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.
## -2.8810  0.9434  2.3530  3.8740  8.7800 12.3700
```

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

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -6.53500 -2.88700  0.02268  0.31930  3.00100  8.19000
```

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

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## -3.136000 -1.553000 -0.006657 -0.005929  1.562000  3.141000
```

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

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
##  0.000015  2.066000  4.472000  5.545000  9.208000 13.650000
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -2.3710 -0.4020  0.3721  0.2891  0.7757  4.1730
```

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

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -3.90600 -0.84700 -0.04572 -0.05091  0.58810  4.12000
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -3.1410 -1.4350 -0.5793 -0.3351  0.5310  3.1400
```

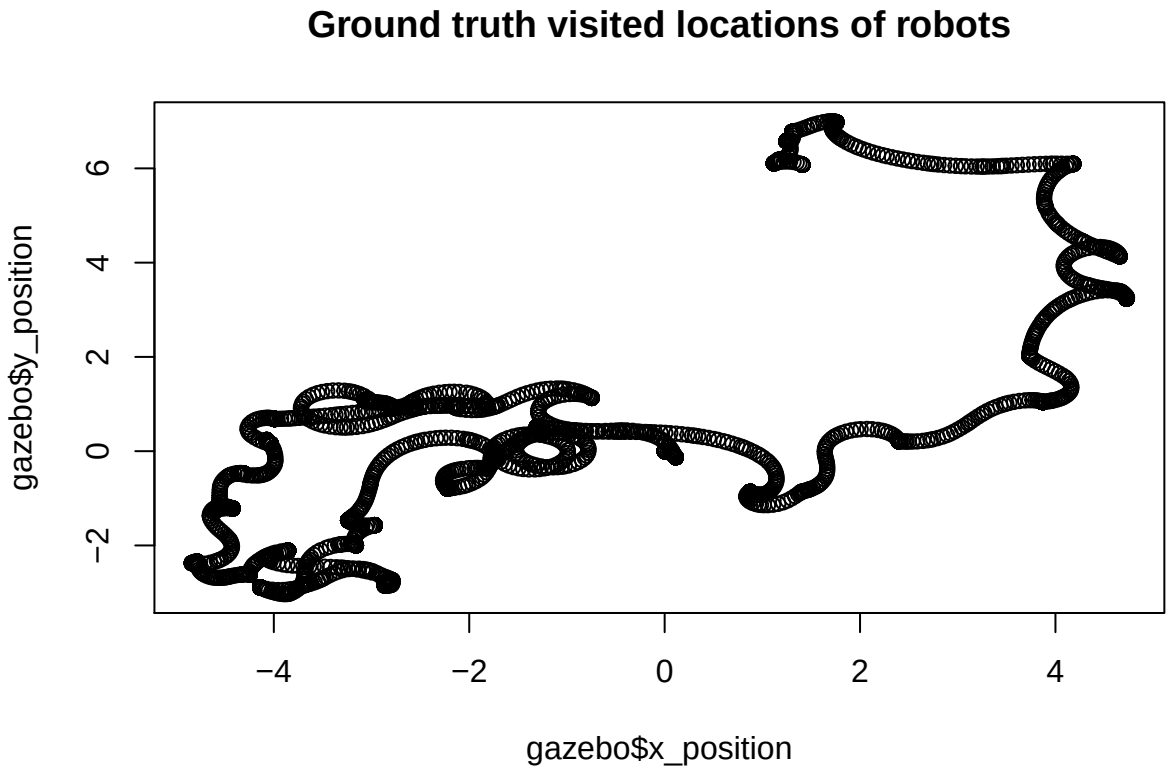
```
summary(discrete$horizontal_error)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## 0.000015 0.788700 1.264000 1.480000 2.072000 4.793000
```

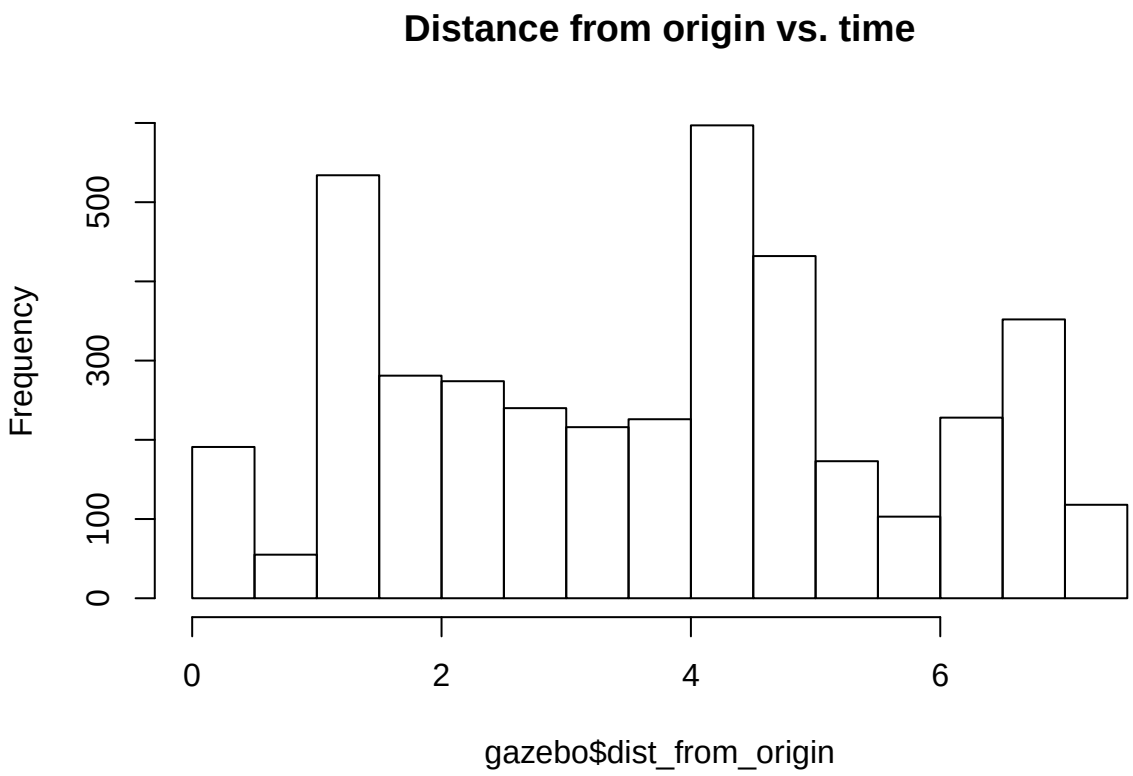
```
if (params$robot >= 2) {
    summary(external_data_averages)
}
```

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

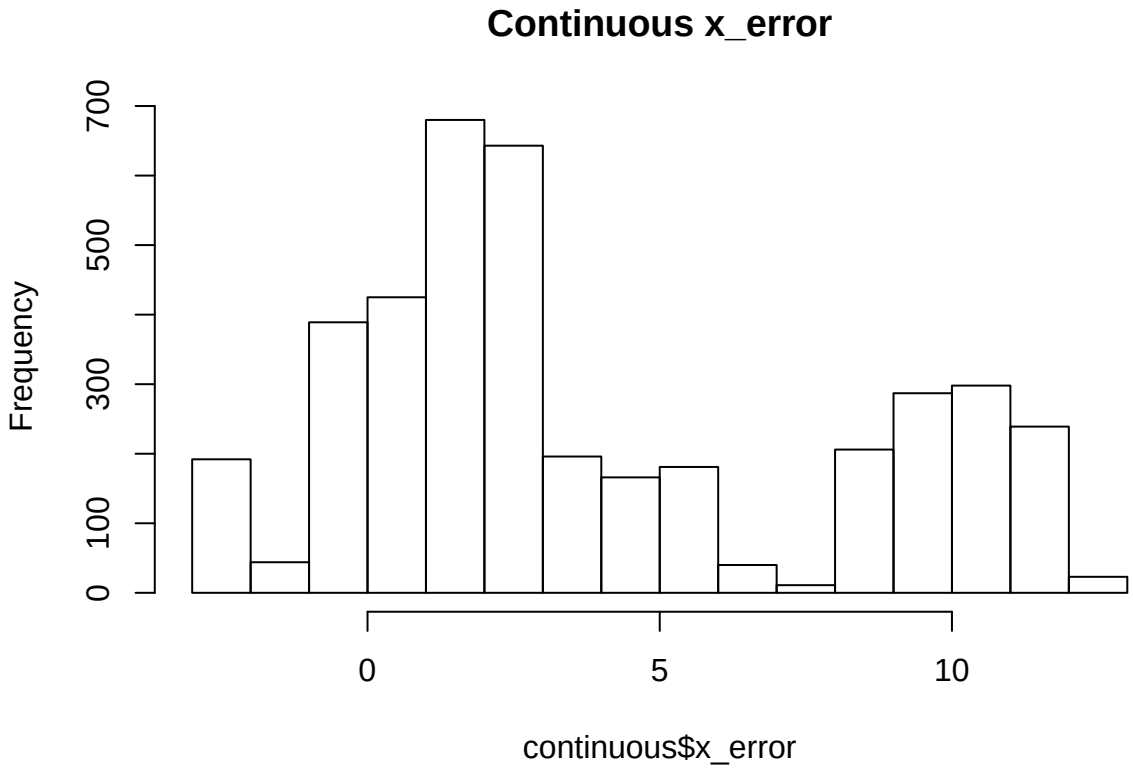
```
plot(gazebo$x_position, gazebo$y_position,
     main = "Ground truth visited locations of robots")
```



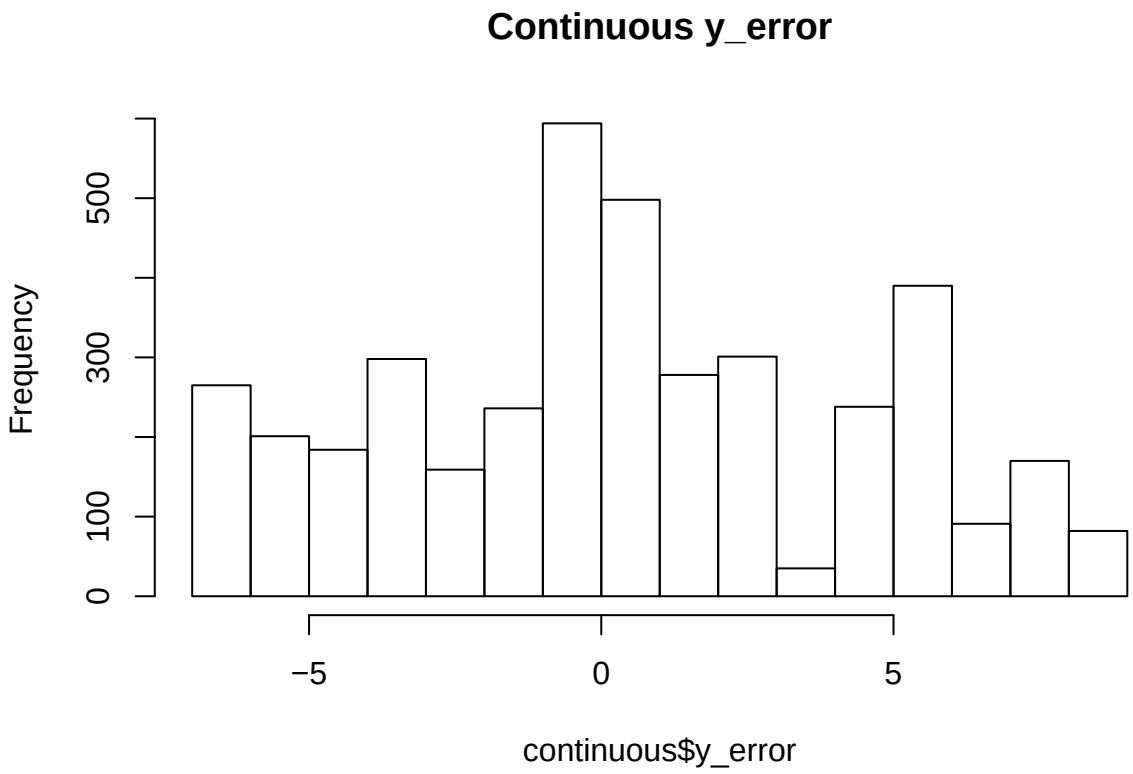

```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```




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

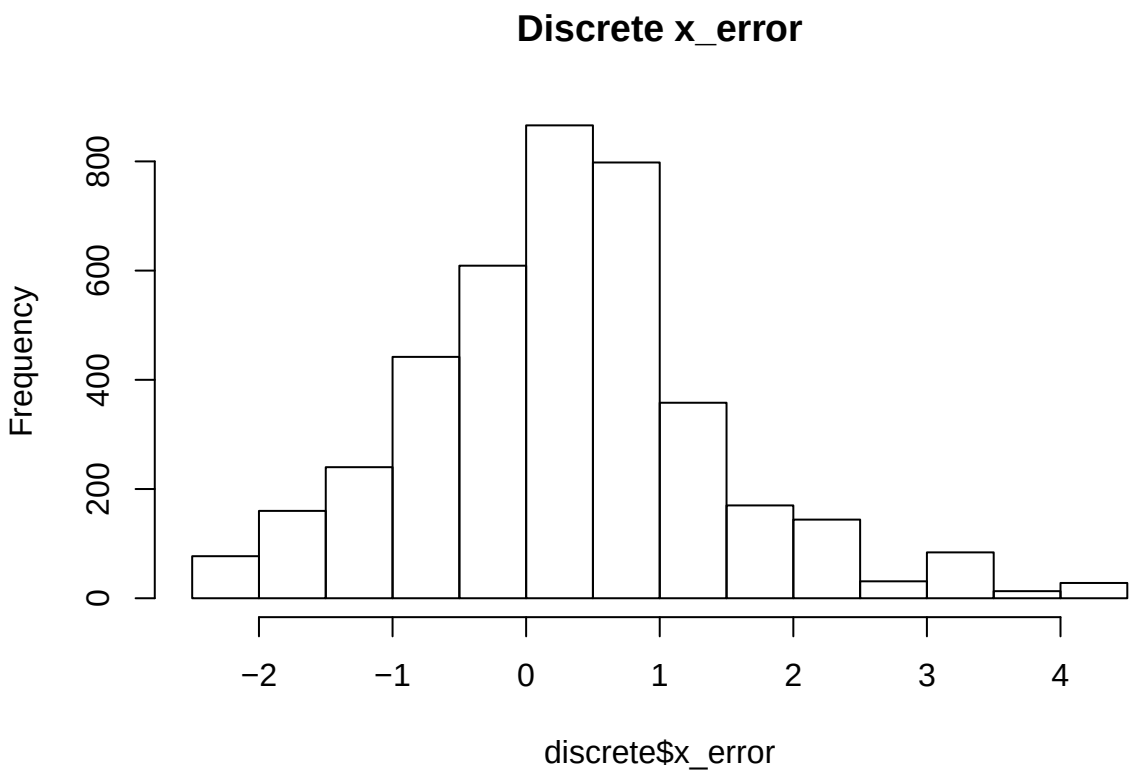



```
hist(continuous$y_error,
      main = "Continuous y_error")
```

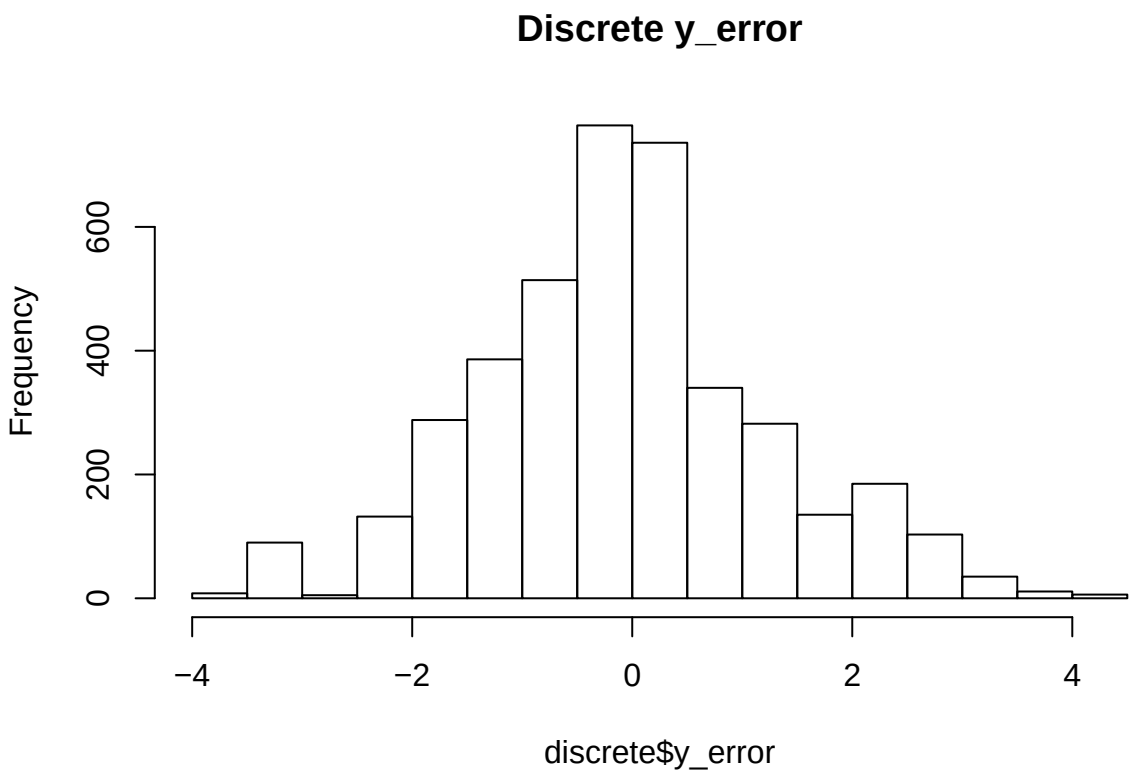



```
hist(continuous$horizontal_error,
     main = "Continuous total distance error")
```

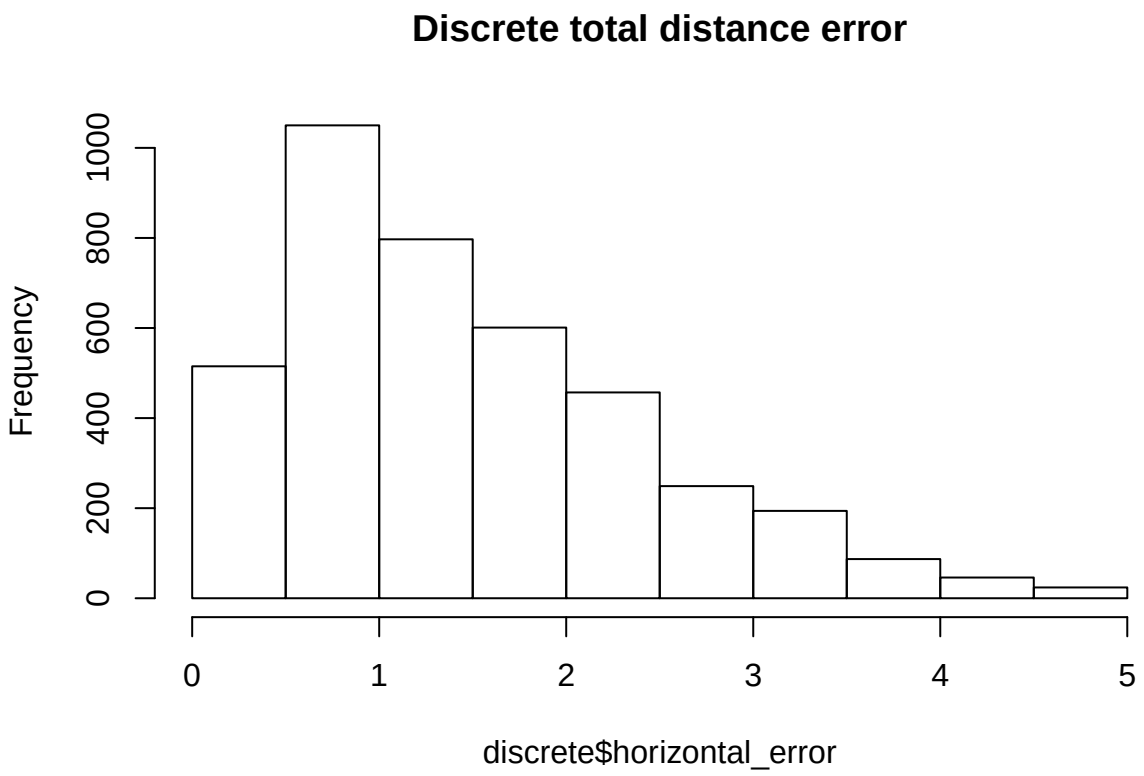

```
hist(discrete$x_error,
     main = "Discrete x_error")
```




```
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 - 04:25:51 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 & 4,020 & $-$4.998 & 2.493 & $-$9.278 & 1.356 \\
## y\_position & 4,020 & 0.499 & 2.175 & $-$5.683 & 3.520 \\
## yaw & 4,020 & 0.150 & 1.817 & $-$3.138 & 3.138 \\
## x\_variance & 4,020 & 12.354 & 7.101 & 0.076 & 24.605 \\
## y\_variance & 4,020 & 12.185 & 7.035 & 0.076 & 24.379 \\
## yaw\_variance & 4,020 & 14.713 & 8.472 & 0.092 & 29.365 \\
## yaw\_error & 4,020 & $-$0.006 & 1.801 & $-$3.136 & 3.141 \\
## x\_error & 4,020 & 3.874 & 4.169 & $-$2.881 & 12.375 \\
## y\_error & 4,020 & 0.319 & 3.922 & $-$6.535 & 8.190 \\
## horizontal\_error & 4,020 & 5.545 & 4.139 & 0.00001 & 13.650 \\
## \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 - 04:25:51 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 & 4,020 & $-$1.413 & 2.165 & $-$4.943 & 2.978 \\
## y\_position & 4,020 & 0.869 & 2.528 & $-$4.309 & 7.595 \\
## yaw & 4,020 & 0.030 & 1.831 & $-$3.115 & 3.138 \\
```

```
## x\_variance & 4,020 & 1.407 & 0.246 & 0.076 & 2.432 \\
## y\_variance & 4,020 & 1.418 & 0.264 & 0.076 & 2.951 \\
## yaw\_variance & 4,020 & 0.397 & 0.183 & 0.090 & 1.029 \\
## x\_error & 4,020 & 0.289 & 1.153 & $-$2.371 & 4.173 \\
## y\_error & 4,020 & $-$0.051 & 1.297 & $-$3.906 & 4.120 \\
## horizontal\_error & 4,020 & 1.480 & 0.953 & 0.00001 & 4.793 \\
## yaw\_error & 4,020 & $-$0.335 & 1.579 & $-$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)
}
```