```r
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```r
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```r
library(ggplot2)
library(tidyr)

# Read the CSV file
data <- read.csv("data/trashwheel.csv")
data$Date <- as.Date(data$Date, format = "%m/%d/%Y")
```

```r
# Filter data for the last 6 months
recent_data <- data %>%
  filter(Date > max(Date) %m-% months(6))

head(recent_data)
```

```
##       ID                Name Dumpster Month Year       Date Weight Volume
## 1 mister Mister Trash Wheel      581  June 2023 2023-06-28   3.56     15
## 2 mister Mister Trash Wheel      582  June 2023 2023-06-28   3.79     15
## 3 mister Mister Trash Wheel      583  June 2023 2023-06-28   2.28     10
## 4 mister Mister Trash Wheel      584  June 2023 2023-06-29   3.90     15
## 5 mister Mister Trash Wheel      585  July 2023 2023-07-03   4.08     15
## 6 mister Mister Trash Wheel      586  July 2023 2023-07-05   4.36     15
##   PlasticBottles Polystyrene CigaretteButts GlassBottles PlasticBags Wrappers
## 1           3400         480           4400           36         310     2200
## 2           4000         390           4200           32         400     1400
## 3           2100         300           3300           12         240     1000
## 4           1900         220           4700           30         180     2100
## 5           2300         310           3900           27         220     1400
## 6           3200         270           5200           21         320     1800
##   SportsBalls HomesPowered
```

```
## 1          27          59
## 2          38          63
## 3          18          38
## 4          21          65
## 5          30          68
## 6          27          73
```

```
sums_recent <- recent_data %>%
  select(-Year) %>%
  select(-Date) %>%
  summarise(across(where(is.numeric), sum, na.rm = TRUE))
```

```
## Warning: There was 1 warning in `summarise()`.
## i In argument: `across(where(is.numeric), sum, na.rm = TRUE)`.
## Caused by warning:
## ! The `...` argument of `across()` is deprecated as of dplyr 1.1.0.
## Supply arguments directly to `.fns` through an anonymous function instead.
##
##   # Previously
##   across(a:b, mean, na.rm = TRUE)
##
##   # Now
##   across(a:b, \(x) mean(x, na.rm = TRUE))
```

```
head(sums_recent)
```

```
##   Dumpster Weight Volume PlasticBottles Polystyrene CigaretteButts GlassBottles
## 1    29645 157.97    710         101710       11453         169480          983
##   PlasticBags Wrappers SportsBalls HomesPowered
## 1       11298    77670         964         2638
```

```
sums_recent <- pivot_longer(sums_recent, cols = everything(), names_to = "Waste_Type", values_to = "Tota

print(sums_recent)
```

```
## # A tibble: 11 x 2
##    Waste_Type       Total
##    <chr>            <dbl>
##  1 Dumpster         29645
##  2 Weight             158.
##  3 Volume             710
##  4 PlasticBottles  101710
##  5 Polystyrene      11453
##  6 CigaretteButts  169480
##  7 GlassBottles       983
##  8 PlasticBags      11298
##  9 Wrappers         77670
## 10 SportsBalls        964
## 11 HomesPowered      2638
```

```
ggplot(sums_recent, aes(x = Waste_Type, y = Total, fill = Waste_Type)) +
  geom_bar(stat = "identity") +
  scale_y_log10() +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1)) +
  labs(title = "Total Waste Collected Over the Last 6 Months",
       x = "Waste Type",
       y = "Total Collected",
       fill = "Waste Type") +
  scale_fill_brewer(palette = "Set3")
```


```
recent_data_long <- recent_data %>%
  select(Date, PlasticBottles, Polystyrene, CigaretteButts, GlassBottles,
         PlasticBags, Wrappers, SportsBalls) %>%
  gather(key = "Waste_Type", value = "Count", -Date)

print(recent_data_long)
```

```
##          Date     Waste_Type Count
## 1  2023-06-28 PlasticBottles  3400
## 2  2023-06-28 PlasticBottles  4000
## 3  2023-06-28 PlasticBottles  2100
## 4  2023-06-29 PlasticBottles  1900
## 5  2023-07-03 PlasticBottles  2300
## 6  2023-07-05 PlasticBottles  3200
```

```
## 7   2023-07-05 PlasticBottles  1200
## 8   2023-07-10 PlasticBottles  3400
## 9   2023-07-10 PlasticBottles  2100
## 10  2023-07-10 PlasticBottles   980
## 11  2023-07-10 PlasticBottles   540
## 12  2023-07-10 PlasticBottles  1100
## 13  2023-07-11 PlasticBottles   750
## 14  2023-07-24 PlasticBottles  1800
## 15  2023-07-24 PlasticBottles  2300
## 16  2023-07-31 PlasticBottles  3400
## 17  2023-07-31 PlasticBottles  2700
## 18  2023-08-08 PlasticBottles  3000
## 19  2023-08-09 PlasticBottles  3800
## 20  2023-08-10 PlasticBottles  4200
## 21  2023-08-10 PlasticBottles  1800
## 22  2023-08-14 PlasticBottles  2000
## 23  2023-08-17 PlasticBottles  3300
## 24  2023-09-11 PlasticBottles  4200
## 25  2023-09-11 PlasticBottles  1200
## 26  2023-09-12 PlasticBottles  2200
## 27  2023-09-12 PlasticBottles   850
## 28  2023-09-12 PlasticBottles   980
## 29  2023-09-13 PlasticBottles   300
## 30  2023-09-13 PlasticBottles   450
## 31  2023-09-13 PlasticBottles    80
## 32  2023-09-19 PlasticBottles  1800
## 33  2023-09-19 PlasticBottles  2200
## 34  2023-09-26 PlasticBottles  3400
## 35  2023-10-10 PlasticBottles  3100
## 36  2023-10-18 PlasticBottles  2600
## 37  2023-11-24 PlasticBottles  1800
## 38  2023-11-24 PlasticBottles  1200
## 39  2023-11-24 PlasticBottles  2200
## 40  2023-11-24 PlasticBottles  1400
## 41  2023-11-29 PlasticBottles  2100
## 42  2023-11-29 PlasticBottles  1600
## 43  2023-11-29 PlasticBottles  2000
## 44  2023-12-12 PlasticBottles  3200
## 45  2023-12-12 PlasticBottles  2100
## 46  2023-12-20 PlasticBottles  1400
## 47  2023-12-20 PlasticBottles   880
## 48  2023-12-23 PlasticBottles  2000
## 49  2023-12-23 PlasticBottles  1200
## 50  2023-06-28    Polystyrene   480
## 51  2023-06-28    Polystyrene   390
## 52  2023-06-28    Polystyrene   300
## 53  2023-06-29    Polystyrene   220
## 54  2023-07-03    Polystyrene   310
## 55  2023-07-05    Polystyrene   270
## 56  2023-07-05    Polystyrene   180
## 57  2023-07-10    Polystyrene   400
## 58  2023-07-10    Polystyrene   200
## 59  2023-07-10    Polystyrene    80
## 60  2023-07-10    Polystyrene    48
```

```
## 61  2023-07-10    Polystyrene   100
## 62  2023-07-11    Polystyrene    50
## 63  2023-07-24    Polystyrene   160
## 64  2023-07-24    Polystyrene   390
## 65  2023-07-31    Polystyrene   480
## 66  2023-07-31    Polystyrene   300
## 67  2023-08-08    Polystyrene   440
## 68  2023-08-09    Polystyrene   350
## 69  2023-08-10    Polystyrene   480
## 70  2023-08-10    Polystyrene    90
## 71  2023-08-14    Polystyrene   290
## 72  2023-08-17    Polystyrene   400
## 73  2023-09-11    Polystyrene   500
## 74  2023-09-11    Polystyrene   210
## 75  2023-09-12    Polystyrene   340
## 76  2023-09-12    Polystyrene   150
## 77  2023-09-12    Polystyrene    80
## 78  2023-09-13    Polystyrene    50
## 79  2023-09-13    Polystyrene   120
## 80  2023-09-13    Polystyrene    20
## 81  2023-09-19    Polystyrene   240
## 82  2023-09-19    Polystyrene   380
## 83  2023-09-26    Polystyrene   360
## 84  2023-10-10    Polystyrene   240
## 85  2023-10-18    Polystyrene   190
## 86  2023-11-24    Polystyrene   120
## 87  2023-11-24    Polystyrene   180
## 88  2023-11-24    Polystyrene   210
## 89  2023-11-24    Polystyrene   100
## 90  2023-11-29    Polystyrene   180
## 91  2023-11-29    Polystyrene   240
## 92  2023-11-29    Polystyrene   160
## 93  2023-12-12    Polystyrene   240
## 94  2023-12-12    Polystyrene   190
## 95  2023-12-20    Polystyrene   120
## 96  2023-12-20    Polystyrene    75
## 97  2023-12-23    Polystyrene   140
## 98  2023-12-23    Polystyrene   210
## 99  2023-06-28 CigaretteButts  4400
## 100 2023-06-28 CigaretteButts  4200
## 101 2023-06-28 CigaretteButts  3300
## 102 2023-06-29 CigaretteButts  4700
## 103 2023-07-03 CigaretteButts  3900
## 104 2023-07-05 CigaretteButts  5200
## 105 2023-07-05 CigaretteButts  2500
## 106 2023-07-10 CigaretteButts  4500
## 107 2023-07-10 CigaretteButts  3200
## 108 2023-07-10 CigaretteButts  1400
## 109 2023-07-10 CigaretteButts   980
## 110 2023-07-10 CigaretteButts  2100
## 111 2023-07-11 CigaretteButts  1200
## 112 2023-07-24 CigaretteButts  3200
## 113 2023-07-24 CigaretteButts  5000
## 114 2023-07-31 CigaretteButts  5800
```

```
## 115 2023-07-31 CigaretteButts  4200
## 116 2023-08-08 CigaretteButts  5400
## 117 2023-08-09 CigaretteButts  6000
## 118 2023-08-10 CigaretteButts  4800
## 119 2023-08-10 CigaretteButts  3800
## 120 2023-08-14 CigaretteButts  4300
## 121 2023-08-17 CigaretteButts  5500
## 122 2023-09-11 CigaretteButts  4200
## 123 2023-09-11 CigaretteButts  3100
## 124 2023-09-12 CigaretteButts  4400
## 125 2023-09-12 CigaretteButts  1800
## 126 2023-09-12 CigaretteButts  2100
## 127 2023-09-13 CigaretteButts  1500
## 128 2023-09-13 CigaretteButts   900
## 129 2023-09-13 CigaretteButts   500
## 130 2023-09-19 CigaretteButts  3600
## 131 2023-09-19 CigaretteButts  4800
## 132 2023-09-26 CigaretteButts  4200
## 133 2023-10-10 CigaretteButts  3300
## 134 2023-10-18 CigaretteButts  3900
## 135 2023-11-24 CigaretteButts  2400
## 136 2023-11-24 CigaretteButts  3200
## 137 2023-11-24 CigaretteButts  3700
## 138 2023-11-24 CigaretteButts  2000
## 139 2023-11-29 CigaretteButts  2800
## 140 2023-11-29 CigaretteButts  3200
## 141 2023-11-29 CigaretteButts  4400
## 142 2023-12-12 CigaretteButts  4200
## 143 2023-12-12 CigaretteButts  3000
## 144 2023-12-20 CigaretteButts  2900
## 145 2023-12-20 CigaretteButts  2600
## 146 2023-12-23 CigaretteButts  3200
## 147 2023-12-23 CigaretteButts  4000
## 148 2023-06-28   GlassBottles    36
## 149 2023-06-28   GlassBottles    32
## 150 2023-06-28   GlassBottles    12
## 151 2023-06-29   GlassBottles    30
## 152 2023-07-03   GlassBottles    27
## 153 2023-07-05   GlassBottles    21
## 154 2023-07-05   GlassBottles    18
## 155 2023-07-10   GlassBottles    22
## 156 2023-07-10   GlassBottles    29
## 157 2023-07-10   GlassBottles     6
## 158 2023-07-10   GlassBottles     0
## 159 2023-07-10   GlassBottles    12
## 160 2023-07-11   GlassBottles    10
## 161 2023-07-24   GlassBottles    24
## 162 2023-07-24   GlassBottles    32
## 163 2023-07-31   GlassBottles    24
## 164 2023-07-31   GlassBottles    38
## 165 2023-08-08   GlassBottles    21
## 166 2023-08-09   GlassBottles    18
## 167 2023-08-10   GlassBottles    40
## 168 2023-08-10   GlassBottles    27
```

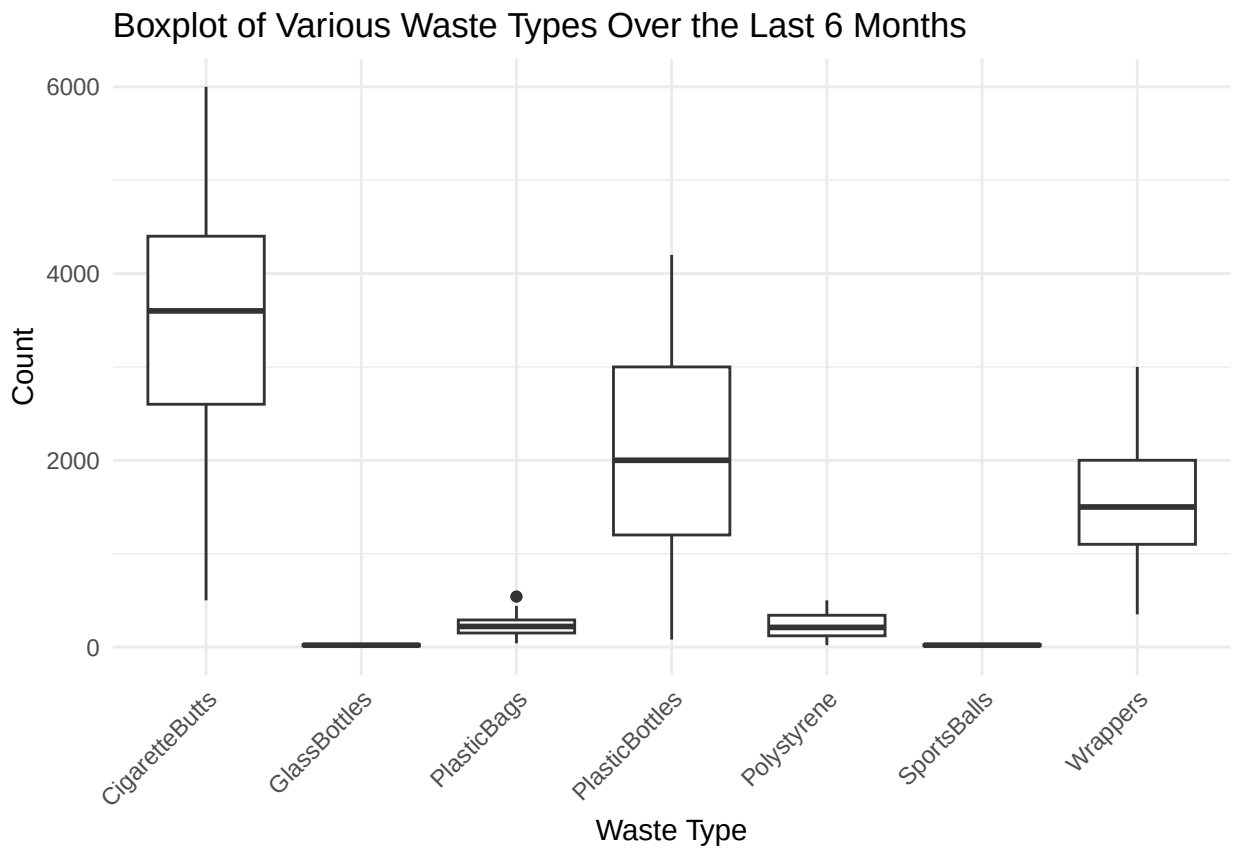
```
## 169 2023-08-14   GlassBottles    24
## 170 2023-08-17   GlassBottles    44
## 171 2023-09-11   GlassBottles    18
## 172 2023-09-11   GlassBottles    10
## 173 2023-09-12   GlassBottles    20
## 174 2023-09-12   GlassBottles     8
## 175 2023-09-12   GlassBottles    16
## 176 2023-09-13   GlassBottles    12
## 177 2023-09-13   GlassBottles     0
## 178 2023-09-13   GlassBottles     4
## 179 2023-09-19   GlassBottles    24
## 180 2023-09-19   GlassBottles    40
## 181 2023-09-26   GlassBottles    20
## 182 2023-10-10   GlassBottles    12
## 183 2023-10-18   GlassBottles    18
## 184 2023-11-24   GlassBottles     6
## 185 2023-11-24   GlassBottles    12
## 186 2023-11-24   GlassBottles    21
## 187 2023-11-24   GlassBottles     8
## 188 2023-11-29   GlassBottles    18
## 189 2023-11-29   GlassBottles    28
## 190 2023-11-29   GlassBottles    24
## 191 2023-12-12   GlassBottles    30
## 192 2023-12-12   GlassBottles    22
## 193 2023-12-20   GlassBottles    12
## 194 2023-12-20   GlassBottles     8
## 195 2023-12-23   GlassBottles    18
## 196 2023-12-23   GlassBottles    27
## 197 2023-06-28    PlasticBags   310
## 198 2023-06-28    PlasticBags   400
## 199 2023-06-28    PlasticBags   240
## 200 2023-06-29    PlasticBags   180
## 201 2023-07-03    PlasticBags   220
## 202 2023-07-05    PlasticBags   320
## 203 2023-07-05    PlasticBags   190
## 204 2023-07-10    PlasticBags   280
## 205 2023-07-10    PlasticBags   250
## 206 2023-07-10    PlasticBags   150
## 207 2023-07-10    PlasticBags   120
## 208 2023-07-10    PlasticBags    48
## 209 2023-07-11    PlasticBags   110
## 210 2023-07-24    PlasticBags   220
## 211 2023-07-24    PlasticBags   360
## 212 2023-07-31    PlasticBags   440
## 213 2023-07-31    PlasticBags   220
## 214 2023-08-08    PlasticBags   330
## 215 2023-08-09    PlasticBags   120
## 216 2023-08-10    PlasticBags   270
## 217 2023-08-10    PlasticBags   420
## 218 2023-08-14    PlasticBags   400
## 219 2023-08-17    PlasticBags   310
## 220 2023-09-11    PlasticBags   540
## 221 2023-09-11    PlasticBags   200
## 222 2023-09-12    PlasticBags   140
```

```
## 223 2023-09-12    PlasticBags   180
## 224 2023-09-12    PlasticBags    80
## 225 2023-09-13    PlasticBags   120
## 226 2023-09-13    PlasticBags   100
## 227 2023-09-13    PlasticBags    40
## 228 2023-09-19    PlasticBags   280
## 229 2023-09-19    PlasticBags   410
## 230 2023-09-26    PlasticBags   300
## 231 2023-10-10    PlasticBags   220
## 232 2023-10-18    PlasticBags   290
## 233 2023-11-24    PlasticBags   140
## 234 2023-11-24    PlasticBags   180
## 235 2023-11-24    PlasticBags   240
## 236 2023-11-24    PlasticBags    80
## 237 2023-11-29    PlasticBags   200
## 238 2023-11-29    PlasticBags   260
## 239 2023-11-29    PlasticBags   180
## 240 2023-12-12    PlasticBags   210
## 241 2023-12-12    PlasticBags   190
## 242 2023-12-20    PlasticBags   220
## 243 2023-12-20    PlasticBags   140
## 244 2023-12-23    PlasticBags   200
## 245 2023-12-23    PlasticBags   250
## 246 2023-06-28       Wrappers  2200
## 247 2023-06-28       Wrappers  1400
## 248 2023-06-28       Wrappers  1000
## 249 2023-06-29       Wrappers  2100
## 250 2023-07-03       Wrappers  1400
## 251 2023-07-05       Wrappers  1800
## 252 2023-07-05       Wrappers  1500
## 253 2023-07-10       Wrappers  2200
## 254 2023-07-10       Wrappers  1800
## 255 2023-07-10       Wrappers   980
## 256 2023-07-10       Wrappers   450
## 257 2023-07-10       Wrappers   900
## 258 2023-07-11       Wrappers  1200
## 259 2023-07-24       Wrappers  1700
## 260 2023-07-24       Wrappers  2400
## 261 2023-07-31       Wrappers  3000
## 262 2023-07-31       Wrappers  1800
## 263 2023-08-08       Wrappers  1400
## 264 2023-08-09       Wrappers  2100
## 265 2023-08-10       Wrappers  2400
## 266 2023-08-10       Wrappers  1850
## 267 2023-08-14       Wrappers  3000
## 268 2023-08-17       Wrappers  1100
## 269 2023-09-11       Wrappers  2900
## 270 2023-09-11       Wrappers  1400
## 271 2023-09-12       Wrappers  2000
## 272 2023-09-12       Wrappers  1500
## 273 2023-09-12       Wrappers  1100
## 274 2023-09-13       Wrappers   600
## 275 2023-09-13       Wrappers   800
## 276 2023-09-13       Wrappers   350
```

```
## 277 2023-09-19       Wrappers  2100
## 278 2023-09-19       Wrappers  2700
## 279 2023-09-26       Wrappers  1200
## 280 2023-10-10       Wrappers   980
## 281 2023-10-18       Wrappers  1600
## 282 2023-11-24       Wrappers  1900
## 283 2023-11-24       Wrappers  1000
## 284 2023-11-24       Wrappers  1200
## 285 2023-11-24       Wrappers   980
## 286 2023-11-29       Wrappers  1500
## 287 2023-11-29       Wrappers  1100
## 288 2023-11-29       Wrappers  2200
## 289 2023-12-12       Wrappers  1800
## 290 2023-12-12       Wrappers  1200
## 291 2023-12-20       Wrappers   980
## 292 2023-12-20       Wrappers  1400
## 293 2023-12-23       Wrappers  1900
## 294 2023-12-23       Wrappers  1600
## 295 2023-06-28    SportsBalls    27
## 296 2023-06-28    SportsBalls    38
## 297 2023-06-28    SportsBalls    18
## 298 2023-06-29    SportsBalls    21
## 299 2023-07-03    SportsBalls    30
## 300 2023-07-05    SportsBalls    27
## 301 2023-07-05    SportsBalls    14
## 302 2023-07-10    SportsBalls    27
## 303 2023-07-10    SportsBalls    21
## 304 2023-07-10    SportsBalls     2
## 305 2023-07-10    SportsBalls     8
## 306 2023-07-10    SportsBalls    12
## 307 2023-07-11    SportsBalls    10
## 308 2023-07-24    SportsBalls    24
## 309 2023-07-24    SportsBalls    30
## 310 2023-07-31    SportsBalls    18
## 311 2023-07-31    SportsBalls    30
## 312 2023-08-08    SportsBalls    24
## 313 2023-08-09    SportsBalls    40
## 314 2023-08-10    SportsBalls    21
## 315 2023-08-10    SportsBalls    42
## 316 2023-08-14    SportsBalls    36
## 317 2023-08-17    SportsBalls    10
## 318 2023-09-11    SportsBalls    30
## 319 2023-09-11    SportsBalls     6
## 320 2023-09-12    SportsBalls    20
## 321 2023-09-12    SportsBalls    18
## 322 2023-09-12    SportsBalls     4
## 323 2023-09-13    SportsBalls     0
## 324 2023-09-13    SportsBalls     0
## 325 2023-09-13    SportsBalls     2
## 326 2023-09-19    SportsBalls    27
## 327 2023-09-19    SportsBalls    18
## 328 2023-09-26    SportsBalls    14
## 329 2023-10-10    SportsBalls    30
## 330 2023-10-18    SportsBalls    20
```

```
## 331 2023-11-24    SportsBalls    14
## 332 2023-11-24    SportsBalls    22
## 333 2023-11-24    SportsBalls    18
## 334 2023-11-24    SportsBalls    10
## 335 2023-11-29    SportsBalls    30
## 336 2023-11-29    SportsBalls    18
## 337 2023-11-29    SportsBalls    12
## 338 2023-12-12    SportsBalls    16
## 339 2023-12-12    SportsBalls    20
## 340 2023-12-20    SportsBalls    32
## 341 2023-12-20    SportsBalls    10
## 342 2023-12-23    SportsBalls    22
## 343 2023-12-23    SportsBalls    21
```

```
ggplot(recent_data_long, aes(x = Waste_Type, y = Count)) +
  geom_boxplot() +
  theme_minimal() +
  labs(title = "Boxplot of Various Waste Types Over the Last 6 Months",
       x = "Waste Type",
       y = "Count") +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```




```
summary_stats <- recent_data_long %>%
  group_by(Waste_Type) %>%
  summarise(Median_Count = median(Count),
```

```
            IQR = IQR(Count),
            Lower_Whisker = quantile(Count, 0.25) - 1.5 * IQR(Count),
            Upper_Whisker = quantile(Count, 0.75) + 1.5 * IQR(Count),
            Mean_Count = mean(Count))

# Print the summary statistics
print(summary_stats)
```

```
## # A tibble: 7 x 6
##   Waste_Type     Median_Count   IQR Lower_Whisker Upper_Whisker Mean_Count
##   <chr>                 <int> <dbl>         <dbl>         <dbl>      <dbl>
## 1 CigaretteButts         3600  1800        -100          7100       3459.
## 2 GlassBottles             20    15         -10.5          49.5       20.1
## 3 PlasticBags             220   140         -60           500        231.
## 4 PlasticBottles         2000  1800       -1500          5700       2076.
## 5 Polystyrene             210   220        -210           670        234.
## 6 SportsBalls              20    15         -10.5          49.5       19.7
## 7 Wrappers               1500   900        -250          3350       1585.
```

```
recent_data_long$Date_numeric <- as.numeric(recent_data_long$Date - min(recent_data_long$Date))

# List of waste types to model
waste_types <- c("Polystyrene", "CigaretteButts", "GlassBottles", "PlasticBags", "Wrappers", "SportsBall

# Initialize an empty list to store models
models <- list()

# Loop over waste types, fit model, and store
for(waste in waste_types) {
  model <- lm(Count ~ Date_numeric, data = filter(recent_data_long, Waste_Type == waste))
  models[[waste]] <- model
}

# Display summaries of all models
lapply(models, summary)
```

```
## $Polystyrene
##
## Call:
## lm(formula = Count ~ Date_numeric, data = filter(recent_data_long,
##     Waste_Type == waste))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -227.947  -83.583   -0.212   94.278  266.527
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  284.0374    29.0047   9.793 6.27e-13 ***
## Date_numeric  -0.6742     0.3032  -2.223    0.031 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

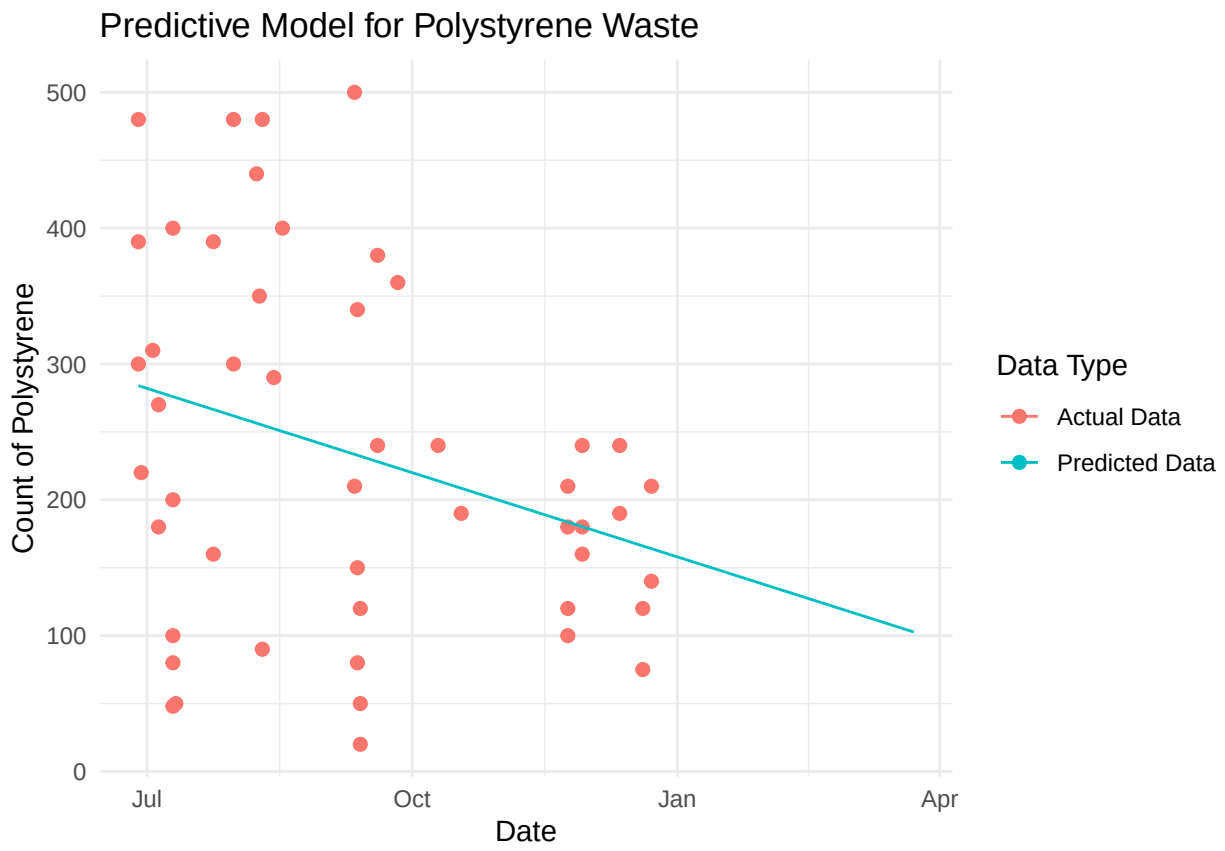
```
##
## Residual standard error: 127.1 on 47 degrees of freedom
## Multiple R-squared:  0.09517,    Adjusted R-squared:  0.07592
## F-statistic: 4.944 on 1 and 47 DF,  p-value: 0.03103
##
##
## $CigaretteButts
##
## Call:
## lm(formula = Count ~ Date_numeric, data = filter(recent_data_long,
##     Waste_Type == waste))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2951.2  -542.4   167.7   867.1  2438.4
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3693.931    305.549  12.089 4.98e-16 ***
## Date_numeric   -3.152      3.194  -0.987    0.329
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1338 on 47 degrees of freedom
## Multiple R-squared:  0.02029,    Adjusted R-squared:  -0.000552
## F-statistic: 0.9735 on 1 and 47 DF,  p-value: 0.3289
##
##
## $GlassBottles
##
## Call:
## lm(formula = Count ~ Date_numeric, data = filter(recent_data_long,
##     Waste_Type == waste))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -22.055  -7.985  -0.017   6.467  23.155
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  22.43726    2.39036   9.387 2.37e-12 ***
## Date_numeric -0.03185    0.02499  -1.274    0.209
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 10.47 on 47 degrees of freedom
## Multiple R-squared:  0.0334, Adjusted R-squared:  0.01283
## F-statistic: 1.624 on 1 and 47 DF,  p-value: 0.2088
##
##
## $PlasticBags
##
## Call:
## lm(formula = Count ~ Date_numeric, data = filter(recent_data_long,
```

```
##     Waste_Type == waste))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -203.165  -66.105   -4.461   55.539  309.556
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  255.1115    24.5069  10.410 8.62e-14 ***
## Date_numeric  -0.3289     0.2562  -1.284    0.206
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 107.3 on 47 degrees of freedom
## Multiple R-squared:  0.03388,    Adjusted R-squared:  0.01332
## F-statistic: 1.648 on 1 and 47 DF,  p-value: 0.2055
##
##
## $Wrappers
##
## Call:
## lm(formula = Count ~ Date_numeric, data = filter(recent_data_long,
##     Waste_Type == waste))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1231.69  -473.20   -41.56   421.26  1375.42
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1691.788    145.247  11.648 1.86e-15 ***
## Date_numeric   -1.430      1.518  -0.942    0.351
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 636.2 on 47 degrees of freedom
## Multiple R-squared:  0.01852,    Adjusted R-squared:  -0.002365
## F-statistic: 0.8867 on 1 and 47 DF,  p-value: 0.3512
##
##
## $SportsBalls
##
## Call:
## lm(formula = Count ~ Date_numeric, data = filter(recent_data_long,
##     Waste_Type == waste))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -19.6224  -7.1185   0.0232   5.9884  21.6509
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  21.26811    2.37402   8.959 9.84e-12 ***
## Date_numeric -0.02137    0.02482  -0.861    0.394
```

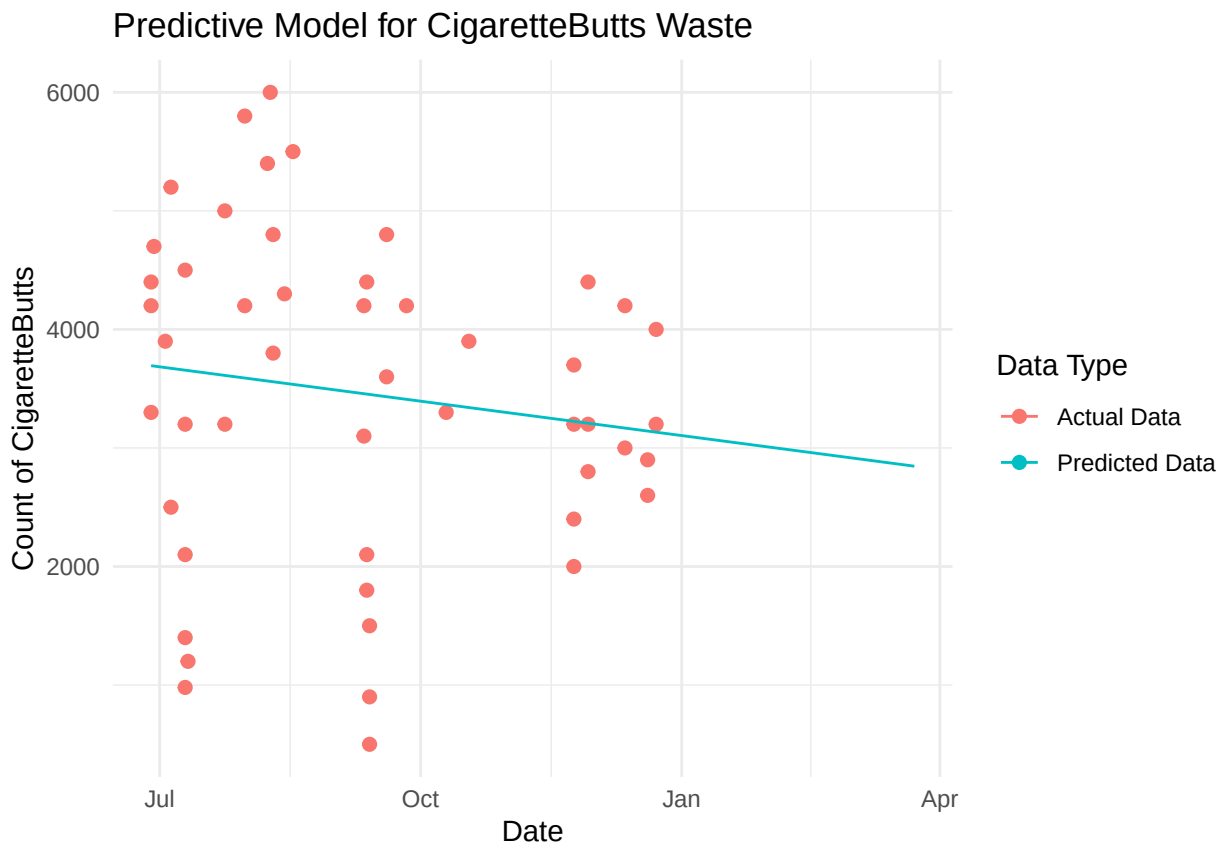
```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 10.4 on 47 degrees of freedom
## Multiple R-squared:  0.01553,    Adjusted R-squared:  -0.005413
## F-statistic: 0.7416 on 1 and 47 DF,  p-value: 0.3935
```

```r
# Function to create prediction plots for a given waste type
create_prediction_plot <- function(waste) {
  # Extending the prediction range to include the next 3 months
  max_date_numeric <- max(recent_data_long$Date_numeric)
  future_extend <- as.numeric((max(recent_data_long$Date) %m+% months(3)) - max(recent_data_long$Date))
  prediction_data <- data.frame(Date_numeric = seq(min(recent_data_long$Date_numeric), max_date_numeric
  prediction_data$Predicted_Count <- predict(models[[waste]], newdata = prediction_data)
  prediction_data$Date <- min(recent_data_long$Date) + prediction_data$Date_numeric * days(1)

  # Plotting
  p <- ggplot(filter(recent_data_long, Waste_Type == waste), aes(x = Date, y = Count)) +
    geom_point(aes(color = "Actual Data"), size = 2) +
    geom_line(data = prediction_data, aes(x = Date, y = Predicted_Count, color = "Predicted Data")) +
    theme_minimal() +
    labs(title = paste("Predictive Model for", waste, "Waste"),
         x = "Date",
         y = paste("Count of", waste),
         color = "Data Type")

  return(p)
}
```

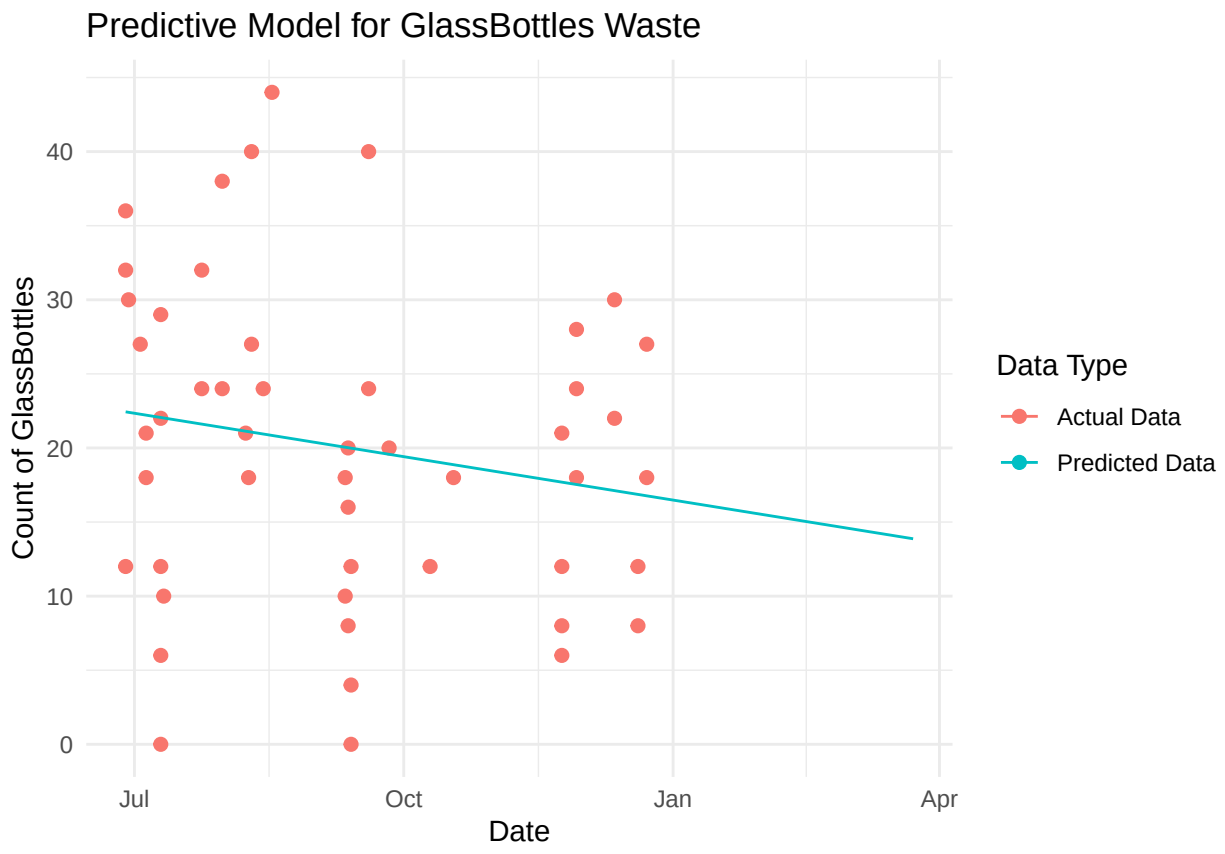
```r
# Use the function to create plots
plot_list <- lapply(waste_types, create_prediction_plot)

plot_list[[1]]
```


Predictive Model for Polystyrene Waste
Count of Polystyrene
500
400
300
200
100
0
Jul
Oct
Jan
Apr
Date
Data Type
Actual Data
Predicted Data

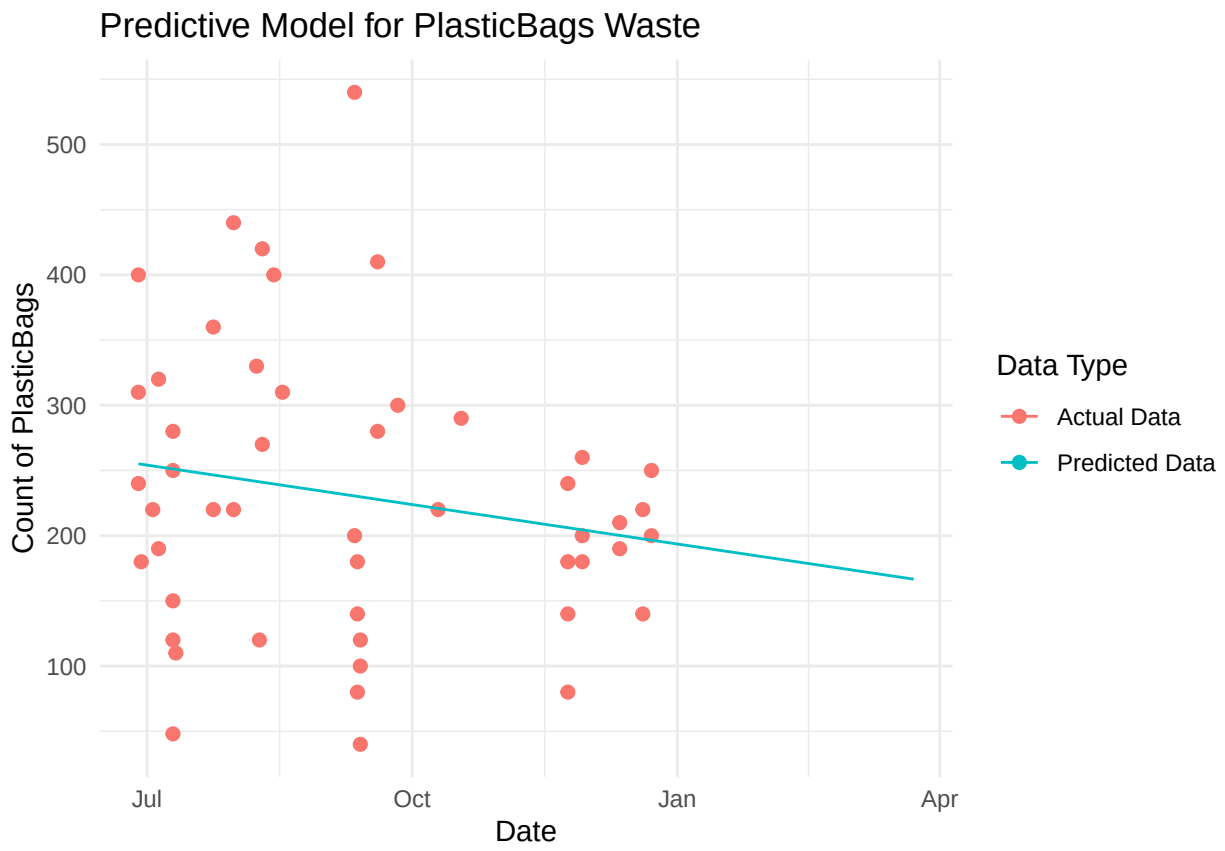
```
plot_list[[2]]
```


Predictive Model for CigaretteButts Waste
6000
4000
2000
Count of CigaretteButts
Jul
Oct
Jan
Apr
Date
Data Type
Actual Data
Predicted Data

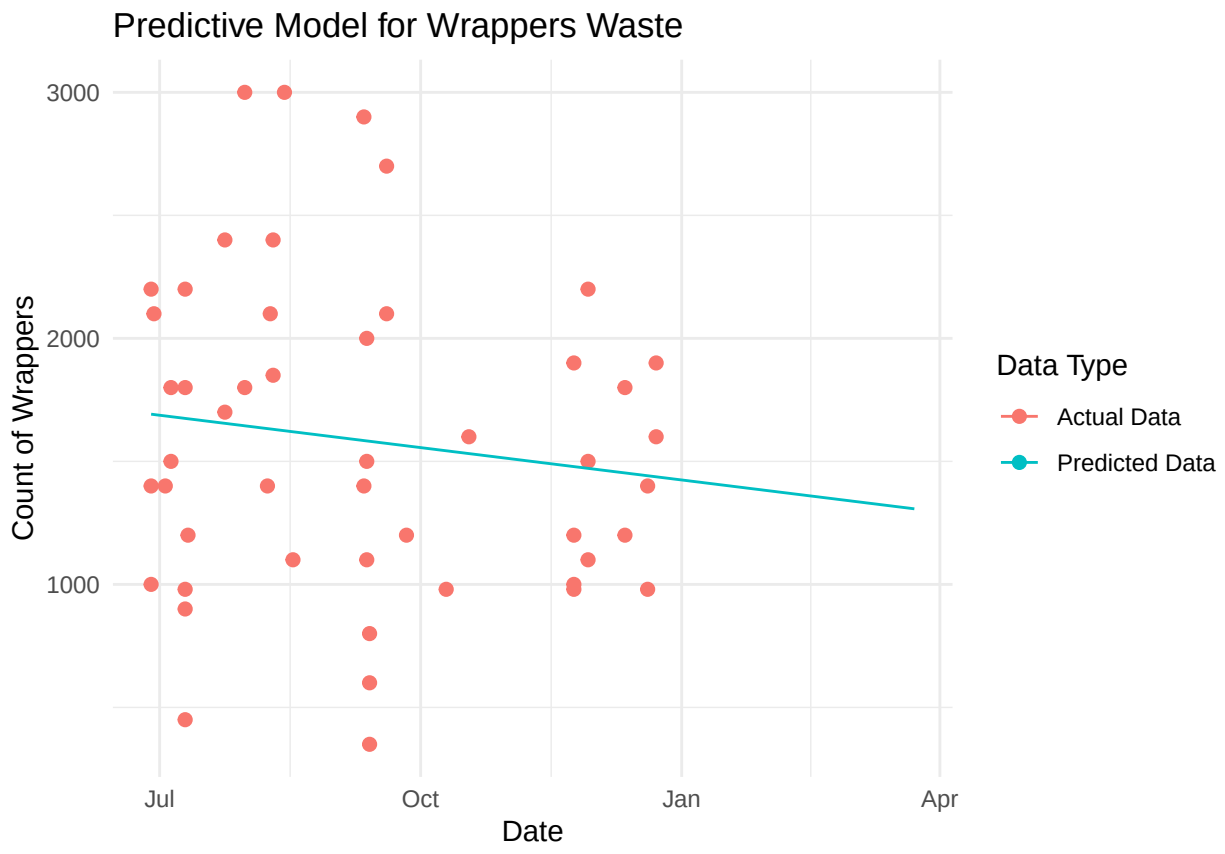
```
plot_list[[3]]
```


Predictive Model for GlassBottles Waste
Count of GlassBottles
40
30
20
10
0
Jul
Oct
Jan
Apr
Date
Data Type
Actual Data
Predicted Data

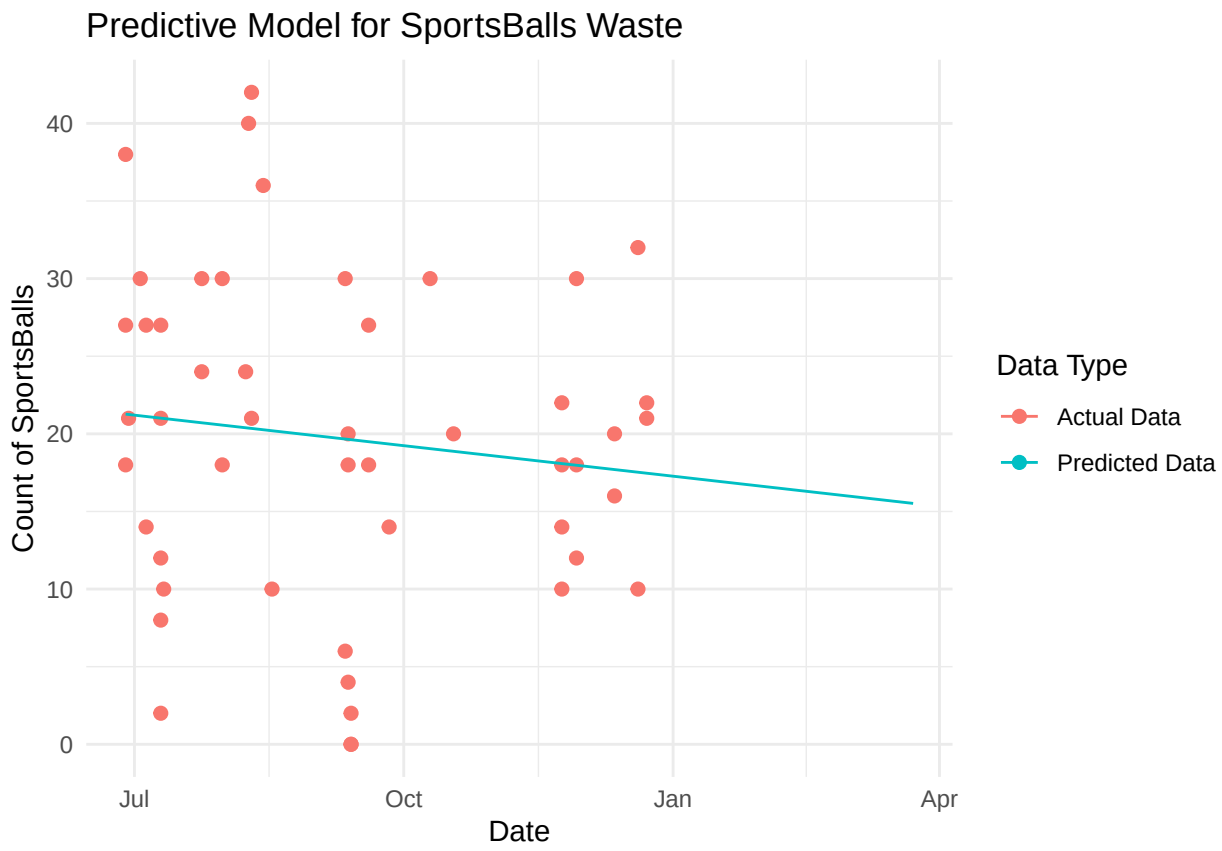
```
plot_list[[4]]
```


Predictive Model for PlasticBags Waste
Count of PlasticBags
500
400
300
200
100
Jul
Oct
Jan
Apr
Date
Data Type
Actual Data
Predicted Data

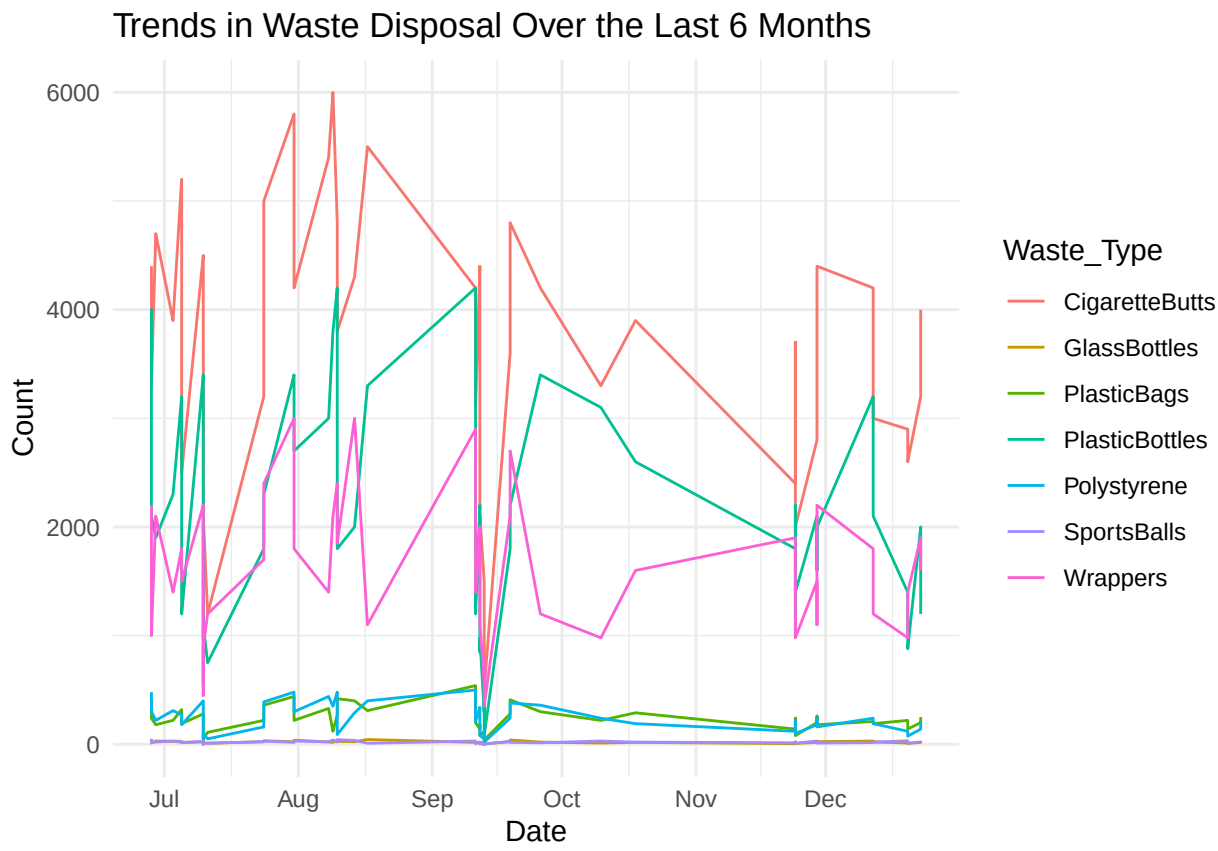
```
plot_list[[5]]
```


Predictive Model for Wrappers Waste
Count of Wrappers
3000
2000
1000
Jul
Oct
Jan
Apr
Date
Data Type
Actual Data
Predicted Data

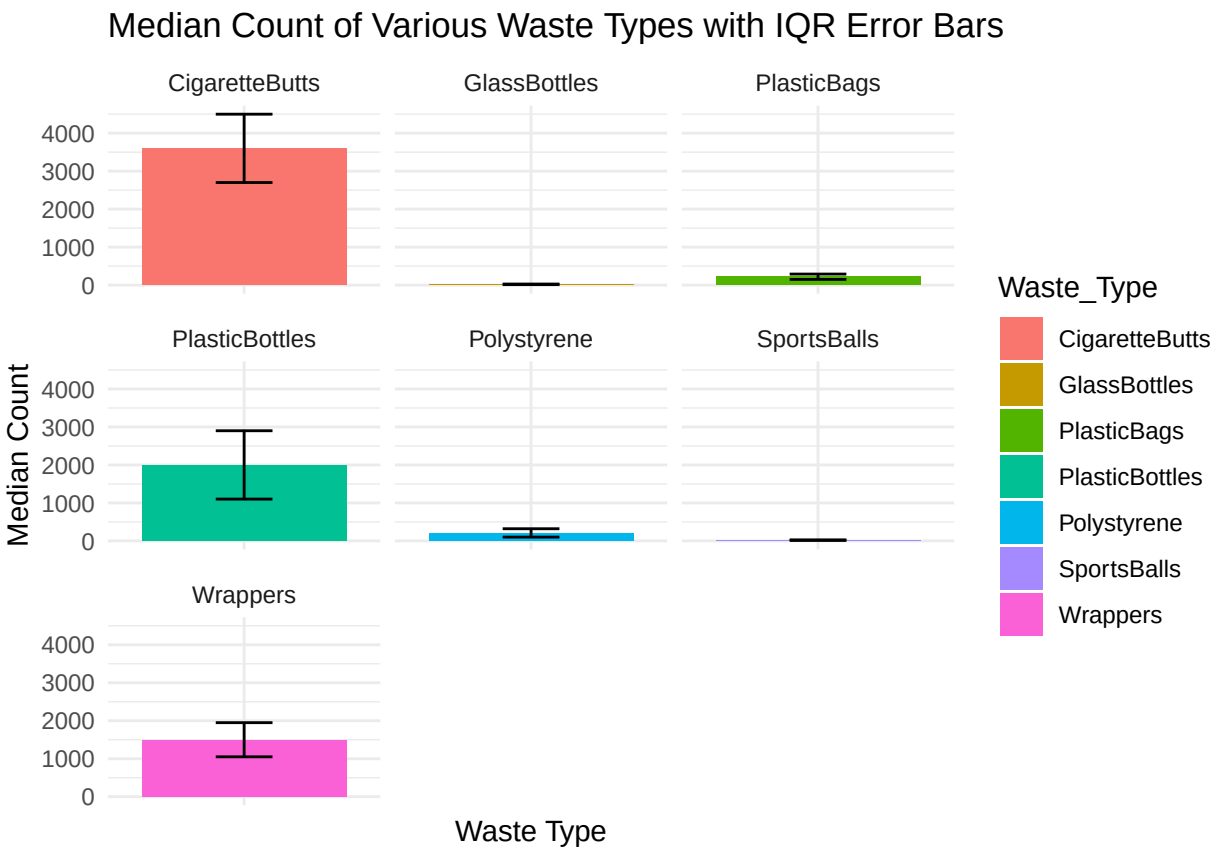
```
plot_list[[6]]
```




```r
# Prepare data for line graph
line_data <- recent_data %>%
  select(Date, PlasticBottles, Polystyrene, CigaretteButts, GlassBottles, PlasticBags, Wrappers, Sportsl
  pivot_longer(cols = -Date, names_to = "Waste_Type", values_to = "Count")

# Create a line graph
ggplot(line_data, aes(x = Date, y = Count, color = Waste_Type)) +
  geom_line() +
  labs(title = "Trends in Waste Disposal Over the Last 6 Months",
       x = "Date",
       y = "Count") +
  theme_minimal()
```




```r
library(ggplot2)
library(dplyr)

# Calculate error margin for IQR (taking half of the IQR as the error margin for simplicity)
summary_stats <- summary_stats %>%
  mutate(Error_Margin = IQR / 2)

# Create a multi-faceted bar chart with error bars
ggplot(summary_stats, aes(x = Waste_Type, y = Median_Count, fill = Waste_Type)) +
  geom_bar(stat = "identity", position = position_dodge()) +
  geom_errorbar(aes(ymin = Median_Count - Error_Margin, ymax = Median_Count + Error_Margin), width = 0.1
  facet_wrap(~ Waste_Type, scales = "free_x") +
  theme_minimal() +
  labs(title = "Median Count of Various Waste Types with IQR Error Bars",
       x = "Waste Type",
       y = "Median Count") +
  theme(axis.text.x = element_blank(), axis.ticks.x = element_blank())
```


Median Count of Various Waste Types with IQR Error Bars
CigaretteButts
GlassBottles
PlasticBags
PlasticBottles
Polystyrene
SportsBalls
Wrappers
4000
3000
2000
1000
0
Median Count
Waste Type
Waste_Type
CigaretteButts
GlassBottles
PlasticBags
PlasticBottles
Polystyrene
SportsBalls
Wrappers