016$AVERAGE.LAFD.TRAVEL.TIME..IN.DIST
RICT...Non.EMS[DISTRICT == "109"])
test$avg_travel_time[First.in.District == "110" & PPE.L

```

We also include all the zip-code of the each firestation

Train Zip-code

```

train$zip_code[train$First.in.District == "1"] <- 90031
train$zip_code[train$First.in.District == "2"] <- 90033
train$zip_code[train$First.in.District == "3"] <- 90012
train$zip_code[train$First.in.District == "4"] <- 90012
train$zip_code[train$First.in.District == "5"] <- 90045
train$zip_code[train$First.in.District == "6"] <- 90004
train$zip_code[train$First.in.District == "7"] <- 91402
train$zip_code[train$First.in.District == "8"] <- 91326
train$zip_code[train$First.in.District == "9"] <- 90023
train$zip_code[train$First.in.District == "10"] <- 90015
train$zip_code[train$First.in.District == "11"] <- 90057
train$zip_code[train$First.in.District == "12"] <- 90042
train$zip_code[train$First.in.District == "13"] <- 90006
train$zip_code[train$First.in.District == "14"] <- 90011
train$zip_code[train$First.in.District == "15"] <- 90007
train$zip_code[train$First.in.District == "16"] <- 90032
train$zip_code[train$First.in.District == "17"] <- 90021
train$zip_code[train$First.in.District == "18"] <- 91342
train$zip_code[train$First.in.District == "19"] <- 90049
train$zip_code[train$First.in.District == "20"] <- 90026
train$zip_code[train$First.in.District == "21"] <- 90011

```

```

train$zip_code[train$First.in.District == "23"] <- 90272
train$zip_code[train$First.in.District == "24"] <- 91040

```

```
train$zip_code[train$First.in.District == "25"] <- 90023
train$zip_code[train$First.in.District == "26"] <- 90018
```

```
train$zip_code[train$First.in.District == "28"] <- 91326
train$zip_code[train$First.in.District == "29"] <- 90010
```

```
train$zip_code[train$First.in.District == "33"] <- 90003
train$zip_code[train$First.in.District == "34"] <- 90018
train$zip_code[train$First.in.District == "35"] <- 90039
train$zip_code[train$First.in.District == "36"] <- 90731
train$zip_code[train$First.in.District == "37"] <- 90024
train$zip_code[train$First.in.District == "38"] <- 90744
train$zip_code[train$First.in.District == "39"] <- 91401
```

```
train$zip_code[train$First.in.District == "41"] <- 90046
train$zip_code[train$First.in.District == "42"] <- 90041
train$zip_code[train$First.in.District == "43"] <- 90034
train$zip_code[train$First.in.District == "44"] <- 90065
```

```
train$zip_code[train$First.in.District == "46"] <- 90037
train$zip_code[train$First.in.District == "47"] <- 90032
```

```
train$zip_code[train$First.in.District == "49"] <- 90744
train$zip_code[train$First.in.District == "50"] <- 90065
train$zip_code[train$First.in.District == "51"] <- 91345
train$zip_code[train$First.in.District == "52"] <- 90029
```

```
train$zip_code[train$First.in.District == "55"] <- 90041
train$zip_code[train$First.in.District == "56"] <- 90065
train$zip_code[train$First.in.District == "57"] <- 90003
```

```
train$zip_code[train$First.in.District == "58"] <- 90035
train$zip_code[train$First.in.District == "59"] <- 90064
train$zip_code[train$First.in.District == "60"] <- 91601
train$zip_code[train$First.in.District == "61"] <- 90036
train$zip_code[train$First.in.District == "62"] <- 90066
train$zip_code[train$First.in.District == "63"] <- 90291
train$zip_code[train$First.in.District == "64"] <- 90061
```

```
train$zip_code[train$First.in.District == "65"] <- 90002
train$zip_code[train$First.in.District == "66"] <- 90037
train$zip_code[train$First.in.District == "67"] <- 90045
train$zip_code[train$First.in.District == "68"] <- 90040
train$zip_code[train$First.in.District == "69"] <- 90272
train$zip_code[train$First.in.District == "70"] <- 91324
train$zip_code[train$First.in.District == "71"] <- 90024
```

```
train$zip_code[train$First.in.District == "72"] <- 91303
train$zip_code[train$First.in.District == "73"] <- 91335
train$zip_code[train$First.in.District == "74"] <- 91040
train$zip_code[train$First.in.District == "75"] <- 91345
train$zip_code[train$First.in.District == "76"] <- 90068
```

```
train$zip_code[train$First.in.District == "77"] <- 91604
train$zip_code[train$First.in.District == "78"] <- 91604
train$zip_code[train$First.in.District == "79"] <- 90248
```

```
train$zip_code[train$First.in.District == "80"] <- 91345
train$zip_code[train$First.in.District == "81"] <- 91402
train$zip_code[train$First.in.District == "82"] <- 90028
train$zip_code[train$First.in.District == "83"] <- 91316
train$zip_code[train$First.in.District == "84"] <- 91367
train$zip_code[train$First.in.District == "85"] <- 90710
```

```
train$zip_code[train$First.in.District == "86"] <- 90068
train$zip_code[train$First.in.District == "87"] <- 91344
train$zip_code[train$First.in.District == "88"] <- 91403
train$zip_code[train$First.in.District == "89"] <- 91605
```

```
train$zip_code[train$First.in.District == "90"] <- 91406
train$zip_code[train$First.in.District == "91"] <- 91342
train$zip_code[train$First.in.District == "92"] <- 90064
train$zip_code[train$First.in.District == "93"] <- 91356
train$zip_code[train$First.in.District == "94"] <- 90016
train$zip_code[train$First.in.District == "95"] <- 90045
train$zip_code[train$First.in.District == "96"] <- 91311
train$zip_code[train$First.in.District == "97"] <- 91604
train$zip_code[train$First.in.District == "98"] <- 91331
train$zip_code[train$First.in.District == "99"] <- 91604
train$zip_code[train$First.in.District == "100"] <- 91406
```

```
train$zip_code[train$First.in.District == "102"] <- 91401
train$zip_code[train$First.in.District == "103"] <- 91325
train$zip_code[train$First.in.District == "104"] <- 91306
train$zip_code[train$First.in.District == "105"] <- 91367
train$zip_code[train$First.in.District == "106"] <- 91304
train$zip_code[train$First.in.District == "107"] <- 91311
train$zip_code[train$First.in.District == "108"] <- 90210
train$zip_code[train$First.in.District == "109"] <- 90049
train$zip_code[train$First.in.District == "110"] <- 90731
train$zip_code[train$First.in.District == "112"] <- 90744
```

```
# For the test dataset
```



```

test$zip_code <- rep(NA,length(test$year))

test$zip_code[test$First.in.District == "1"] <- 90031
test$zip_code[test$First.in.District == "2"] <- 90033
test$zip_code[test$First.in.District == "3"] <- 90012
test$zip_code[test$First.in.District == "4"] <- 90012
test$zip_code[test$First.in.District == "5"] <- 90045
test$zip_code[test$First.in.District == "6"] <- 90004
test$zip_code[test$First.in.District == "7"] <- 91402
test$zip_code[test$First.in.District == "8"] <- 91326
test$zip_code[test$First.in.District == "9"] <- 90023
test$zip_code[test$First.in.District == "10"] <- 90015
test$zip_code[test$First.in.District == "11"] <- 90057
test$zip_code[test$First.in.District == "12"] <- 90042
test$zip_code[test$First.in.District == "13"] <- 90006
test$zip_code[test$First.in.District == "14"] <- 90011
test$zip_code[test$First.in.District == "15"] <- 90007
test$zip_code[test$First.in.District == "16"] <- 90032
test$zip_code[test$First.in.District == "17"] <- 90021
test$zip_code[test$First.in.District == "18"] <- 91342
test$zip_code[test$First.in.District == "19"] <- 90049
test$zip_code[test$First.in.District == "20"] <- 90026
test$zip_code[test$First.in.District == "21"] <- 90011

test$zip_code[test$First.in.District == "23"] <- 90272
test$zip_code[test$First.in.District == "24"] <- 91040
test$zip_code[test$First.in.District == "25"] <- 90023
test$zip_code[test$First.in.District == "26"] <- 90018

test$zip_code[test$First.in.District == "28"] <- 91326
test$zip_code[test$First.in.District == "29"] <- 90010

test$zip_code[test$First.in.District == "33"] <- 90003
test$zip_code[test$First.in.District == "34"] <- 90018
test$zip_code[test$First.in.District == "35"] <- 90039
test$zip_code[test$First.in.District == "36"] <- 90731
test$zip_code[test$First.in.District == "37"] <- 90024
test$zip_code[test$First.in.District == "38"] <- 90744
test$zip_code[test$First.in.District == "39"] <- 91401

test$zip_code[test$First.in.District == "41"] <- 90046
test$zip_code[test$First.in.District == "42"] <- 90041
test$zip_code[test$First.in.District == "43"] <- 90034
test$zip_code[test$First.in.District == "44"] <- 90065

test$zip_code[test$First.in.District == "46"] <- 90037

```

```
test$zip_code[test$First.in.District == "47"] <- 90032
```

```
test$zip_code[test$First.in.District == "49"] <- 90744
```

```
test$zip_code[test$First.in.District == "50"] <- 90065
```

```
test$zip_code[test$First.in.District == "51"] <- 91345
```

```
test$zip_code[test$First.in.District == "52"] <- 90029
```

```
test$zip_code[test$First.in.District == "55"] <- 90041
```

```
test$zip_code[test$First.in.District == "56"] <- 90065
```

```
test$zip_code[test$First.in.District == "57"] <- 90003
```

```
test$zip_code[test$First.in.District == "58"] <- 90035
```

```
test$zip_code[test$First.in.District == "59"] <- 90064
```

```
test$zip_code[test$First.in.District == "60"] <- 91601
```

```
test$zip_code[test$First.in.District == "61"] <- 90036
```

```
test$zip_code[test$First.in.District == "62"] <- 90066
```

```
test$zip_code[test$First.in.District == "63"] <- 90291
```

```
test$zip_code[test$First.in.District == "64"] <- 90061
```

```
test$zip_code[test$First.in.District == "65"] <- 90002
```

```
test$zip_code[test$First.in.District == "66"] <- 90037
```

```
test$zip_code[test$First.in.District == "67"] <- 90045
```

```
test$zip_code[test$First.in.District == "68"] <- 90040
```

```
test$zip_code[test$First.in.District == "69"] <- 90272
```

```
test$zip_code[test$First.in.District == "70"] <- 91324
```

```
test$zip_code[test$First.in.District == "71"] <- 90024
```

```
test$zip_code[test$First.in.District == "72"] <- 91303
```

```
test$zip_code[test$First.in.District == "73"] <- 91335
```

```
test$zip_code[test$First.in.District == "74"] <- 91040
```

```
test$zip_code[test$First.in.District == "75"] <- 91345
```

```
test$zip_code[test$First.in.District == "76"] <- 90068
```

```
test$zip_code[test$First.in.District == "77"] <- 91604
```

```
test$zip_code[test$First.in.District == "78"] <- 91604
```

```
test$zip_code[test$First.in.District == "79"] <- 90248
```

```
test$zip_code[test$First.in.District == "80"] <- 91345
```

```
test$zip_code[test$First.in.District == "81"] <- 91402
```

```
test$zip_code[test$First.in.District == "82"] <- 90028
```

```
test$zip_code[test$First.in.District == "83"] <- 91316
```

```
test$zip_code[test$First.in.District == "84"] <- 91367
```

```
test$zip_code[test$First.in.District == "85"] <- 90710
```

```
test$zip_code[test$First.in.District == "86"] <- 90068
```

```
test$zip_code[test$First.in.District == "87"] <- 91344
```

```
test$zip_code[test$First.in.District == "88"] <- 91403
```

```

test$zip_code[test$First.in.District == "89"] <- 91605

test$zip_code[test$First.in.District == "90"] <- 91406
test$zip_code[test$First.in.District == "91"] <- 91342
test$zip_code[test$First.in.District == "92"] <- 90064
test$zip_code[test$First.in.District == "93"] <- 91356
test$zip_code[test$First.in.District == "94"] <- 90016
test$zip_code[test$First.in.District == "95"] <- 90045
test$zip_code[test$First.in.District == "96"] <- 91311
test$zip_code[test$First.in.District == "97"] <- 91604
test$zip_code[test$First.in.District == "98"] <- 91331
test$zip_code[test$First.in.District == "99"] <- 91604
test$zip_code[test$First.in.District == "100"] <- 91406

test$zip_code[test$First.in.District == "102"] <- 91401
test$zip_code[test$First.in.District == "103"] <- 91325
test$zip_code[test$First.in.District == "104"] <- 91306
test$zip_code[test$First.in.District == "105"] <- 91367
test$zip_code[test$First.in.District == "106"] <- 91304
test$zip_code[test$First.in.District == "107"] <- 91311
test$zip_code[test$First.in.District == "108"] <- 90210
test$zip_code[test$First.in.District == "109"] <- 90049
test$zip_code[test$First.in.District == "110"] <- 90731

test$zip_code[test$First.in.District == "112"] <- 90744

```

With cleaned dataset, we tried

#(1) Extreme Gradient Boosting & Cross validation

```

require(xgboost)
require(methods)
require(data.table)

dtrain = xgb.DMatrix(data.matrix(train[, -c(1:2)]), label=train$elapsed_time)
dvalid = xgb.DMatrix(data.matrix(valid[, -c(1:2)]), label=valid$elapsed_time)
dtest <- xgb.DMatrix(data.matrix(df_test[, -c(1:2)]))
# depth 6~16, #eta = 0.1 ~ 0.01, nround
xg.train <- xgb.train(data=dtrain,
                      eta=0.1,
                      booster="gbtree",
                      max.depth=6,
                      verbose=2,
                      nthread=4,
                      nround=100,
                      metrics='rmse',
                      watchlist=list(train=dtrain, valid=dvalid),
                      eval.metric="rmse",

```

```

        objective="reg:linear")
p.xg.valid = predict(xg.train, dvalid)
p.xg.valid = pmax(0, p.xg.valid)
mse(valid$elapsed_time - p.xg.valid)

dtrain = xgb.DMatrix(data.matrix(df_train[, -c(1:2)]), label=df_train$elapsed_time)
xg.model <- xgb.train(data=dtrain,
  eta=0.1,
  booster="gbtree",
  max.depth=6,
  verbose=2,
  nthread=4,
  nround=100,
  metrics='rmse',
  watchlist=list(train=dtrain),
  eval.metric="rmse",
  objective="reg:linear")
p.xg.test = predict(xg.model, dtest)
head(p.xg.test)
p.xg.test = pmax(0, p.xg.test)

write_submission(p.xg.test, df_test$row.id, 'predict_xg_with_new_df.csv')

```

(2) Random Forest

```

library("randomForest")
rf.train = randomForest(elapsed_time ~ . - `Non-EMS`, data=train[, -c(1:3)],
  importance=F,
  do.trace=TRUE,
  ntree=50)
p.rf.valid = predict(rf.train, valid[, -c(1:3)])
mse(valid$elapsed_time - p.rf.valid)
rf.model = randomForest(elapsed_time ~ . - `Non-EMS`, data=df_train[, -c(1:3)],
  importance=F,
  do.trace=TRUE,
  ntree=50)
p.rf.test = predict(rf.model, df_test[, -c(1:3)])
write_submission(p.rf.test, df_test$row.id, 'predict_rf.csv')

```

(3) Neural network deep learning

```

library("neuralnet")
nnd <- neuralnet(`elapsed_time` ~ `year` + `Dispatch Sequence` +
  `Dispatch Status` + `Unit Type` + `PPE Level` +
  `Incident Creation Time (GMT)` + `First in District`
  ,data = new, hidden = c(5,3),linear.output = T)
plot(nnd)
nnd$result.matrix
nn_pred = prediction(nnd)

```

```
pr.nn <- nn_pred$net.result*(max(df_train$elapsed_time)-min(df_train$elapsed_time))+
  min(df_train$elapsed_time)
```

(4) We believed that EMS is a important factor so we include interaction

between EMS with all the variables.

Linear Regression (Interaction)

```
n <- names(df_train)
```

```
f <- as.formula(paste("elapsed_time ~", paste(n[!n %in% "elapsed_time"], collapse = " + ")))
```

```
df_t <- df_test[,c(1:3)]
```

```
lr.model <- lm(elapsed_time ~ X2013 + X2014 + X2015 + X2016 + norm_First_District +
  norm_Dispatch_Seq + AVI + CAV + ENR + HSP + NAV + ONS + OVD +
  PGR + QTR + RAD + TSP + WRS + AR + AU + Administrative +
  BC + BP + BT + CP + CR + CT + CV + DC + DP + DT + DZ + E +
  EA + EL + EM + F + FC + FT + GT + H + HC + HM + HR + PT +
  RA + RA6xx + RA8xx + RH + RP + RT + S + SC + SQ + SW + T +
  TP + UR + WT + EMS + Non.EMS + FD26028 + FD26029 +
norm_Incident_Time +
  AVI*EMS + CAV*EMS + ENR*EMS + HSP*EMS + NAV*EMS + ONS*EMS
+ OVD*EMS +
  PGR*EMS + QTR*EMS + RAD*EMS + TSP*EMS + WRS*EMS + AR*EMS +
AU*EMS + Administrative*EMS +
  BC*EMS + BP*EMS + BT*EMS + CP*EMS + CR*EMS + CT*EMS +
CV*EMS + DC*EMS + DP*EMS + DT*EMS + DZ*EMS + E*EMS +
  EA*EMS + EL*EMS + EM*EMS + F*EMS + FC*EMS + FT*EMS + GT*EMS
+ H*EMS + HC*EMS + HM*EMS + HR*EMS + PT*EMS +
  RA *EMS+ RA6xx*EMS + RA8xx*EMS + RH*EMS + RP*EMS + RT*EMS +
S*EMS + SC*EMS + SQ*EMS + SW*EMS + T*EMS +
  TP*EMS + UR*EMS + WT*EMS+ AVI*Non.EMS + CAV*Non.EMS + ENR
*Non.EMS+ HSP*Non.EMS + NAV*Non.EMS + ONS*Non.EMS + OVD*Non.EMS +
  PGR *Non.EMS+ QTR*Non.EMS + RAD*Non.EMS + TSP*Non.EMS + WRS
*Non.EMS+ AR *Non.EMS+ AU *Non.EMS+ Administrative*Non.EMS +
  BC*Non.EMS + BP *Non.EMS+ BT*Non.EMS + CP*Non.EMS + CR
*Non.EMS+ CT *Non.EMS+ CV *Non.EMS+ DC*Non.EMS + DP *Non.EMS+ DT
*Non.EMS+ DZ*Non.EMS + E*Non.EMS +
  EA *Non.EMS+ EL*Non.EMS + EM *Non.EMS+ F *Non.EMS+ FC
*Non.EMS+ FT *Non.EMS+ GT *Non.EMS+ H *Non.EMS+ HC*Non.EMS + HM*Non.EMS
+ HR*Non.EMS + PT*Non.EMS +
  RA *Non.EMS+ RA6xx *Non.EMS+ RA8xx *Non.EMS+ RH*Non.EMS +
RP*Non.EMS + RT *Non.EMS+ S *Non.EMS+ SC*Non.EMS + SQ*Non.EMS + SW
*Non.EMS+ T*Non.EMS +
  TP *Non.EMS+ UR *Non.EMS+ WT*Non.EMS,data = df)
anova(lr.model)
```

Since we achieved Low MSE when we used GBM and Linear regression with the

polynomial degree of 5, we treid ensemble of 2 tecniques.

We gave 70% weight to gradient boosting and 30% weight to the lm+polynomial regression.

```
# lm + gbm (weighted)

pred_out <- predict(lm_out,df_t)
predTest <- predict(bst, dtest)
ensem<-pred_out*.3+predTest*.7
head(ensem)
setwd("/Users/junhyukjang/Desktop")
df_submit <- data.frame(df_test$row.id, pred_lm)
names(df_submit) <- c("row.id", "prediction")
write.csv(x = df_submit, file = 'prediction_infinite_lm.csv',row.names=FALSE)
length(ensem)
prediction_ensemble <- read.csv("~/Desktop/Submission/prediction_ensemble.csv")
```

```
# Even if we tried with those ways, it was not influenced on our kaggle score change.
# We have submitted 30 times with different algorithms and different ways of data cleaning.
# However, we could not get the result that we are satisfied with.
# Even though our group could not reach to the goal, from this group project,
# we have learned how to deal with large data set as well as how to cooperate
# and work together. We have discussed together.
```