# Descriptive Analysis

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## Contents



### Settings

```
rm(list = ls())
bomb_data <- read.csv("../data/geocoded_bomb_data.csv")

bomb_data$Time <- as.POSIXct(bomb_data$Time)

bomb_data$district <- as.factor(bomb_data$district)
bomb_data$Type.of.bomb <- as.factor(bomb_data$Type.of.bomb)

head(bomb_data)
```

```
##   X                Time                                                Location
## 1 1 1940-09-07 00:08:00                43 Southwark Park Road, SE16, London, UK
## 2 2 1940-09-07 00:10:00 49 Southwark Park road, Bermondsey, SE16, London, UK
## 3 3 1940-09-07 00:15:00                84 Southwark Park Road, SE16, London, UK
## 4 4 1940-09-07 00:18:00             141 Braidwood Road, Catford SE6, London, UK
## 5 5 1940-09-07 00:20:00              129 Killearn Road, Catford SE6, London, UK
## 6 6 1940-09-07 00:20:00                  27 Crutchley Road, Downham, London, UK
##   Type.of.bomb
## 1           IB
## 2           IB
## 3           IB
## 4           IB
## 5           IB
## 6           IB
##                                                                Damage.or.other
## 1                                                  Grocers: 3x2 roof damaged
## 2                                                   Bakers: 3x2 roof damaged
## 3 front room on 1st floor and contents slightly damaged. 3x2 rood damage
## 4                                                              10x6 roof damage
## 5                                 Front room on 1st floor severely damaged
## 6                                IB on enclosed ground at rear of premises
##        lat        lon  district
## 1 51.49225 -0.0621761 Southwark
## 2 51.49269 -0.0653908 Southwark
## 3 51.49225 -0.0621761 Southwark
## 4 51.44085 -0.0053336  Lewisham
## 5 51.44151 -0.0054617  Lewisham
```

```
## 6 51.43674  0.0052611  Lewisham
```

## Descriptive analysis

### Explosive event type

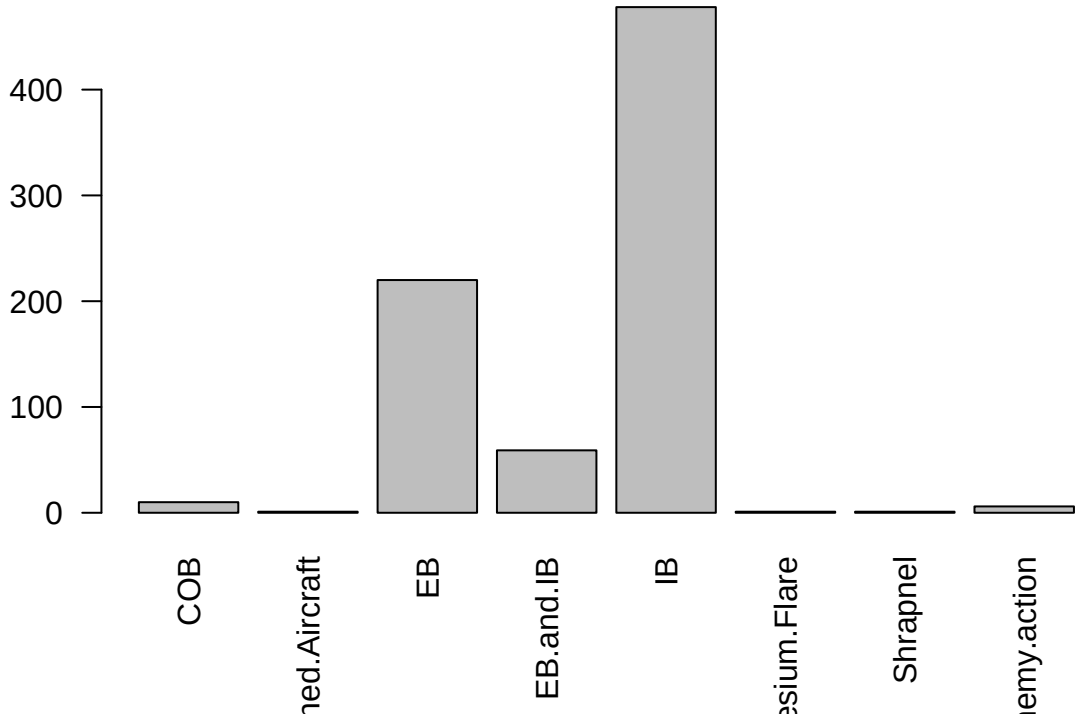
We got the following types of bombs - Explosive Bombs (EB) - Incendiary Bombs (IB) - Magnesium Flare - Crude Oil Bomb (COB) - Shrapnel - Unknown enemy action - Crashed aircraft

Moreover we got 67 NAs

```
summary(bomb_data$Type.of.bomb)
```

```
##                 COB    Crashed.Aircraft                  EB           EB.and.IB
##                  10                   1                 220                  59
##                  IB     Magnesium.Flare            Shrapnel Unknow.enemy.action
##                 478                   1                   1                   6
##                NA's
##                  67
```

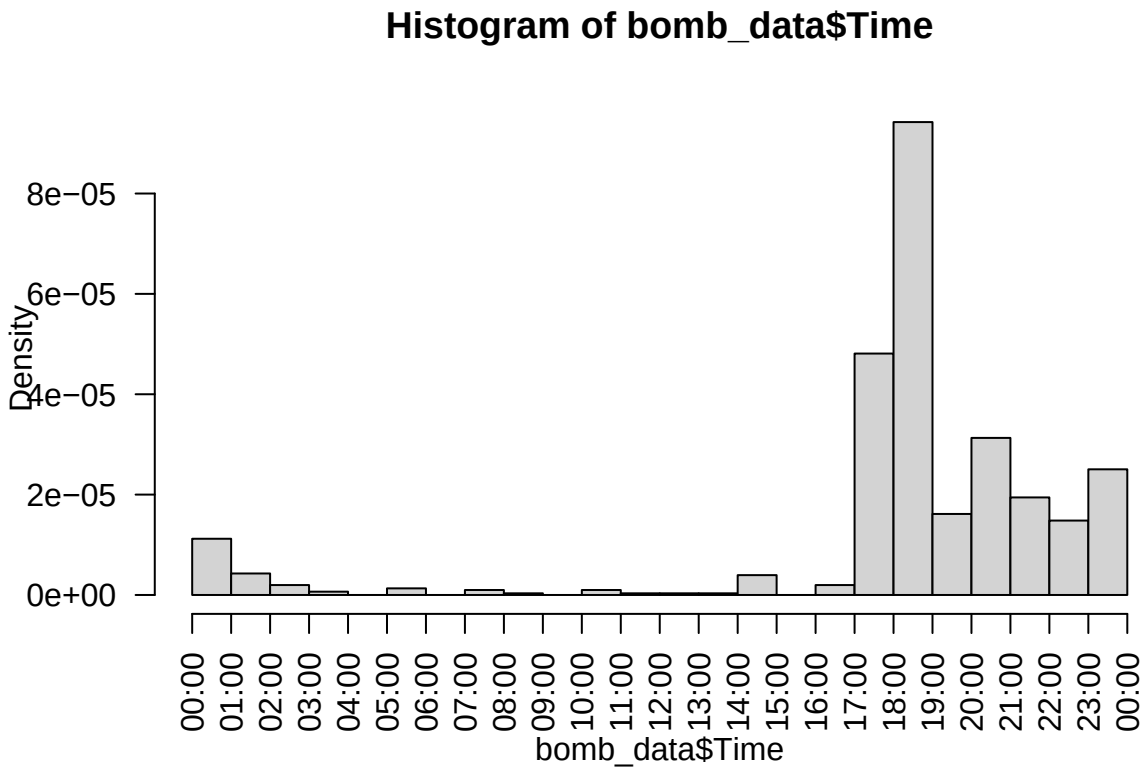
```
#Type of bomb
barplot(table(bomb_data$Type.of.bomb), las=2)
```




### Evolution in time

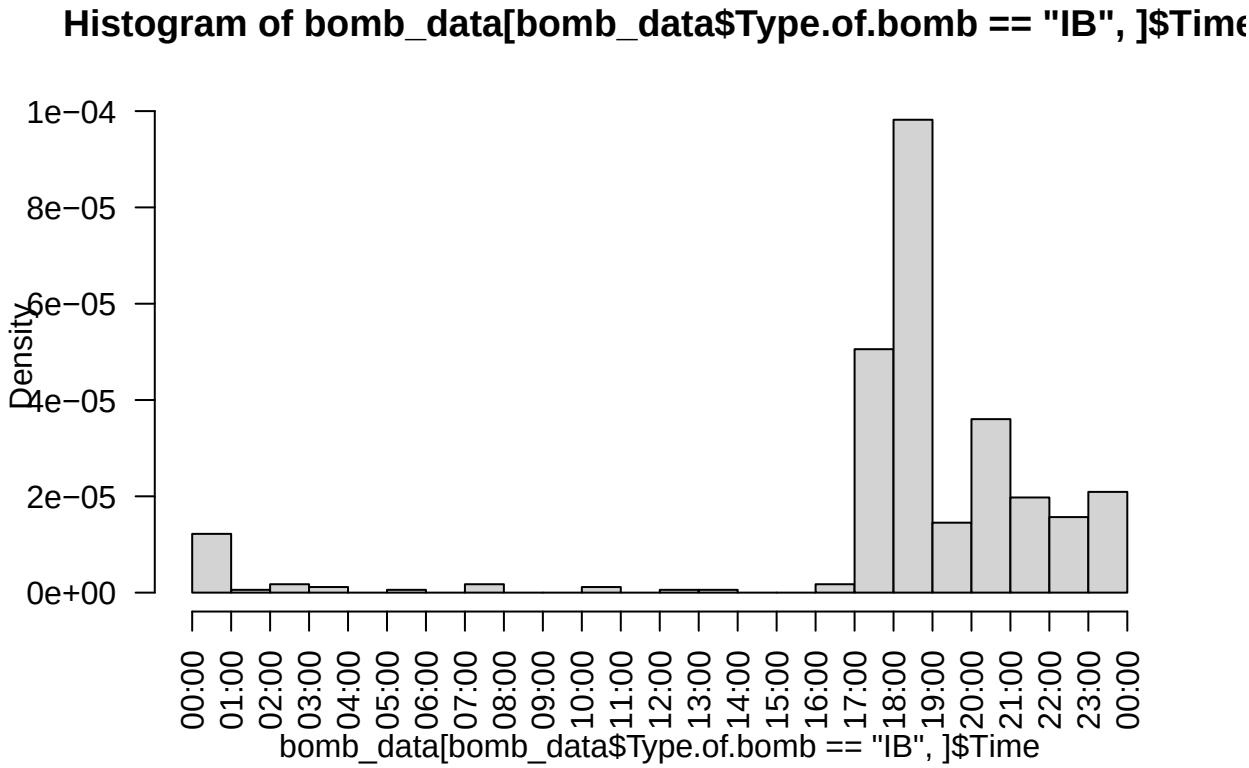
All types of bombs

```r
hist(bomb_data$Time, breaks = "hours", las=2)
```

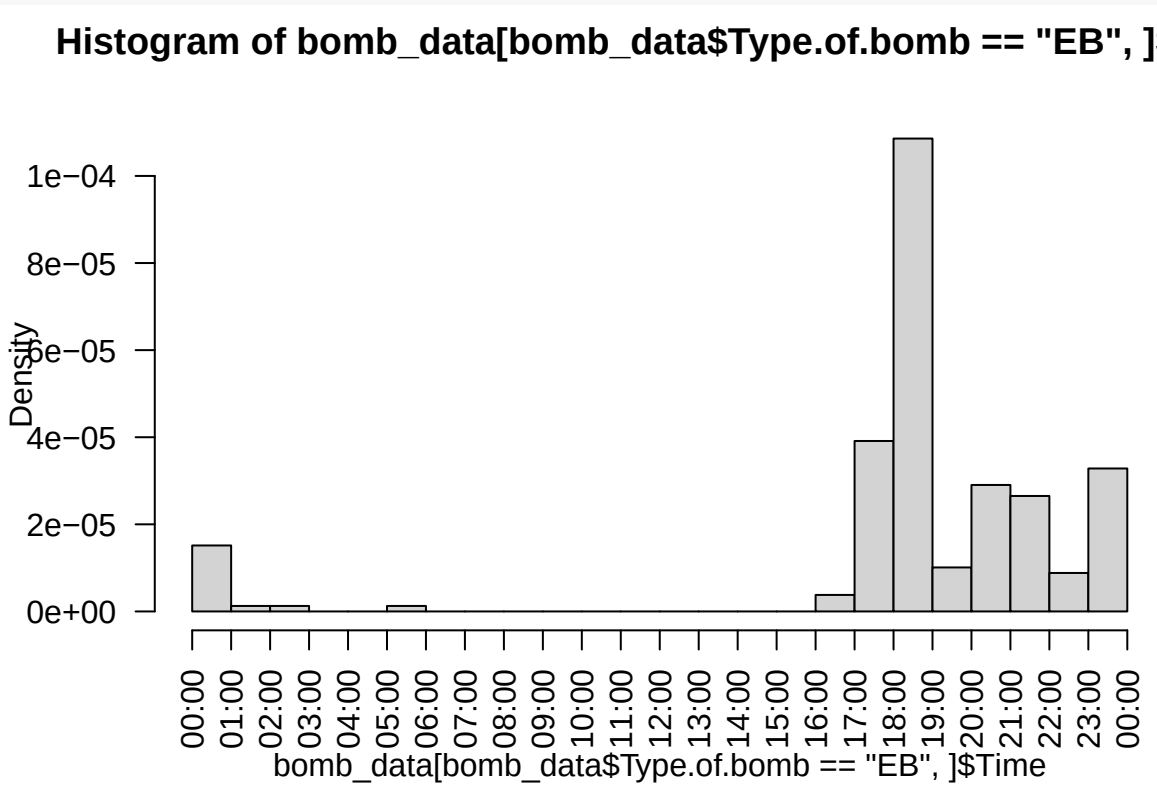



By bomb type

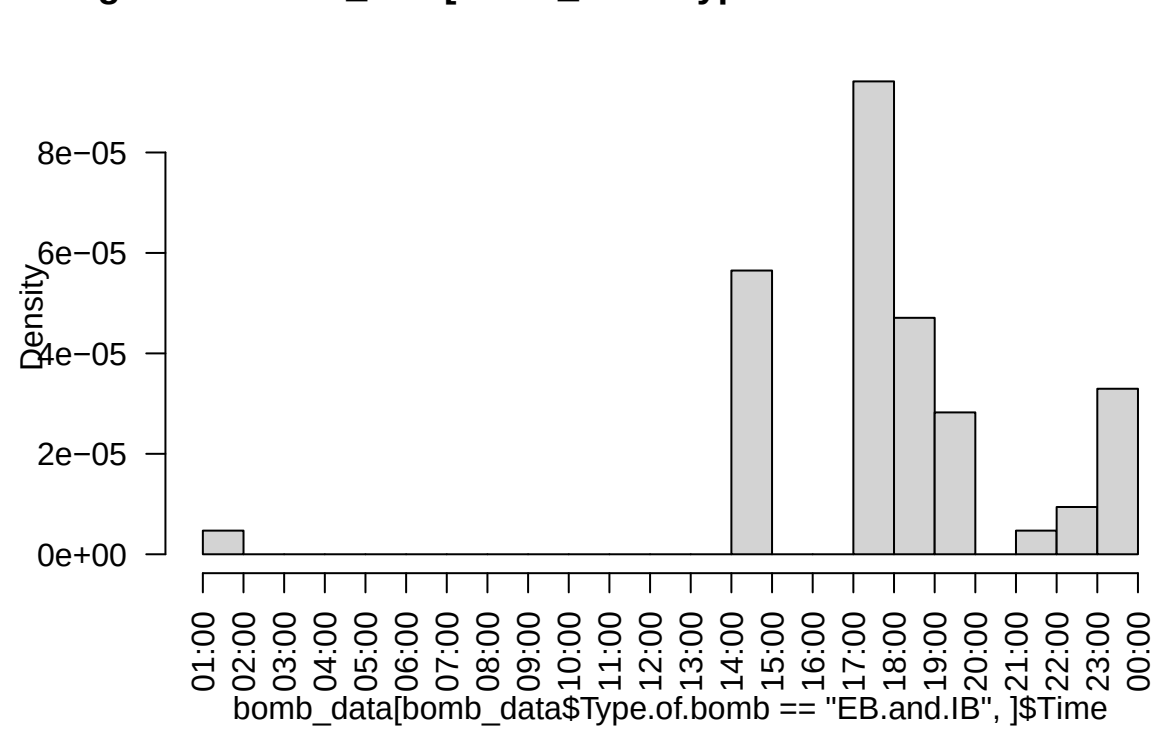
```r
hist(bomb_data[bomb_data$Type.of.bomb == "IB",]$Time, breaks = "hours", las=2)
```



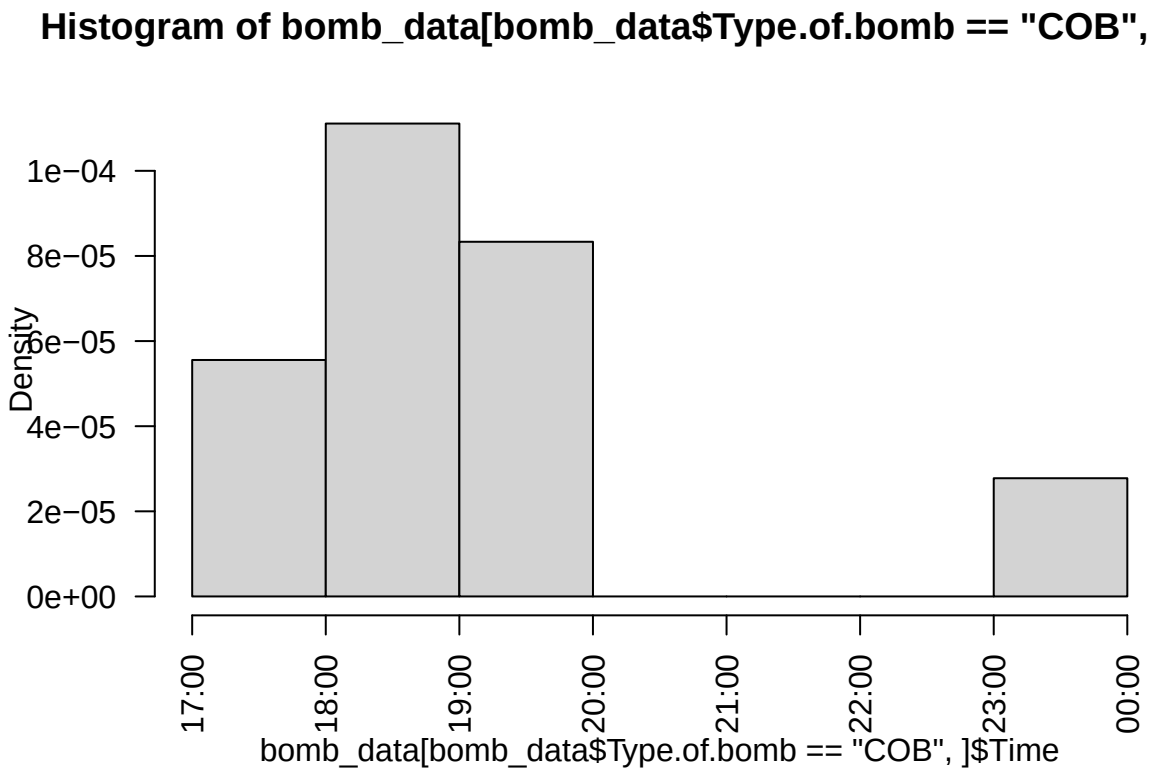
```
hist(bomb_data[bomb_data$Type.of.bomb == "EB",]$Time, breaks = "hours", las=2)
```




```
hist(bomb_data[bomb_data$Type.of.bomb == "EB.and.IB",]$Time, breaks = "hours", las=2)
```



```r
hist(bomb_data[bomb_data$Type.of.bomb == "COB",]$Time, breaks = "hours", las=2)
```




**Maps**

References - https://www.paulamoraga.com/tutorial-terra/#2_Vector_data - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london - https://conservancy.umn.edu/bitstream/handle/11299/220339/time-maps-tutorial-v2.html?sequence=3&isAllowed=y - https://rspatial.org/spatial/6-crs.html

```r
library(terra)
```

```
## terra 1.7.55
```

```r
library(ggplot2)
library(tidyterra)
```

```
## Warning: package 'tidyterra' was built under R version 4.2.3
```

```
##
## Attaching package: 'tidyterra'
```

```
## The following object is masked from 'package:stats':
##
##     filter
```

```r
london_spat_vect <- vect("../data/London-data/London_Borough_Excluding_MHW.shp")
london_spat_vect
```

```
##  class       : SpatVector
##  geometry    : polygons
##  dimensions  : 33, 7  (geometries, attributes)
##  extent      : 503568.2, 561957.5, 155850.8, 200933.9  (xmin, xmax, ymin, ymax)
##  source      : London_Borough_Excluding_MHW.shp
```

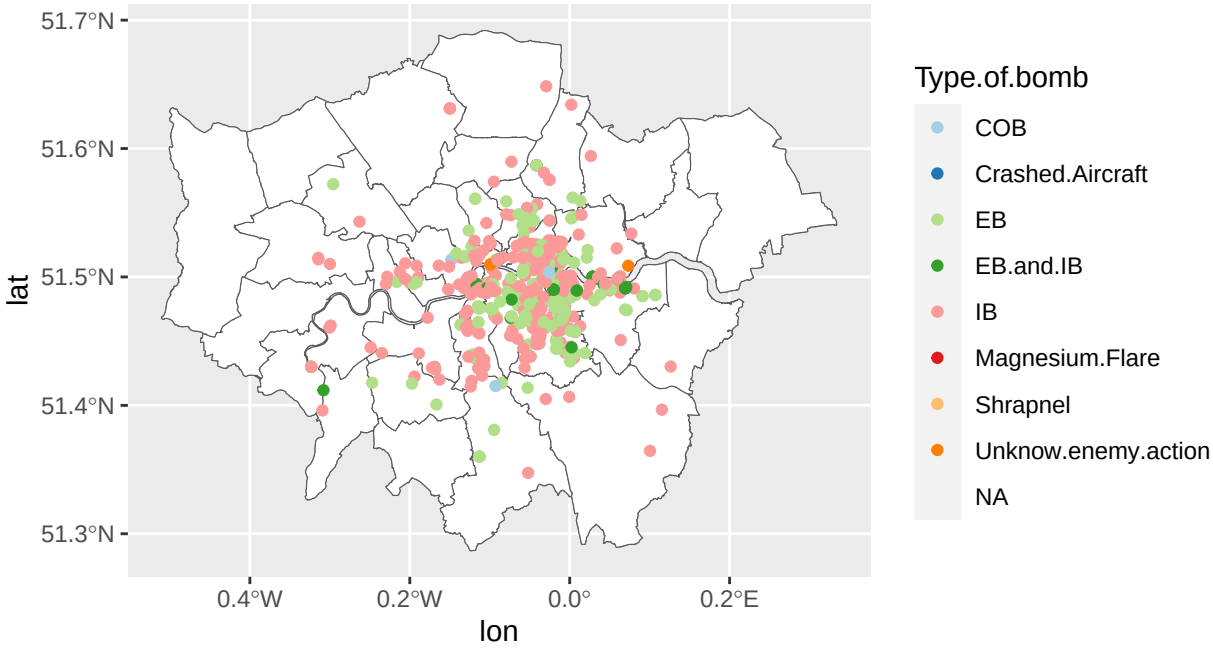
```
##  coord. ref. : OSGB36 / British National Grid
##  names       :             NAME  GSS_CODE  HECTARES NONLD_AREA ONS_INNER
##  type        :            <chr>     <chr>     <num>      <num>     <chr>
##  values      : Kingston upon ~ E09000021      3726          0         F
##                        Croydon E09000008      8649          0         F
##                        Bromley E09000006 1.501e+04          0         F
##  SUB_2009 SUB_2006
##     <chr>    <chr>
##        NA       NA
##        NA       NA
##        NA       NA
```

```
newcrs <- "+proj=longlat +datum=WGS84"
london_spat_vect <- terra::project(london_spat_vect, newcrs)

london_map <- ggplot(data = london_spat_vect) +
  geom_spatvector() +
  geom_sf(fill = "white")

# adding data points
explosion_sites <- london_map +
  geom_point(data = bomb_data[-c(367,459,745,395, 750,749),],
             aes(x = lon, y = lat, label = X, group = Time, col = Type.of.bomb)) +
  scale_colour_brewer(palette = "Paired")
```

```
## Warning in geom_point(data = bomb_data[-c(367, 459, 745, 395, 750, 749), :
## Ignoring unknown aesthetics: label
```

```
explosion_sites
```

```
## Warning: Removed 74 rows containing missing values (`geom_point()`).
```




```
greenwich <- london_map +
  geom_sf(fill = ifelse(london_map$data$NAME == "Greenwich", 'red', "white"))
```

```
greenwich + geom_point(data = bomb_data[-c(367,459,745,395, 750,749),],
             aes(x = lon, y = lat, label = X, group = Time, col = district == "Greenwich" ))
```

```
## Warning in geom_point(data = bomb_data[-c(367, 459, 745, 395, 750, 749), :
## Ignoring unknown aesthetics: label
```

```
## Warning: Removed 8 rows containing missing values (`geom_point()`).
```