

two_stationary Experiment Report

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This is a summary of the data from the two_stationary 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.
## 1.351e-05 1.371e-04 2.604e-04 2.615e-04 3.860e-04 5.105e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 4.383e-10 9.601e-09 3.392e-08 4.433e-08 7.164e-08 1.480e-07
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.162e-05 1.356e-04 2.584e-04 2.469e-04 3.532e-04 5.029e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.351e-05 1.371e-04 2.604e-04 2.615e-04 3.860e-04 5.105e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 0.0000135 0.3148000 0.3994000 0.4711000 0.7363000 0.9262000
```

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

```
##      Min. 1st Qu.  Median     Mean 3rd Qu.     Max.
## -1.2640 -0.7247 -0.5019 -0.5222 -0.1483  0.0000
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -4.052e-05 1.455e-05 4.579e-05 4.752e-05 7.218e-05 1.902e-04
```

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

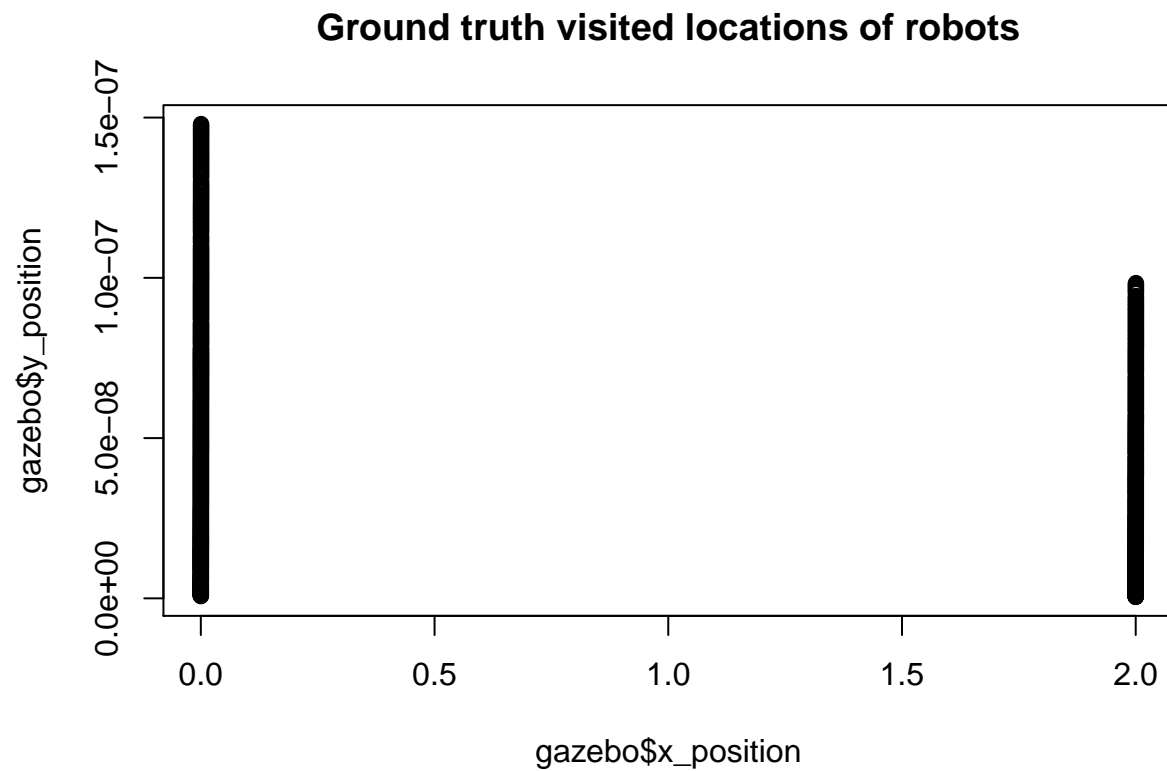
```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 0.0000135 0.3480000 0.7982000 0.7230000 0.8275000 1.5670000
```

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

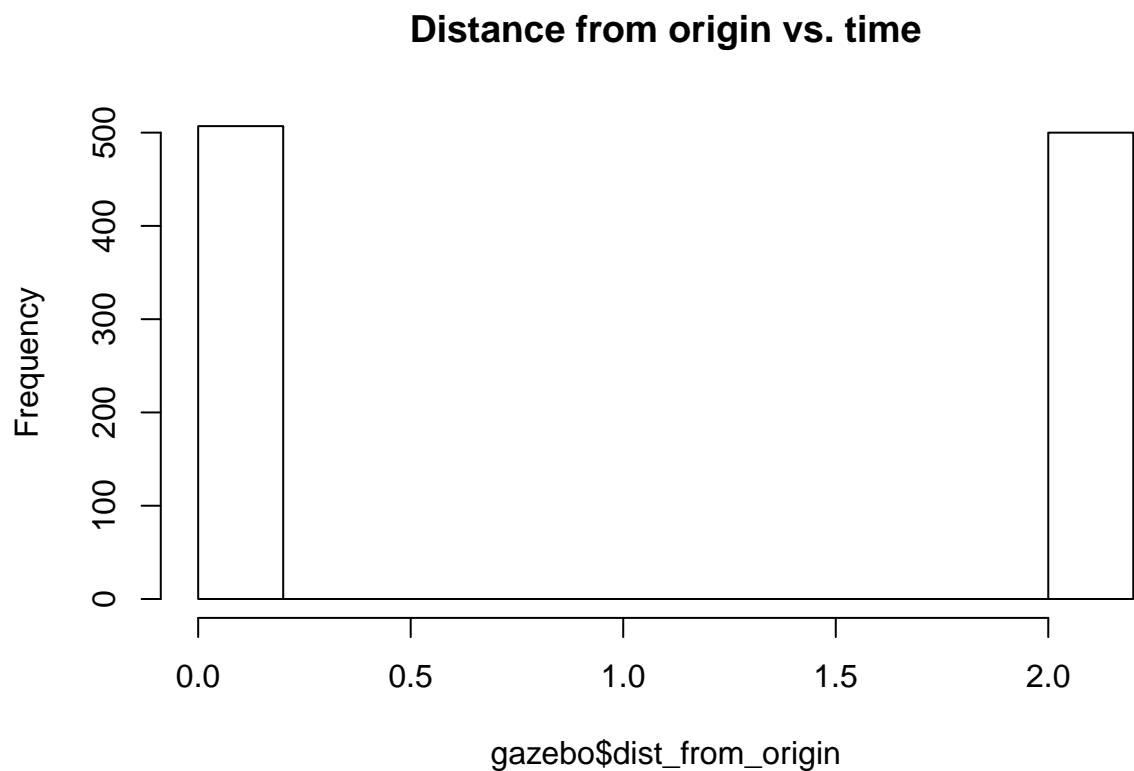
```
##      Length Class  Mode
## [1,] 1      -none- numeric
## [2,] 1      -none- numeric
```

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

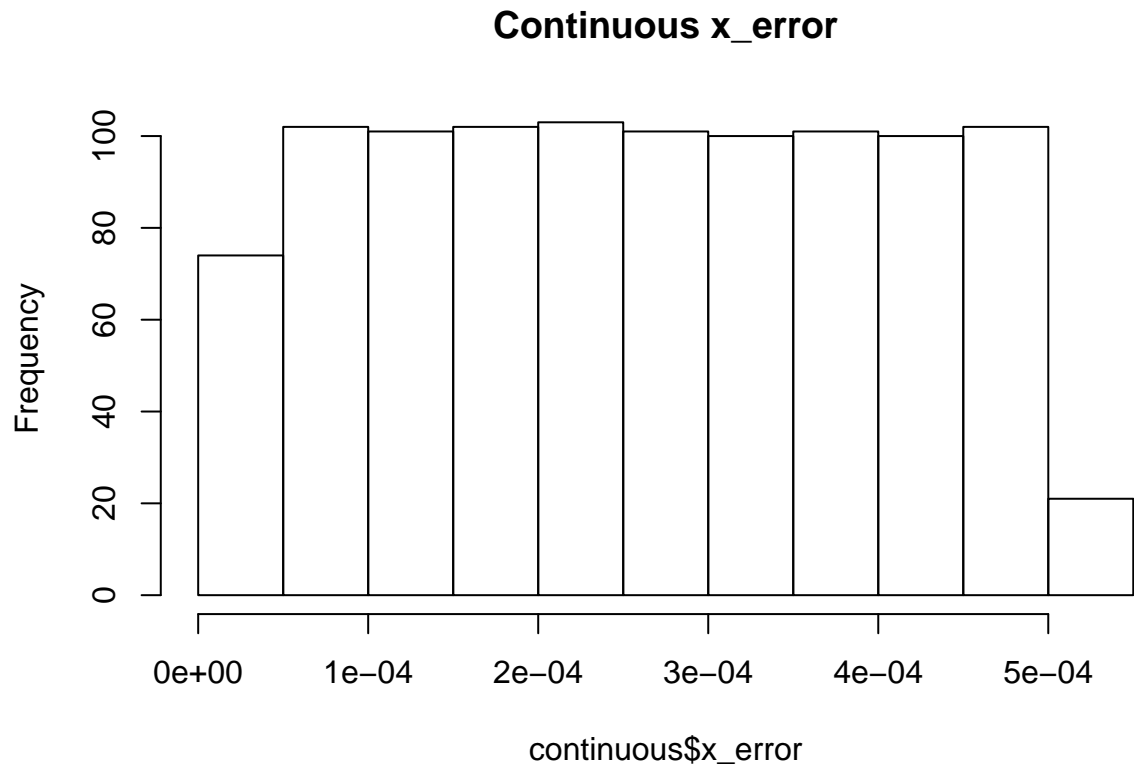
```
plot(gazebo$x_position, gazebo$y_position,
     main = "Ground truth visited locations of robots")
```



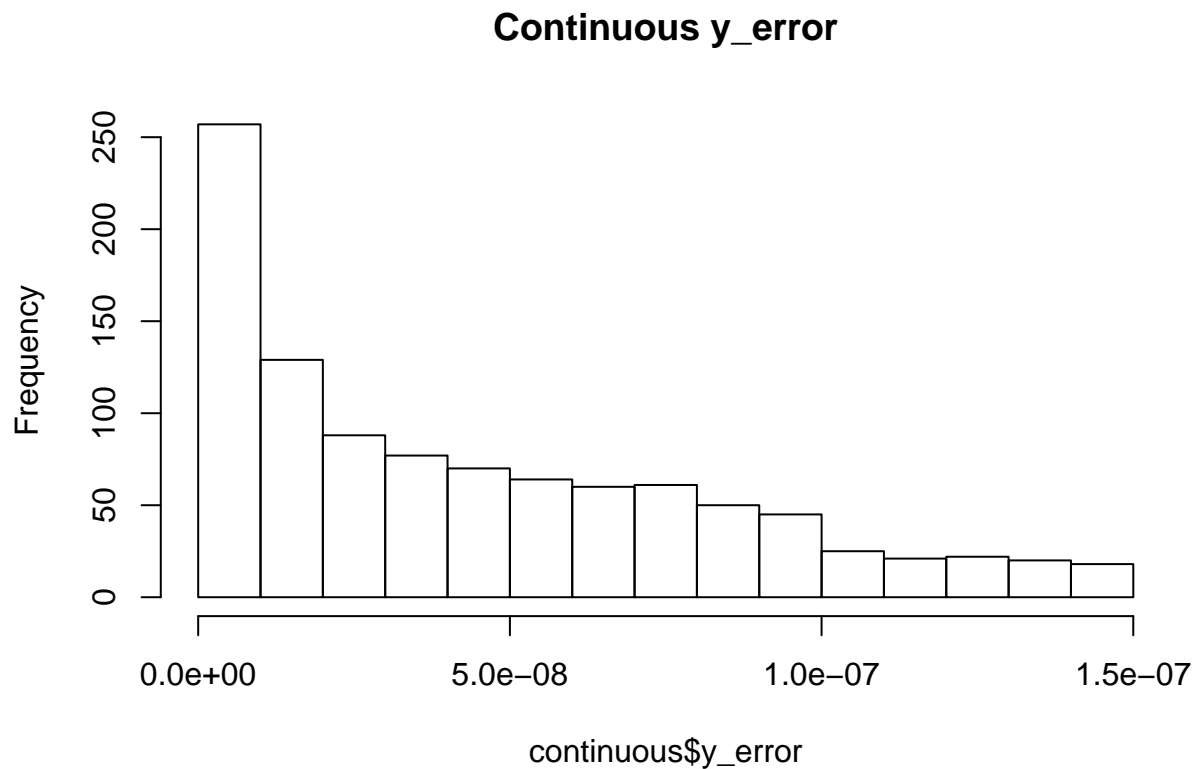
```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```



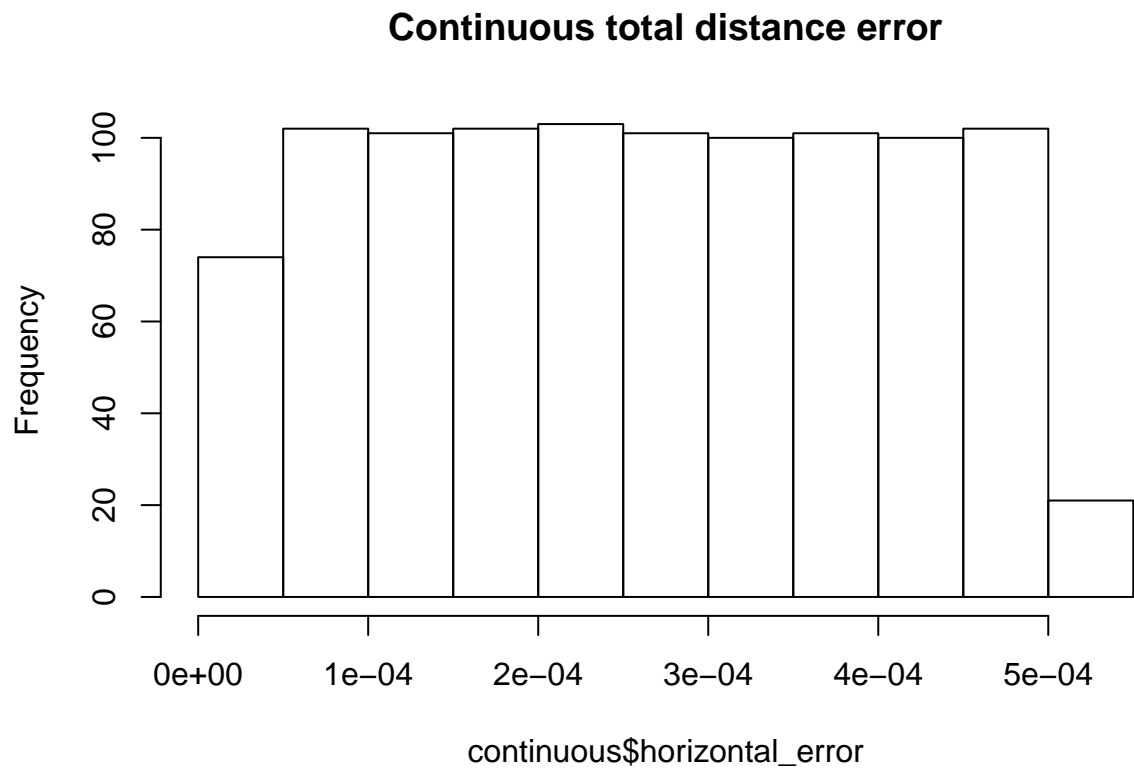
```
hist(continuous$x_error,  
     main = "Continuous x_error")
```



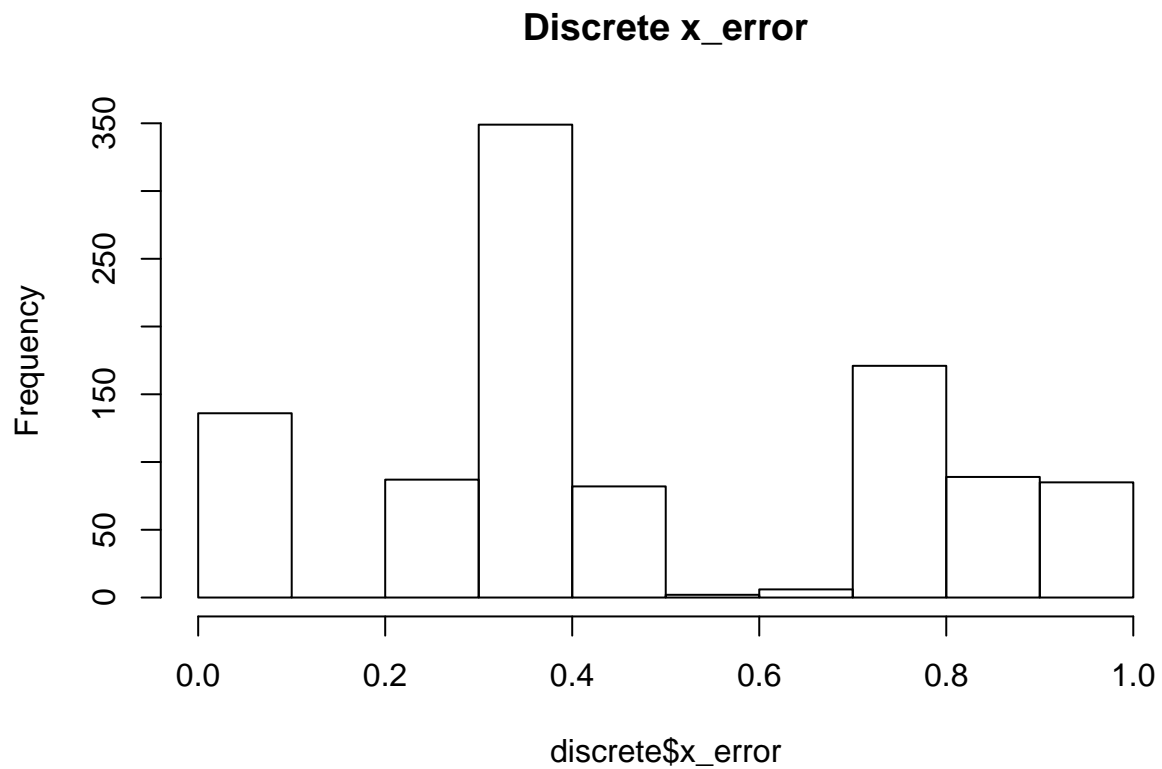
```
hist(continuous$y_error,  
     main = "Continuous y_error")
```



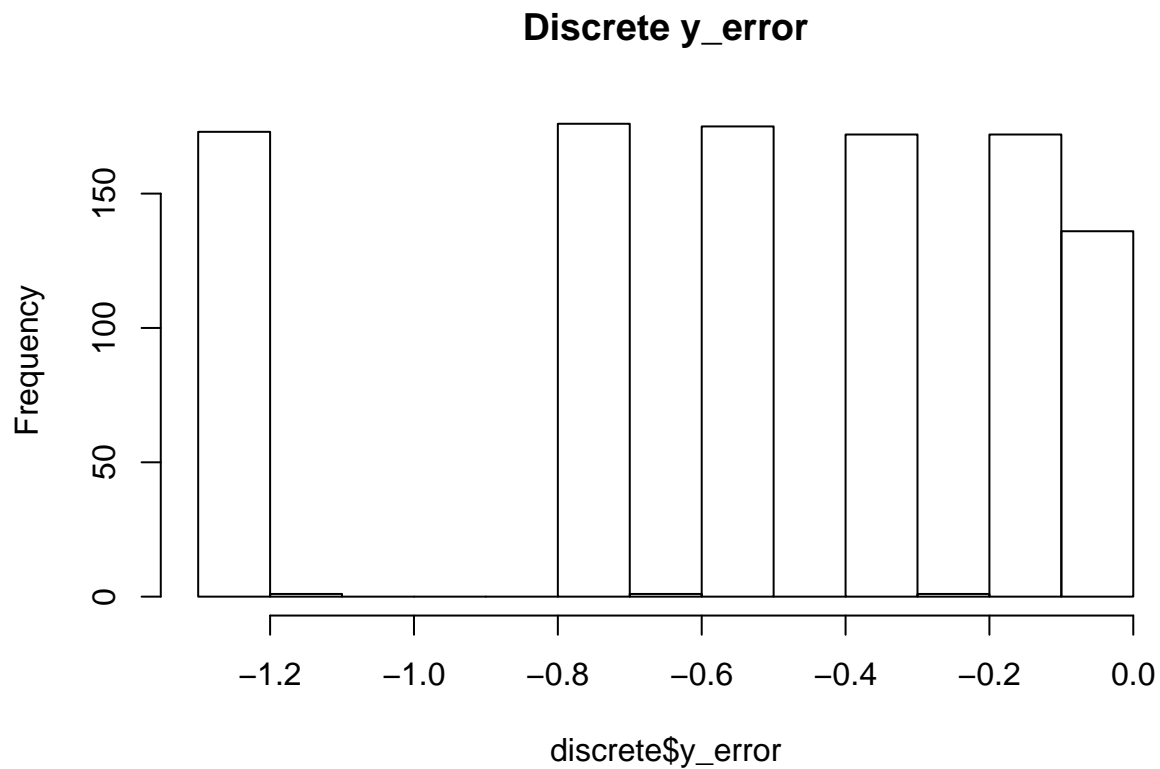
```
hist(continuous$horizontal_error,  
     main = "Continuous total distance error")
```



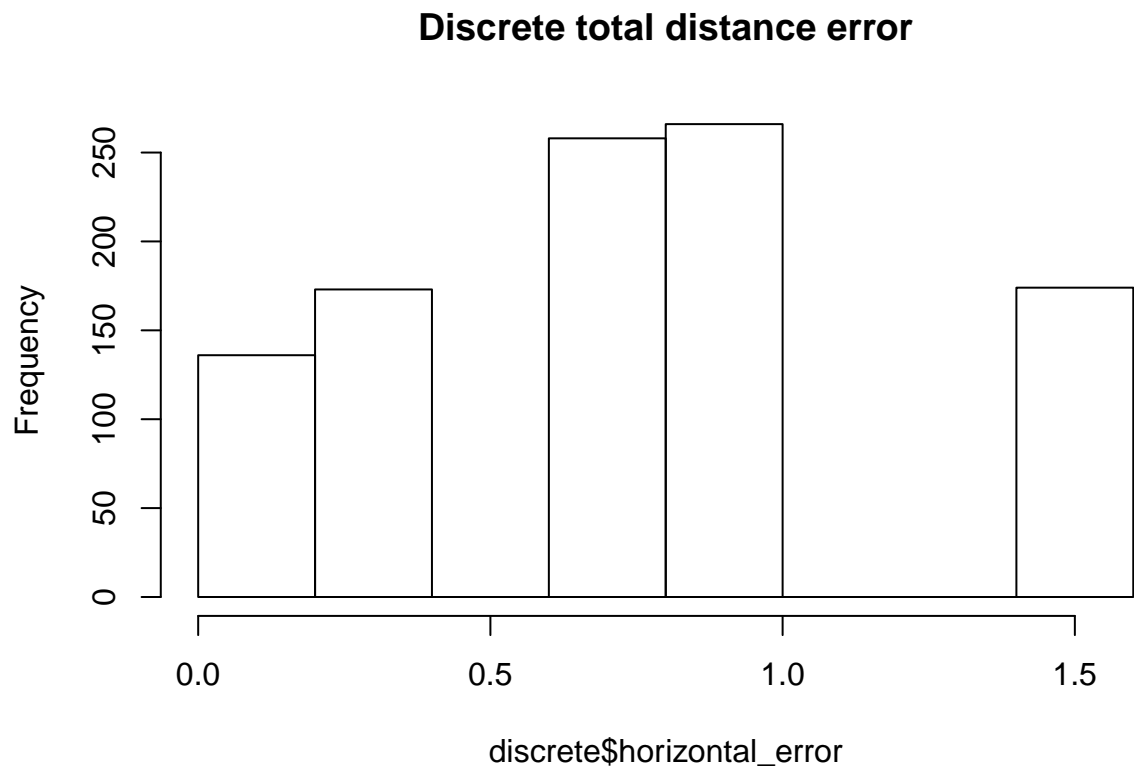
```
hist(discrete$x_error,  
     main = "Discrete x_error")
```



```
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, " 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 - 04:04:07 PM
## \begin{table}[h] \centering
## \caption{Continuous Filter Estimate for two-stationary Experiment}
## \label{tab:two_stationary_continuous_summary}
## \begin{tabular}{@{\extracolsep{5pt}}lcccc}
## \ll[-1.8ex]\hline
## \hline \ll[-1.8ex]
## Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multi
## \hline \ll[-1.8ex]
## x\_position & 1,007 & 0.993 & 1.000 & $-\$0 & 2 \ll
## y\_position & 1,007 & 0.000 & 0.000 & $-\$0 & 0 \ll
## yaw & 1,007 & 0.000 & 0.000 & $-\$0 & 0 \ll
## x\_variance & 1,007 & 1.521 & 0.840 & 0.067 & 2.982 \ll
## y\_variance & 1,007 & 1.521 & 0.840 & 0.067 & 2.982 \ll
## yaw\_variance & 1,007 & 1.824 & 1.007 & 0.081 & 3.574 \ll
## yaw\_error & 1,007 & 0.0002 & 0.0001 & 0.00001 & 0.001 \ll
## x\_error & 1,007 & 0.0003 & 0.0001 & 0.00001 & 0.001 \ll

```

```

## y\_error & 1,007 & 0.00000004 & 0.00000004 & 0.000 & 0.0000001 \\
## horizontal\_error & 1,007 & 0.0003 & 0.0001 & 0.00001 & 0.001 \\
## \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.harvard
## % Date and time: Mon, Aug 15, 2016 - 04:04:08 PM
## \begin{table}[h] \centering
## \caption{Discrete Filter Estimate for two-stationary Experiment}
## \label{tab:two_stationary_discrete_summary}
## \begin{tabular}{@{\extracolsep{5pt}}lcccc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
## Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multicolumn{1}{c}{St. Error} \\
## \hline \\[-1.8ex]
## x\_position & 1,007 & 0.522 & 1.027 & $-0.896 & 1.970 \\
## y\_position & 1,007 & 0.522 & 0.408 & $-0.000 & 1.264 \\
## yaw & 1,007 & 0.0002 & 0.0001 & $-0.000 & 0.0005 \\
## x\_variance & 1,007 & 0.522 & 0.590 & 0.002 & 1.652 \\
## y\_variance & 1,007 & 0.522 & 0.590 & 0.002 & 1.652 \\
## yaw\_variance & 1,007 & 0.379 & 0.171 & 0.088 & 0.689 \\
## x\_error & 1,007 & 0.471 & 0.283 & 0.00001 & 0.926 \\
## y\_error & 1,007 & $-0.522 & 0.408 & $-1.264 & 0.000 \\
## horizontal\_error & 1,007 & 0.723 & 0.467 & 0.00001 & 1.567 \\
## yaw\_error & 1,007 & 0.00005 & 0.00004 & $-0.00004 & 0.0002 \\
## \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)
}

```