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.
## -0.0579  7.1790  7.8900  7.8300  9.0520 12.6600
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  -1.307   4.603   6.328   9.263  12.180  24.170
```

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

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -3.14100 -1.57300  0.05442  0.05513  1.71500  3.14000
```

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

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
##  0.000013  8.796000 10.350000 12.690000 15.200000 26.390000
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -1.8550 -0.2575  0.4299  0.4947  1.3260  4.5310
```

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

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -6.16300 -0.90910  0.17760  0.01794  1.15800  5.31600
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -3.1400 -1.4520 -0.5391 -0.2733  1.0190  3.1410
```

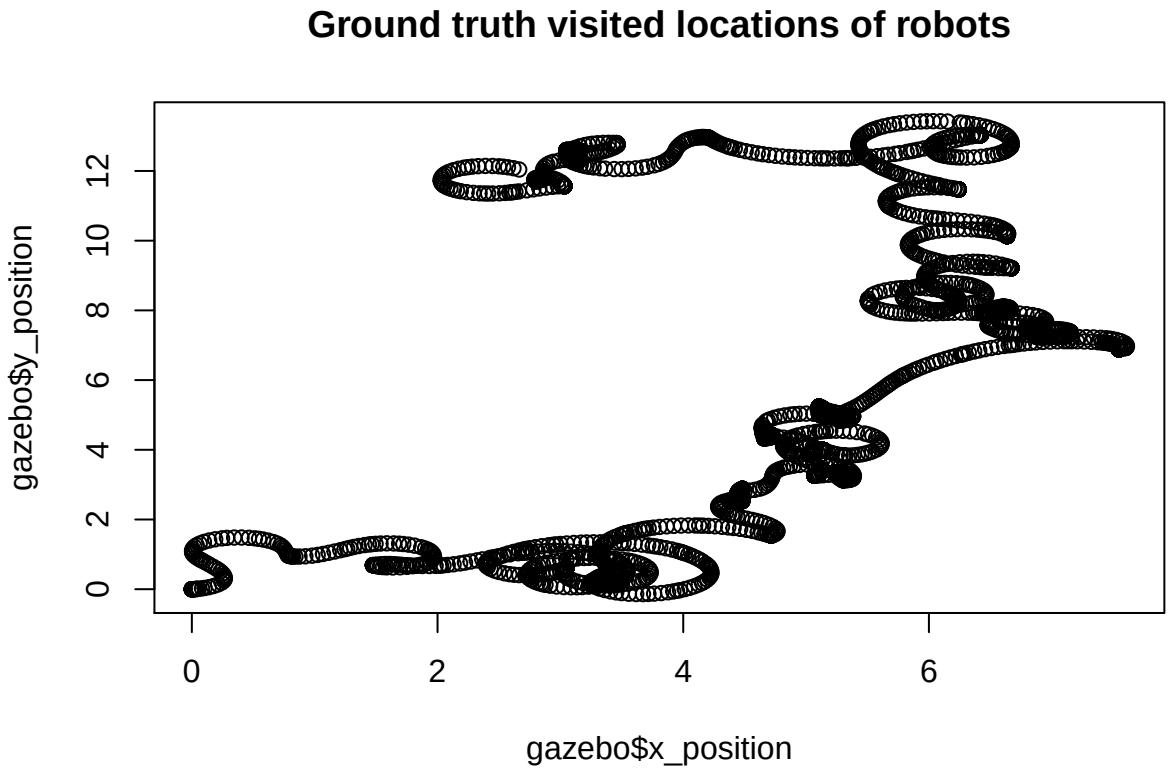
```
summary(discrete$horizontal_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## 0.000015 0.790300 1.627000 1.820000 2.455000 6.353000
```

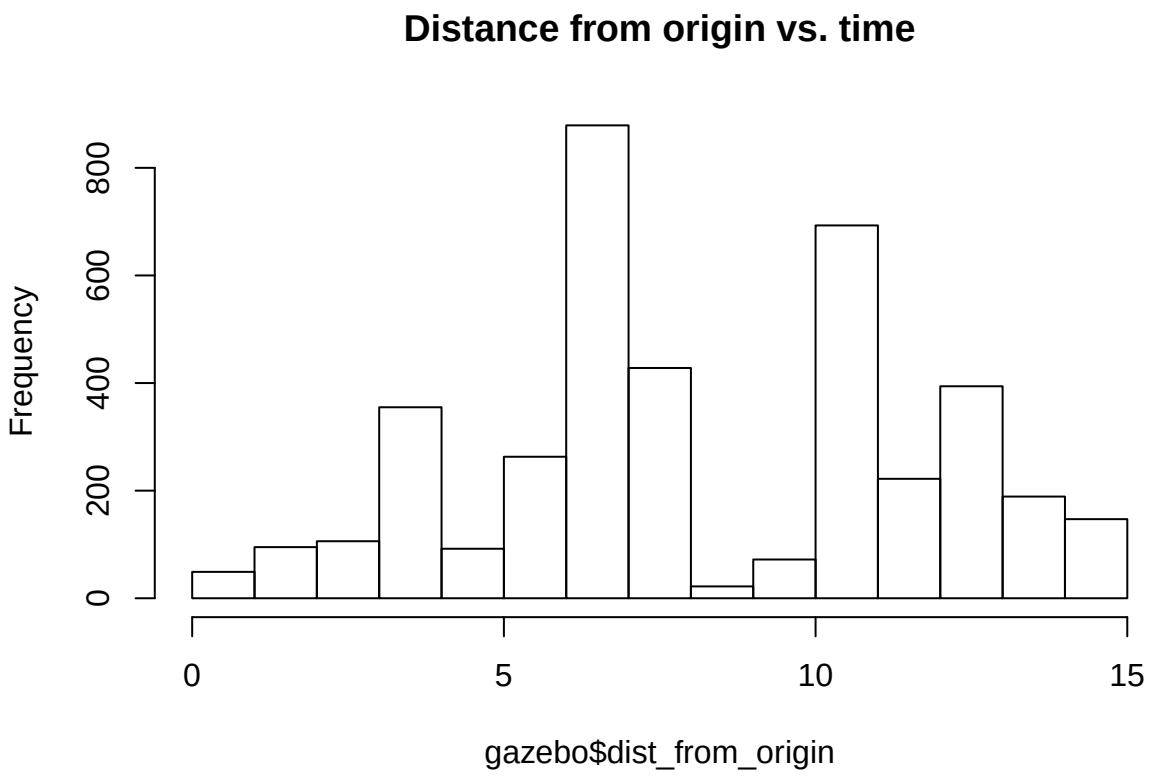
```
if (params$robot >= 2) {
    summary(external_data_averages)
}
```

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

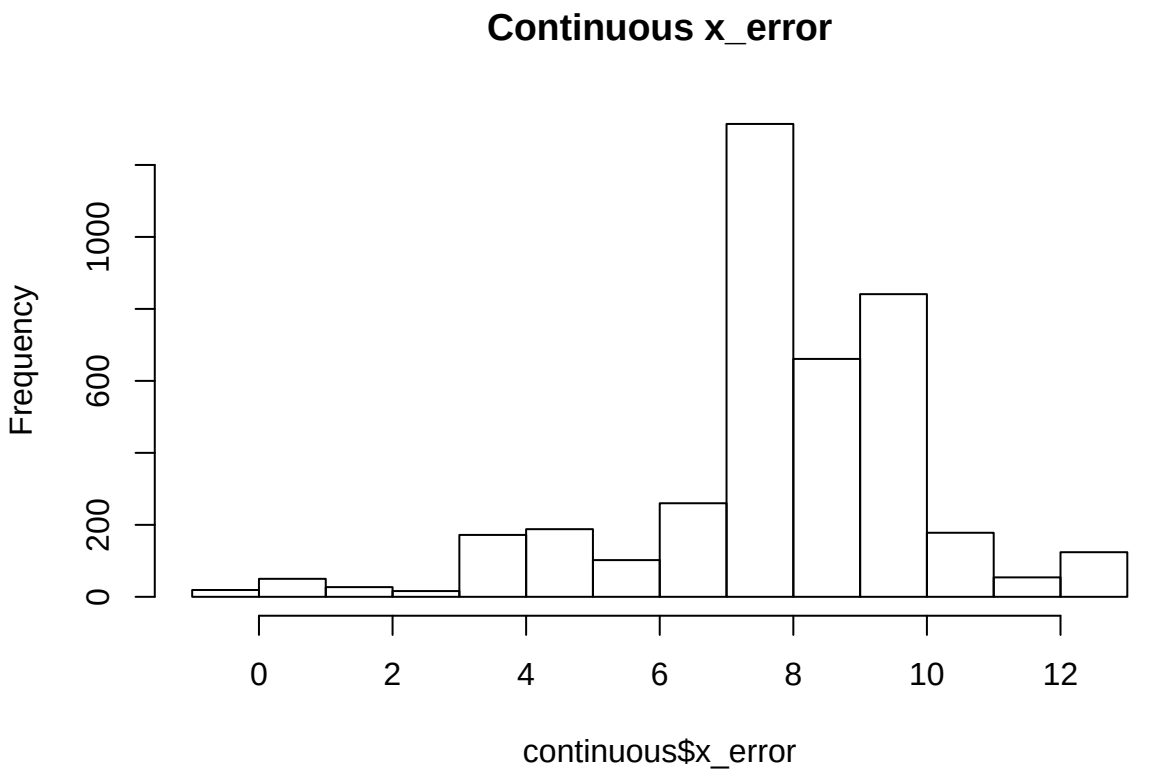
```
plot(gazebo$x_position, gazebo$y_position,
     main = "Ground truth visited locations of robots")
```



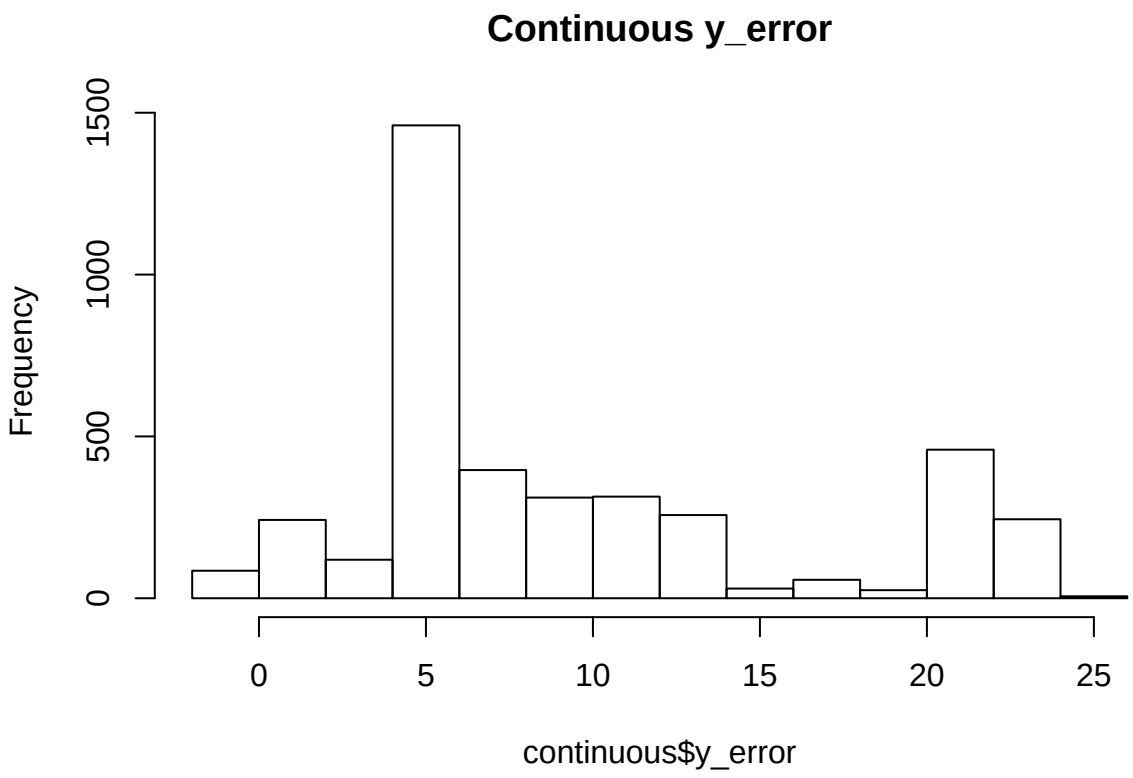

```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```




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

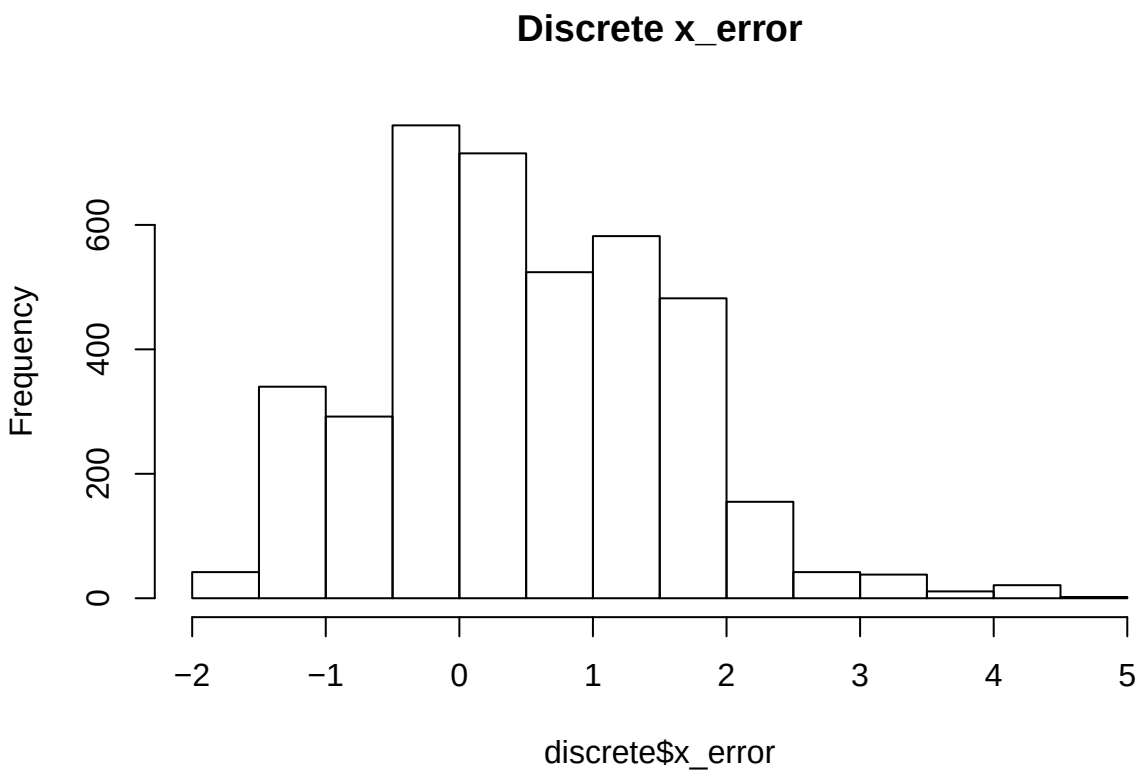



```
hist(continuous$y_error,
      main = "Continuous y_error")
```

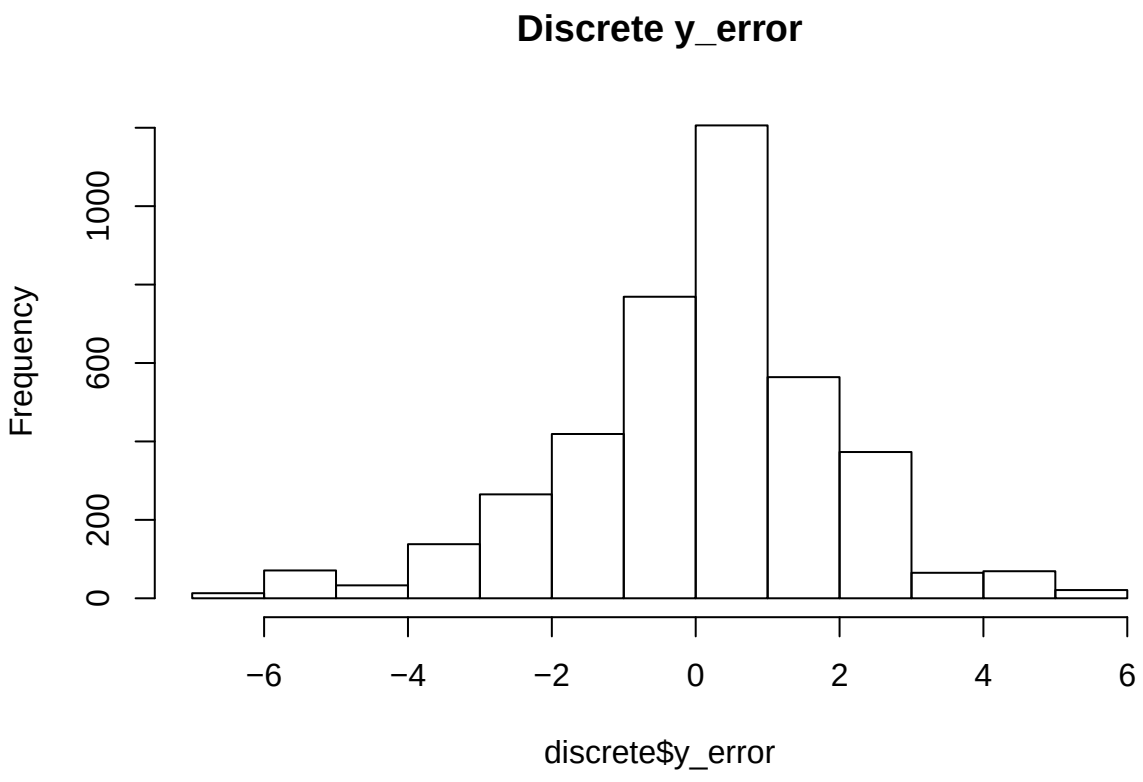



```
hist(continuous$horizontal_error,
     main = "Continuous total distance error")
```

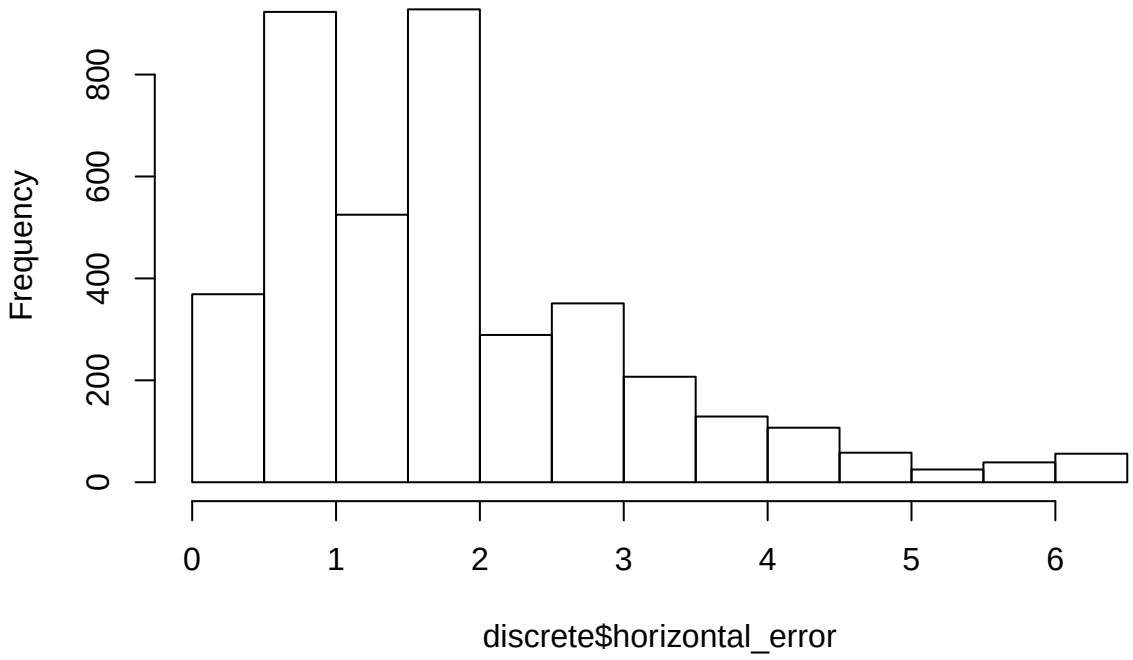

```
hist(discrete$x_error,
     main = "Discrete x_error")
```




```
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: Wed, Aug 10, 2016 - 04:36:42 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 & 4,006 & $-$3.020 & 1.507 & $-$6.146 & 1.440 \\
## y\_position & 4,006 & $-$3.227 & 3.335 & $-$11.144 & 2.243 \\
## yaw & 4,006 & $-$0.107 & 1.793 & $-$3.092 & 3.124 \\
## x\_variance & 4,006 & 12.163 & 6.971 & 0.078 & 24.200 \\
## y\_variance & 4,006 & 12.264 & 7.028 & 0.078 & 24.385 \\
## yaw\_variance & 4,006 & 14.655 & 8.398 & 0.093 & 29.149 \\
## yaw\_error & 4,006 & 0.055 & 1.876 & $-$3.141 & 3.140 \\
## x\_error & 4,006 & 7.830 & 2.169 & $-$0.058 & 12.657 \\
## y\_error & 4,006 & 9.263 & 6.786 & $-$1.307 & 24.174 \\
## horizontal\_error & 4,006 & 12.686 & 6.076 & 0.00001 & 26.385 \\
## \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: Wed, Aug 10, 2016 - 04:36:42 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 & 4,006 & 4.315 & 1.637 & $-$0.465 & 7.617 \\
## y\_position & 4,006 & 6.017 & 2.799 & $-$0.000 & 12.120 \\
## yaw & 4,006 & $-$0.276 & 2.019 & $-$3.137 & 3.130 \\
```

```
## x\_variance & 4,006 & 1.404 & 0.244 & 0.078 & 2.301 \\
## y\_variance & 4,006 & 1.406 & 0.246 & 0.078 & 2.343 \\
## yaw\_variance & 4,006 & 0.393 & 0.178 & 0.088 & 0.857 \\
## x\_error & 4,006 & 0.495 & 1.070 & $-$1.855 & 4.531 \\
## y\_error & 4,006 & 0.018 & 1.888 & $-$6.163 & 5.316 \\
## horizontal\_error & 4,006 & 1.820 & 1.280 & 0.00001 & 6.353 \\
## yaw\_error & 4,006 & $-$0.273 & 1.663 & $-$3.140 & 3.141 \\
## \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)
}
```