

101C_final_project

```
train<-read.csv("/Users/lingjuexie/Downloads/lafdttraining.csv")
#View(train)
```

```
str(train)
```

```
## 'data.frame': 2774370 obs. of 11 variables:
## $ row.id : int 580427 3312294 704743 1802270 1826207 2996572 2964360 164745 2
## $ incident.ID : Factor w/ 1308591 levels "FD26028.067137399",...: 1 1 1 2 2 2 2 3 4
## $ year : int 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 ...
## $ First.in.District : int 93 93 93 12 12 12 12 59 6 6 ...
## $ Emergency.Dispatch.Code : Factor w/ 1 level "Emergency": 1 1 1 1 1 1 1 1 1 ...
## $ Dispatch.Sequence : int 1 2 3 1 2 3 4 1 1 2 ...
## $ Dispatch.Status : Factor w/ 12 levels "AVI","CAV","ENR",...: 9 9 10 9 10 10 6 9 9 9 ..
## $ Unit.Type : Factor w/ 41 levels "Administrative Non-Emergency",...: 38 15 28 15 2
## $ PPE.Level : Factor w/ 2 levels "EMS","Non-EMS": 1 1 1 1 1 1 1 1 1 1 ...
## $ Incident.Creation.Time..GMT.: Factor w/ 86390 levels "00:00:00","00:00:01",...: 82830 82830 82830 8
## $ elapsed_time : int 263 263 367 248 NA 216 203 495 413 493 ...
```

```
summary(train)
```

```
##      row.id      incident.ID      year
## Min.   : 1      FD26028.5792503737: 154   Min.   :2013
## 1st Qu.: 851896      FD26028.5798927238: 138   1st Qu.:2014
## Median :1703909      FD26029.0775587933: 133   Median :2015
## Mean   :1704482      FD26028.0842920648: 124   Mean    :2015
## 3rd Qu.:2556828      FD26029.5731679408: 114   3rd Qu.:2016
## Max.   :3409335      FD26029.069691221 : 111   Max.    :2016
##      (Other)      :2773596
## First.in.District Emergency.Dispatch.Code Dispatch.Sequence
## Min.   : 1.00      Emergency:2774086   Min.   : 1.000
## 1st Qu.: 26.00      NA's      : 284     1st Qu.: 1.000
## Median : 57.00
## Mean   : 52.47
## 3rd Qu.: 79.00
## Max.   :112.00
## NA's   :284
## Dispatch.Status      Unit.Type
## QTR   :2294343      E - Engine           :1107573
## RAD    : 430760      RA - ALS Rescue Ambulance : 875687
## AVI    : 14934      RA8xx - BLS Rescue Ambulance : 421104
## ONS    : 10541      T - Truck            : 274348
## NAV    : 10423      BC - Battalion Chief    : 37896
## HSP    : 6084      EM - Emergency Medical Supervisor: 30158
## (Other): 7285      (Other)              : 27604
## PPE.Level      Incident.Creation.Time..GMT. elapsed_time
## EMS   :2202724      02:37:12: 178        Min.   : 2.0
## Non-EMS: 571631      09:20:38: 177        1st Qu.: 307.0
## NA's   : 15         18:43:21: 176        Median : 389.0
##      18:12:09: 175        Mean   : 508.1
##      18:45:40: 172        3rd Qu.: 517.0
##      (Other) :2773208      Max.   :86398.0
## NA's      : 284        NA's   :456940
```

```
summary(factor(train$year))
```

```
##    2013    2014    2015    2016  
## 658854 681045 707027 727444
```

```
summary(factor(train$First.in.District))
```

```
##      9      64      66      57      11      46      33      89      94  
## 90732 84899 72097 66116 63180 57233 56148 53832 53242  
##      39      61      27      98      37      60      51      91      15  
## 52587 48169 48080 46010 44486 42723 41910 41480 39816  
##      3      10      65      4      26      35      58      63      13  
## 39605 39197 39035 39018 38524 38051 37841 37402 37029  
##      2      68      7      29      93      6      88      90      34  
## 36155 35931 35011 34676 34583 34469 34293 33428 33128  
##      73      41      81      72      52      105      82      14      20  
## 31645 30265 28891 28156 27926 27801 27307 27098 26634  
##      1      75      59      102      38      87      21      77      85  
## 25983 25679 25258 25100 24695 24570 24266 23929 22501  
##      12      84      74      92      78      96      19      104      43  
## 22209 22023 21854 21437 21352 20740 20642 20167 20027  
##      83      62      5      86      48      70      25      56      100  
## 19973 19930 19546 18879 18351 18313 16932 16537 16494  
##      106      67      79      103      47      50      95      36      17  
## 16249 15049 15034 14929 13583 13309 13062 11966 11865  
##      42      112      107      55      16      18      44      76      71  
## 11675 11562 11430 10952 10788 10154 9987 9515 9292  
##      69      101      24      8      109      23      97      28 (Other)  
## 8925 7603 7487 6387 5673 5274 4445 4392 10273  
##      NA's  
##      284
```

```
summary(factor(train$Dispatch.Sequence))
```

```
##      1      2      3      4      5      6      7      8      9  
## 1303014 892056 279784 85987 38661 27035 22781 20811 19770  
##      10      11      12      13      14      15      16      17      18  
## 17368 14637 10555 7786 4767 3125 2519 2186 1787  
##      19      20      21      22      23      24      25      26      27  
## 1528 1305 1135 1001 825 730 608 524 462  
##      28      29      30      31      32      33      34      35      36  
## 409 378 347 315 289 252 239 210 192  
##      37      38      39      41      40      42      43      44      45  
## 176 157 148 133 131 126 116 112 108  
##      46      47      48      49      52      50      51      53      54  
## 102 100 84 78 77 75 74 71 66  
##      55      58      59      56      57      61      62      60      63  
##      58      55      48      47      45      45      45      43      39  
##      68      64      66      67      69      71      70      65      72  
##      39      37      36      36      35      34      33      31      30  
##      73      74      75      80      83      79      82      76      78  
##      30      26      26      25      25      23      22      21      21  
##      81      84      85      89      87      77      86      88      90  
##      19      18      18      18      17      16      16      16      16  
##      91      93      92      94      95      105      96      109 (Other)
```

```
##      13      13      12      11      11      11      10      10      550
##      NA's
##      5308
```

```
summary(factor(train$Dispatch.Status))
```

```
##      AVI      CAV      ENR      HSP      NAV      ONS      OVD      PGR      QTR
##  14934    1509    4716    6084    10423    10541      67    315 2294343
##      RAD      TSP      WRS
##  430760      40      638
```

```
summary(factor(train$Unit.Type))
```

```
##      Administrative Non-Emergency      AR - Arson
##                                5649      1802
##      AU - Assessment Unit      BC - Battalion Chief
##                                24      37896
##      BP - Brush Patrol      BT - Boat
##                                543      2182
##      CP - Command Post Unit      CR - Crash
##                                58      501
##      CT - Cycle Team      CV - Communications Van
##                                739      61
##      DC - Division Commander      DP - Dump Truck
##                                639      38
##      DT - Dozer (Tractor) Tender      DZ - Dozer (Tractor)
##                                338      83
##      E - Engine      EA - Emergency Air
##                                1107573      188
##      EL - Emergency Lighting      EM - Emergency Medical Supervisor
##                                7      30158
##      F - Foam      FC - Fire Chief
##                                1315      1
##      FT - Foam Tender      GT - Gator Truck
##                                36      64
##      H - Helicopter      HC - Hose Carrier
##                                4659      7
##      HM - Hazmat Tender      HR - Heavy Rescue
##                                9      1253
##      PT - Planning Trailer      RA - ALS Rescue Ambulance
##                                2      875687
##      RA6xx - ALS Rescue (Ready Reserve)      RA8xx - BLS Rescue Ambulance
##                                828      421104
##      RH - Rescue Helicopter      RP - Rehab Plug Buggy
##                                714      4
##      RT - Rehab Tender (Food Service)      S - Stair (Stair 80 at LAX)
##                                99      383
##      SC - Swift Water Coordinator      SQ - Squad
##                                7      3240
##      SW - Swift Water Rescue      T - Truck
##                                33      274348
##      TP - Tractor Transport      UR - USAR Apparatus
##                                441      1452
##      WT - Water Tender
##                                205
```

```
summary(train$Incident.Creation.Time..GMT.)
```

```
## 02:37:12 09:20:38 18:43:21 18:12:09 18:45:40 22:04:30 01:47:51 03:35:51
##      178      177      176      175      172      157      156      153
## 17:31:17 21:38:02 22:04:27 02:45:47 23:07:09 03:47:56 06:54:44 21:31:18
##      149      149      148      146      130      129      127      124
## 03:54:16 22:30:09 19:28:10 20:19:13 23:45:56 18:24:28 21:20:15 22:37:28
##      122      121      120      116      116      114      114      114
## 07:11:12 23:08:25 03:44:56 20:00:43 18:28:37 03:57:23 15:58:20 18:13:54
##      113      113      112      112      111      110      110      110
## 00:09:31 02:37:13 02:47:46 19:34:58 21:31:30 16:27:35 21:46:42 22:59:57
##      107      107      106      105      105      103      103      103
## 23:11:28 19:50:07 20:15:35 21:37:59 00:12:22 02:01:46 20:04:17 03:58:38
##      102      101      101      101      100      100      100      99
## 05:10:41 00:51:01 01:22:48 02:50:48 18:43:52 20:12:49 21:27:21 16:28:02
##      99      98      98      98      98      98      98      97
## 21:09:21 23:19:34 02:53:19 06:52:49 20:00:53 20:36:05 20:53:38 04:40:57
##      97      97      96      96      96      96      96      95
## 17:59:05 22:15:26 22:54:49 23:59:21 01:11:29 02:52:29 13:18:34 18:18:05
##      95      95      95      95      94      94      94      94
## 19:21:16 21:34:01 00:13:56 01:06:23 02:32:25 16:43:36 17:45:02 22:47:05
##      94      94      93      93      93      93      93      93
## 23:34:56 00:10:42 01:57:30 02:26:40 05:31:15 18:37:29 19:29:49 19:33:02
##      93      92      92      92      92      92      92      92
## 20:05:06 21:53:38 22:21:12 00:16:30 01:28:36 02:52:27 03:01:30 03:06:28
##      92      92      92      91      91      91      91      91
## 03:46:19 17:08:26 (Other)      NA's
##      91      91 2763464      284
```

```
summary(factor(train$First.in.District))
```

```
##      9      64      66      57      11      46      33      89      94
## 90732 84899 72097 66116 63180 57233 56148 53832 53242
##      39      61      27      98      37      60      51      91      15
## 52587 48169 48080 46010 44486 42723 41910 41480 39816
##      3      10      65      4      26      35      58      63      13
## 39605 39197 39035 39018 38524 38051 37841 37402 37029
##      2      68      7      29      93      6      88      90      34
## 36155 35931 35011 34676 34583 34469 34293 33428 33128
##      73      41      81      72      52      105      82      14      20
## 31645 30265 28891 28156 27926 27801 27307 27098 26634
##      1      75      59      102      38      87      21      77      85
## 25983 25679 25258 25100 24695 24570 24266 23929 22501
##      12      84      74      92      78      96      19      104      43
## 22209 22023 21854 21437 21352 20740 20642 20167 20027
##      83      62      5      86      48      70      25      56      100
## 19973 19930 19546 18879 18351 18313 16932 16537 16494
##      106      67      79      103      47      50      95      36      17
## 16249 15049 15034 14929 13583 13309 13062 11966 11865
##      42      112      107      55      16      18      44      76      71
## 11675 11562 11430 10952 10788 10154 9987 9515 9292
##      69      101      24      8      109      23      97      28 (Other)
## 8925 7603 7487 6387 5673 5274 4445 4392 10273
##      NA's
```

```
##      284
```

```
summary(factor(train$elapsed_time))
```

```
##      354      341      338      335      362      352      326      336      344
##      7379      7371      7356      7337      7337      7334      7333      7332      7323
##      329      348      353      342      330      332      343      323      345
##      7311      7303      7300      7299      7282      7280      7274      7260      7259
##      351      357      317      347      331      318      333      325      356
##      7248      7248      7245      7234      7230      7229      7218      7212      7207
##      327      340      319      350      346      316      349      355      334
##      7204      7191      7188      7183      7174      7173      7162      7157      7154
##      337      321      324      339      311      361      315      328      358
##      7150      7148      7142      7142      7141      7107      7102      7090      7089
##      360      365      363      366      320      370      322      310      359
##      7084      7079      7078      7060      7047      7047      7042      7037      7023
##      307      368      369      364      371      314      306      367      299
##      7011      7002      7000      6966      6930      6912      6905      6884      6873
##      312      313      308      379      373      304      384      309      303
##      6872      6845      6843      6838      6837      6823      6804      6802      6781
##      375      374      302      301      380      376      382      305      300
##      6760      6757      6754      6735      6731      6730      6729      6728      6709
##      372      295      378      377      381      298      296      297      383
##      6699      6697      6691      6690      6642      6623      6622      6591      6513
##      293      386      385      291      393      392      290      398 (Other)
##      6484      6482      6448      6432      6426      6423      6420      6407 1632644
##      NA's
## 456940
```