one_mobile Experiment Report

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```
## Loading required package: stargazer
```

```
##
## Please cite as:
```

```
##  Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables.
```

```
##  R package version 5.2. http://CRAN.R-project.org/package=stargazer
```

This is a summary of the data from the one_mobile experiment.

Shown below is the summary of the error of all robots combined for both x and y coordinates, and also the error in total distance.

```
summary(continuous$x_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -28.6700 -21.1600 -14.2700 -12.5300   0.2439   6.1330
```

```
summary(continuous$y_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -5.74900 -0.06006  2.58900  3.67200  7.18000 16.53000
```

```
summary(continuous$yaw_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -3.14100 -1.59700  0.04786  0.02887  1.69300  3.14200
```

```
summary(continuous$horizontal_error)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
##  0.000014 10.660000 15.490000 16.050000 21.670000 28.700000
```

```
summary(discrete$x_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -5.42400 -0.70040 -0.09425 -0.14840  0.55110  4.07700
```

```
summary(discrete$y_error)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -4.1840 -0.4973  0.1222  0.1893  0.8155  5.5940
```

```
summary(discrete$yaw_error)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -3.1410 -1.2800 -0.4858 -0.2251  0.9126  3.1400
```

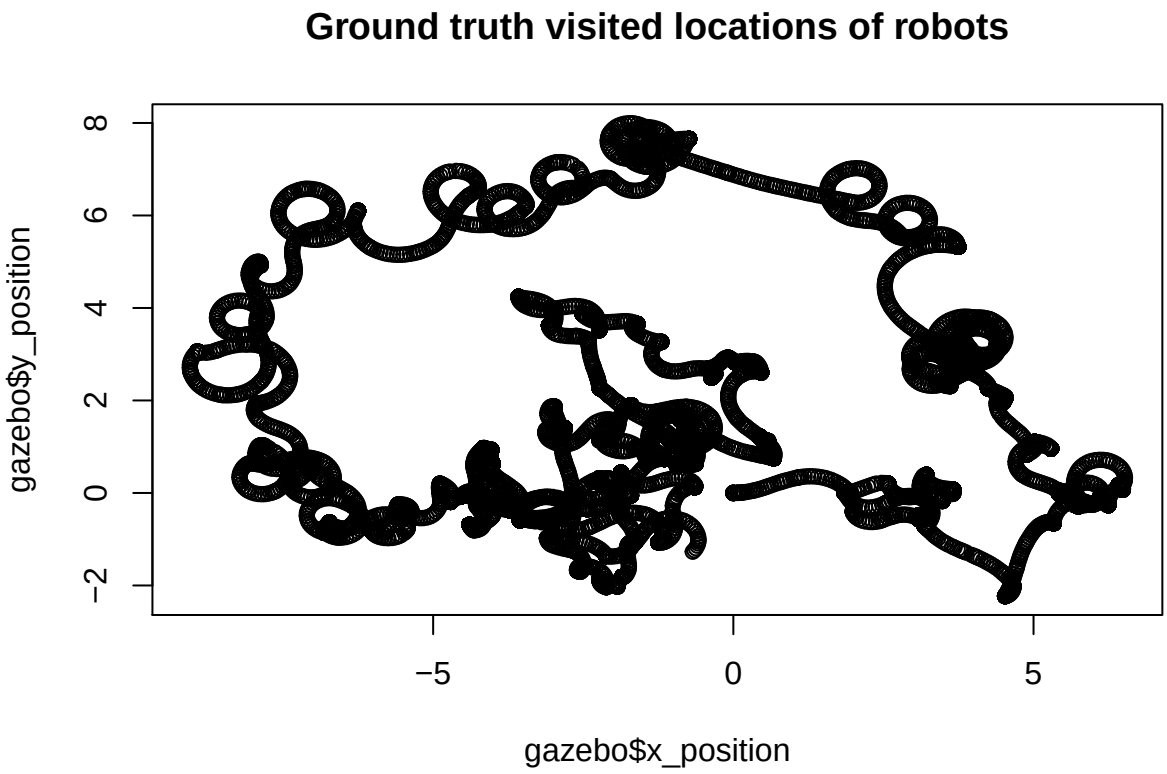
```
summary(discrete$horizontal_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## 0.000014 0.595300 1.171000 1.366000 1.762000 6.037000
```

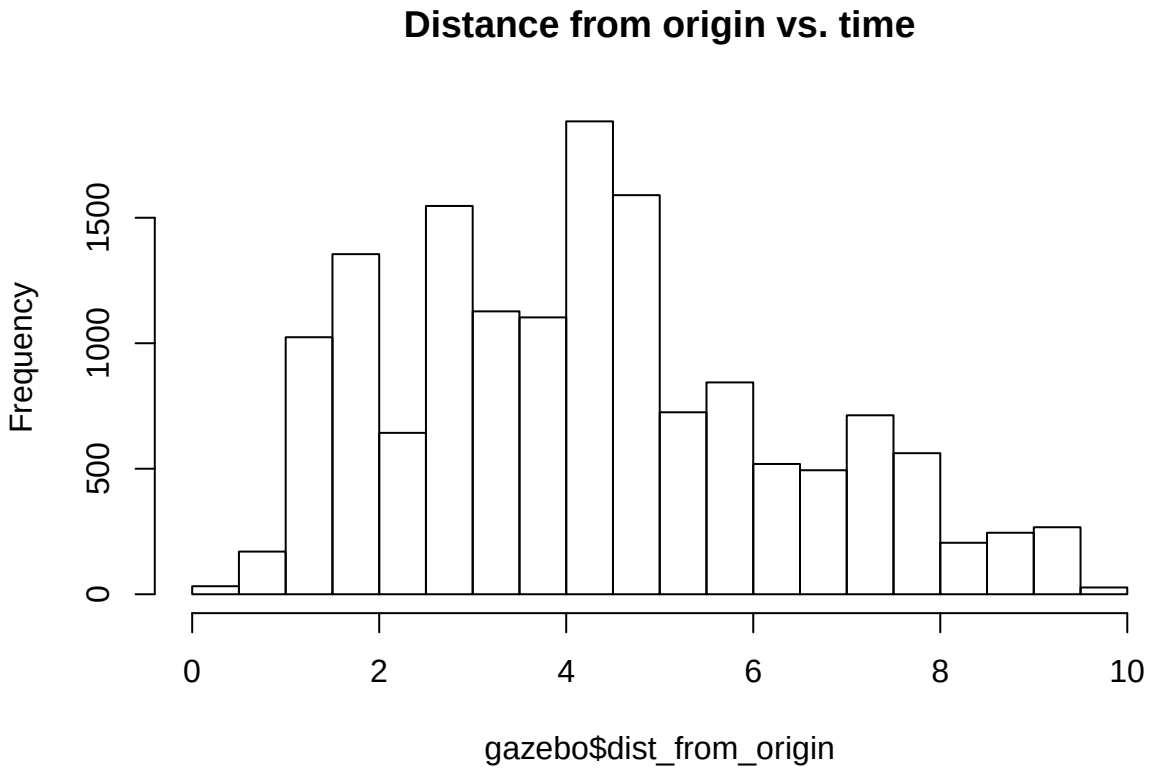
```
if (params$robot >= 2) {
    summary(external_data_averages)
}
```

Shown below are plots representing the robot's motion and error over time.

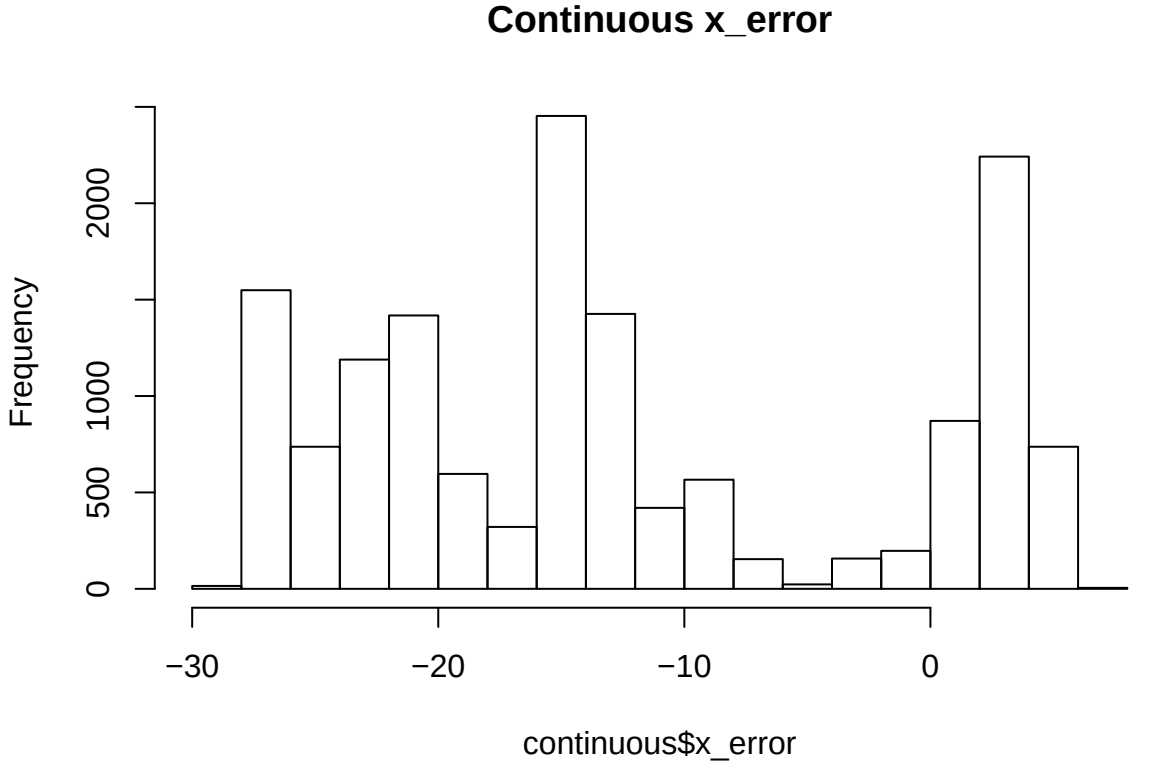
```
plot(gazebo$x_position, gazebo$y_position,
     main = "Ground truth visited locations of robots")
```



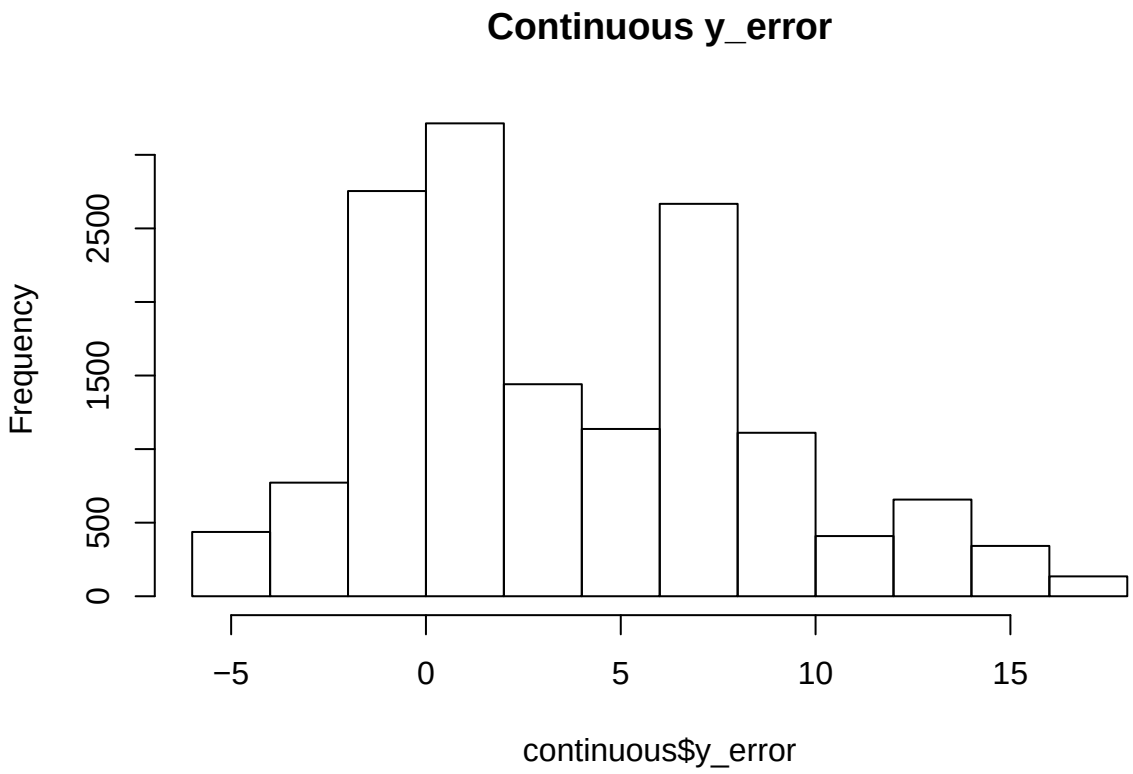

```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```



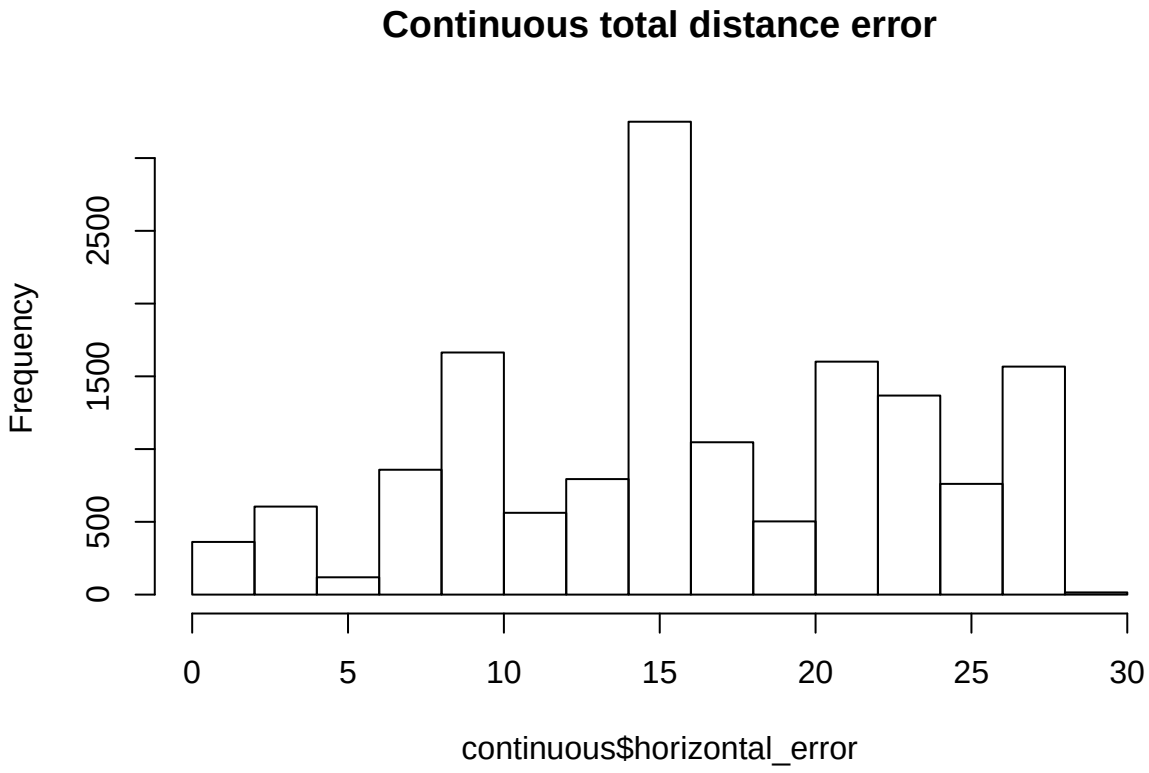

```
hist(continuous$x_error,
     main = "Continuous x_error")
```



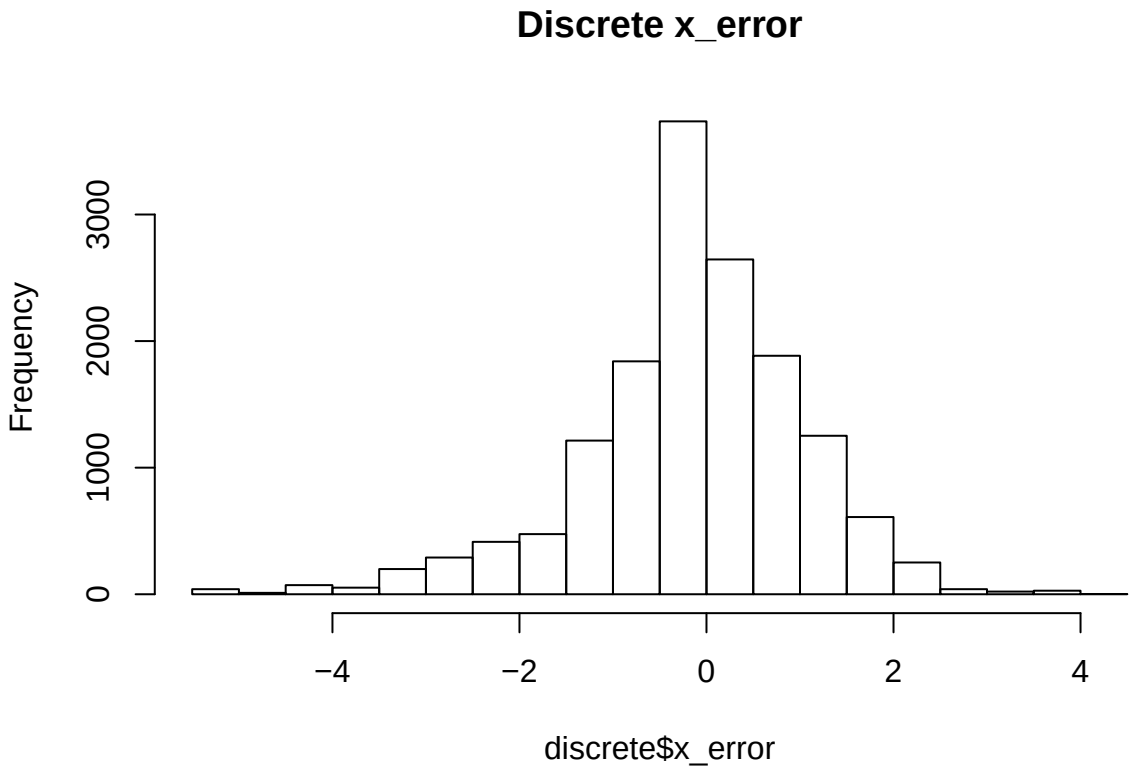

```
hist(continuous$y_error,
      main = "Continuous y_error")
```



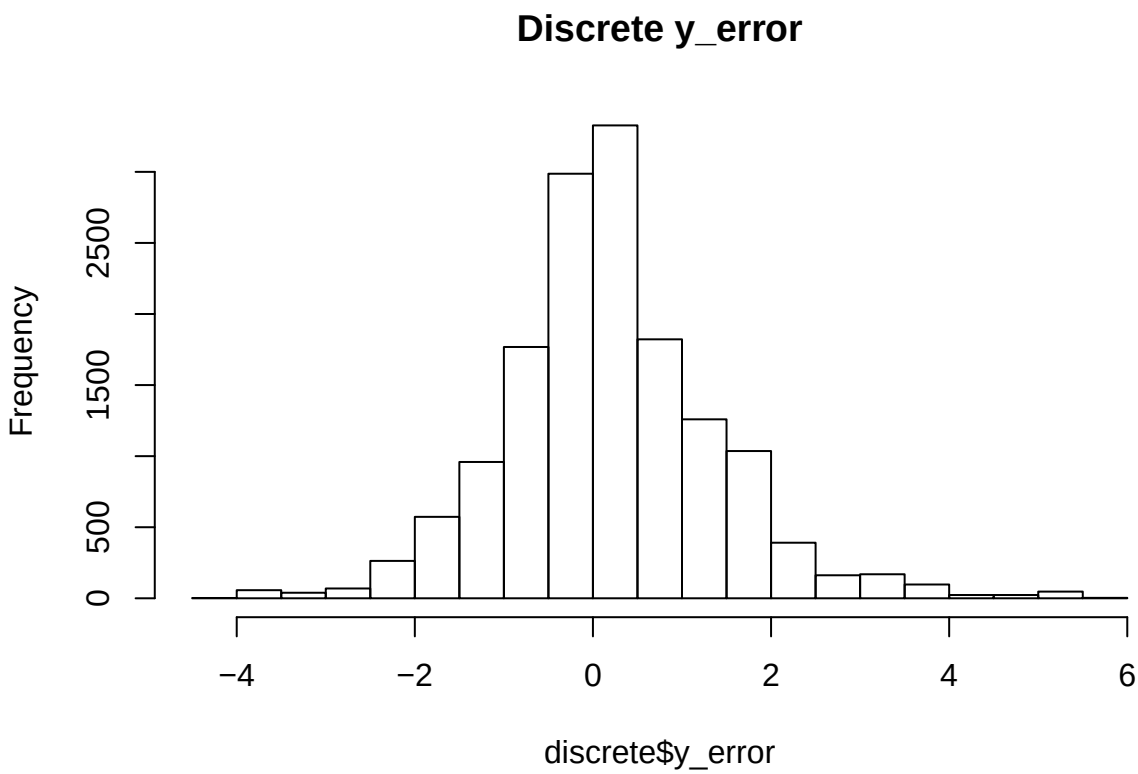

```
hist(continuous$horizontal_error,
     main = "Continuous total distance error")
```



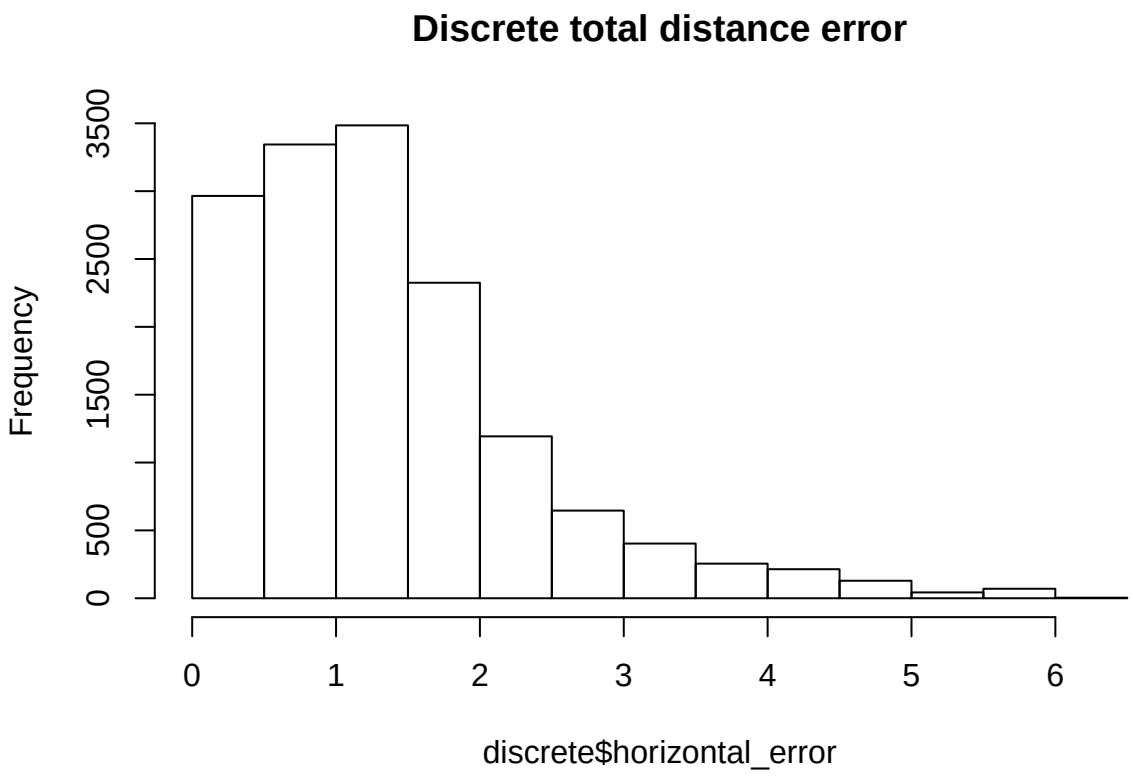

```
hist(discrete$x_error,
     main = "Discrete x_error")
```




```
hist(discrete$y_error,
     main = "Discrete y_error")
```




```
hist (discrete$horizontal_error,
      main = "Discrete total distance error")
```




```
figure_dir <- "/home/matt/thesis/writing/r_figures/"
filename = paste0(figure_dir, params$experiment, "_continuous_error.pdf")
pdf(filename)
plot(continuous$horizontal_error, main="Continuous Filter Error", sub=paste0("For ", params$experiment,

dev.off()
```

```
## pdf
##   2
```

```
filename = paste0(figure_dir, params$experiment, "_discrete_error.pdf")
pdf(filename)
plot(discrete$horizontal_error, main="Discrete Filter Error", sub=paste0("For ", params$experiment, " E
dev.off()
```

```
## pdf
##   2
```

```
if (params$experiment == "one_stationary_noiseless") {
    gazebo$horizontal_error <- sqrt(gazebo$x_position ^ 2 + gazebo$y_position ^ 2)
    pdf(paste0(figure_dir, "gazebo_odom_drift.pdf"))

    plot(gazebo$horizontal_error, main="Gazebo Odometry Drift for Stationary Robot with Noiseless Odome
    dev.off()
}
```

```
table_dir <- "/home/matt/thesis/writing/autogenerated_tables/"

out_file <- paste0(table_dir, params$experiment, "_continuous_summary.tex")
tex_label <- paste0("tab:", params$experiment, "_continuous_summary")
stargazer(continuous,
```

```
          out=out_file,
          table.placement="h",
          label=tex_label,
          title=gsub("_", "-", paste0("Continuous Filter Estimate for ", params$experiment, " Experimen
          digits.extra = 20)
```

```
##
## % Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvar
## % Date and time: Mon, Aug 15, 2016 - 10:02:13 PM
## \begin{table}[h] \centering
##   \caption{Continuous Filter Estimate for one-mobile Experiment}
##   \label{tab:one_mobile_continuous_summary}
## \begin{tabular}{@{\extracolsep{5pt}}lccccc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
## Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multi
## \hline \\[-1.8ex]
## x\_position & 15,076 & 11.513 & 8.009 & $-$2.112 & 24.567 \\
## y\_position & 15,076 & $-$2.285 & 3.388 & $-$9.531 & 5.612 \\
## yaw & 15,076 & 0.170 & 1.802 & $-$3.141 & 3.139 \\
## x\_variance & 15,076 & 46.768 & 27.000 & 0.072 & 94.569 \\
## y\_variance & 15,076 & 46.223 & 26.811 & 0.072 & 93.871 \\
## yaw\_variance & 15,076 & 55.723 & 32.202 & 0.086 & 112.648 \\
## yaw\_error & 15,076 & 0.029 & 1.833 & $-$3.141 & 3.142 \\
## x\_error & 15,076 & $-$12.529 & 10.614 & $-$28.665 & 6.133 \\
## y\_error & 15,076 & 3.672 & 4.859 & $-$5.749 & 16.526 \\
## horizontal\_error & 15,076 & 16.050 & 7.009 & 0.00001 & 28.697 \\
## \hline \\[-1.8ex]
## \end{tabular}
## \end{table}
```

```
out_file <- paste0(table_dir, params$experiment, "_discrete_summary.tex")
tex_label <- paste0("tab:", params$experiment, "_discrete_summary")
stargazer(discrete,
          out=out_file,
          table.placement="h",
          label=tex_label,
          title=gsub("_", "-", paste0("Discrete Filter Estimate for ", params$experiment, " Experiment"
          digits.extra = 20)
```

```
##
## % Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvar
## % Date and time: Mon, Aug 15, 2016 - 10:02:13 PM
## \begin{table}[h] \centering
##   \caption{Discrete Filter Estimate for one-mobile Experiment}
##   \label{tab:one_mobile_discrete_summary}
## \begin{tabular}{@{\extracolsep{5pt}}lccccc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
## Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multi
## \hline \\[-1.8ex]
## x\_position & 15,076 & $-$0.868 & 3.504 & $-$8.419 & 7.784 \\
## y\_position & 15,076 & 1.198 & 1.877 & $-$3.695 & 7.539 \\
## yaw & 15,076 & $-$0.103 & 1.706 & $-$3.141 & 3.141 \\
```

```
## x\_variance & 15,076 & 1.483 & 0.261 & 0.071 & 4.915 \\
## y\_variance & 15,076 & 1.458 & 0.215 & 0.071 & 4.559 \\
## yaw\_variance & 15,076 & 0.409 & 0.206 & 0.085 & 2.231 \\
## x\_error & 15,076 & $-$0.148 & 1.186 & $-$5.424 & 4.077 \\
## y\_error & 15,076 & 0.189 & 1.201 & $-$4.184 & 5.594 \\
## horizontal\_error & 15,076 & 1.366 & 1.019 & 0.00001 & 6.037 \\
## yaw\_error & 15,076 & $-$0.225 & 1.606 & $-$3.141 & 3.140 \\
## \hline \\[-1.8ex]
## \end{tabular}
## \end{table}
```

```
if (params$experiment == "one_stationary_noiseless") {
    stargazer(gazebo,
              out=paste0(table_dir, "gazebo_stationary_noiseless_summary.tex"),
              table.placement="h",
              label="tab:gazebo_stationary_noiseless_summary",
              title="Ground Truth Noiseless Odometry for Stationary Robot located at Origin",
              digits.extra = 20)
}
```