

two_mobile_no_gps Experiment Report

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August 15, 2016

This is a summary of the data from the two_mobile_no_gps 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.
## -44.810 -20.850  -3.786 -10.400   3.118  12.110
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -43.94000 -34.60000 -0.00001 -4.98200 17.69000  50.79000
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -3.141000 -1.561000  0.007684  0.008380  1.583000  3.142000
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.00002 16.99000 22.23000 29.00000 48.65000 56.41000
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -27.1100 -16.4500 -6.4550 -9.6800 -2.9120   0.1895
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -13.8600 -7.5410 -3.7930 -4.2970  0.1431   4.9130
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -3.141000 -1.566000  0.005404  0.006812  1.587000  3.142000
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.000018  4.689000  7.998000 11.200000 18.320000 29.940000
```

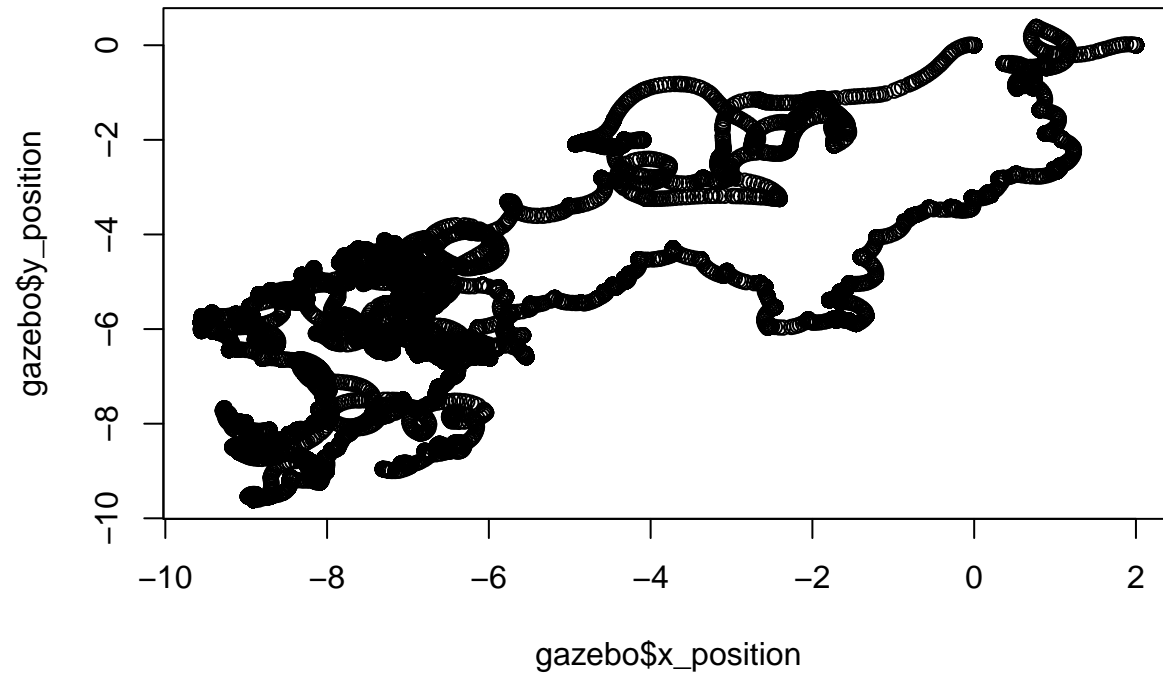
```
if (params$robot >= 2) {
  summary(external_data_averages)
}
```

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

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

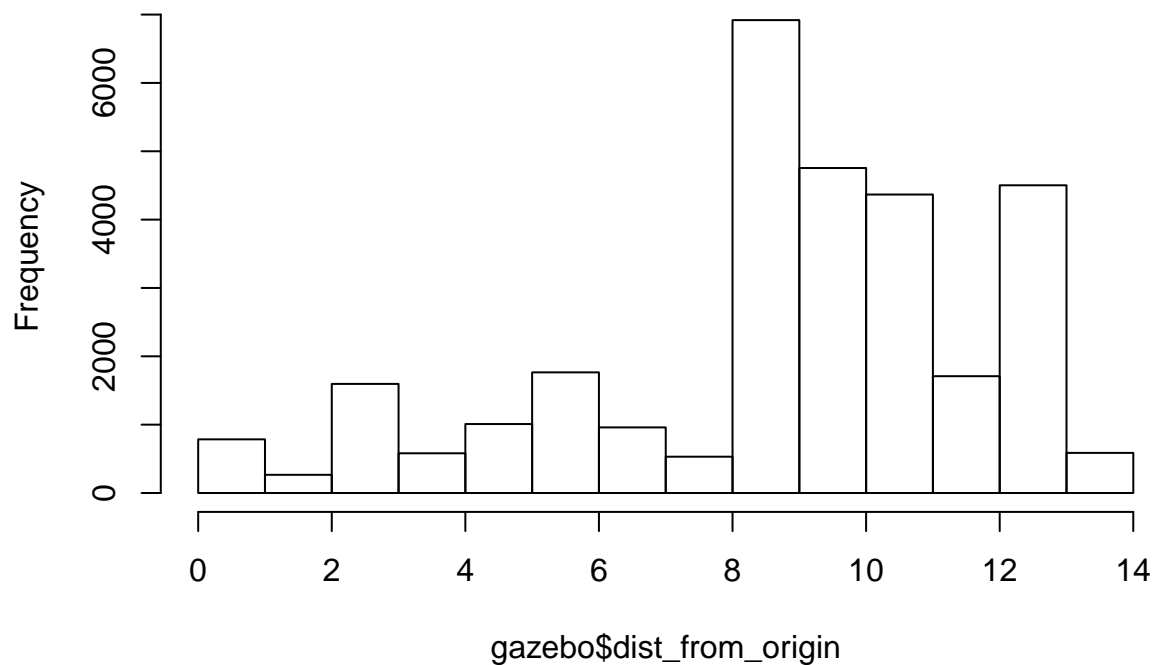
```
plot(gazebo$x_position, gazebo$y_position,
     main = "Ground truth visited locations of robots")
```

Ground truth visited locations of robots

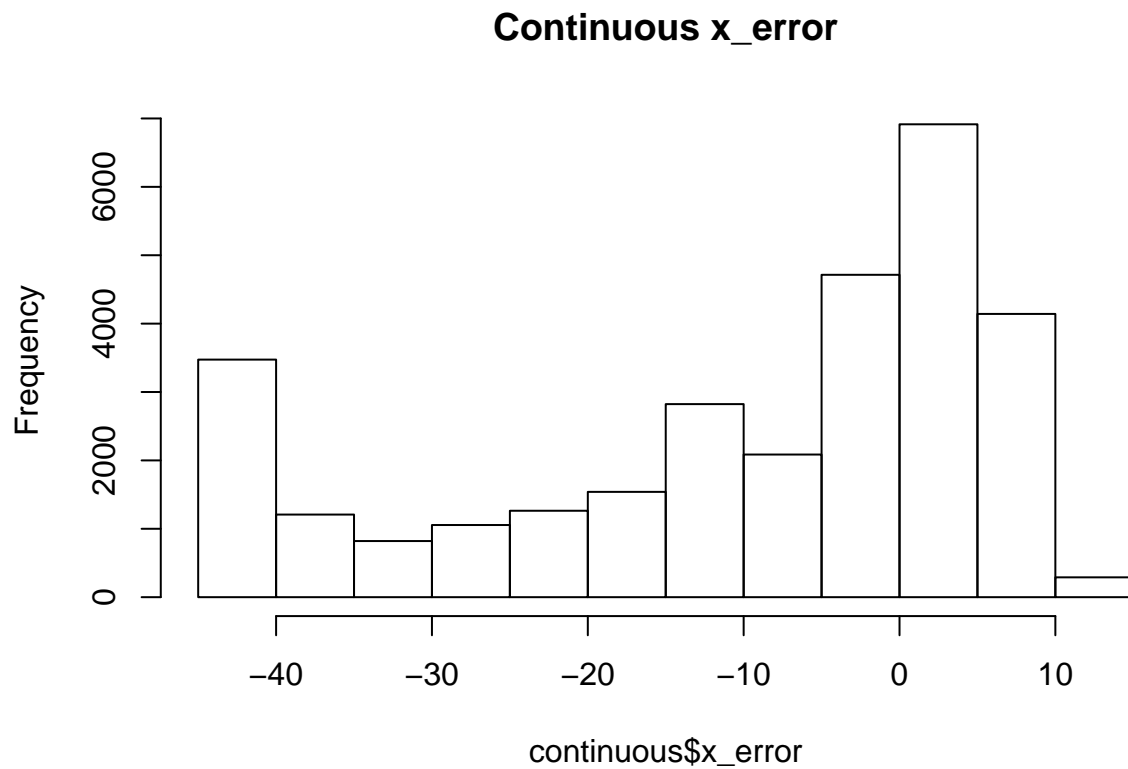


```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```

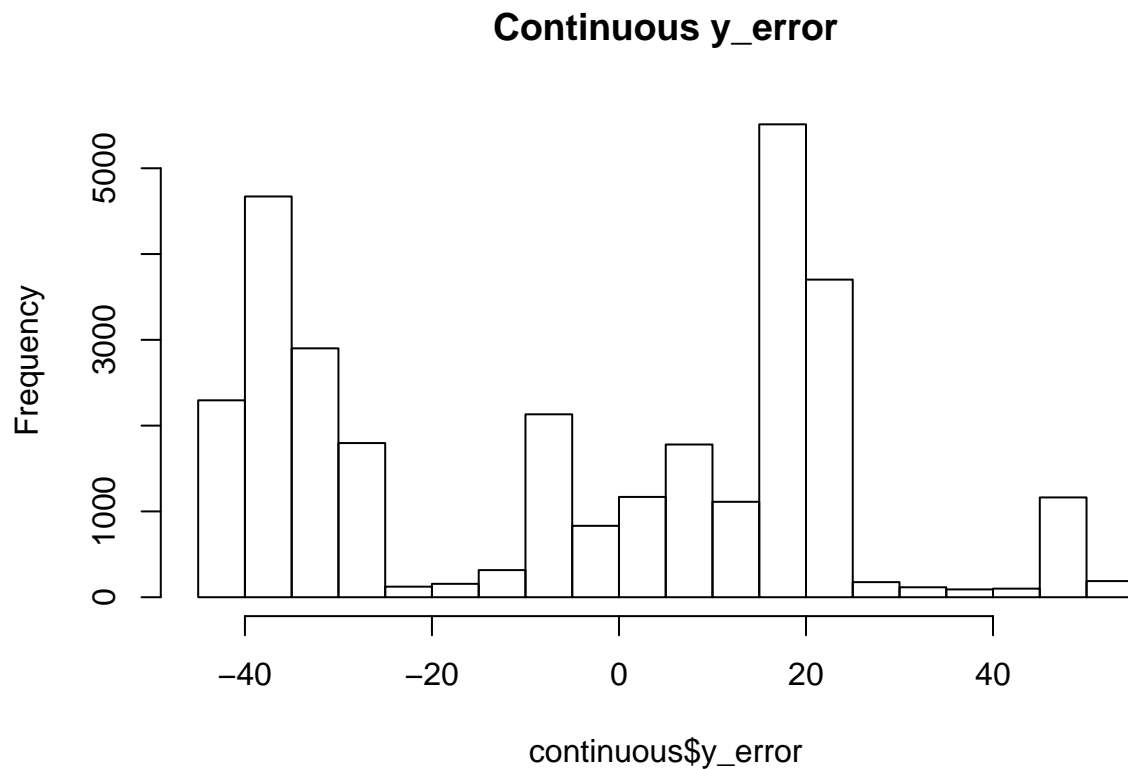
Distance from origin vs. time



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

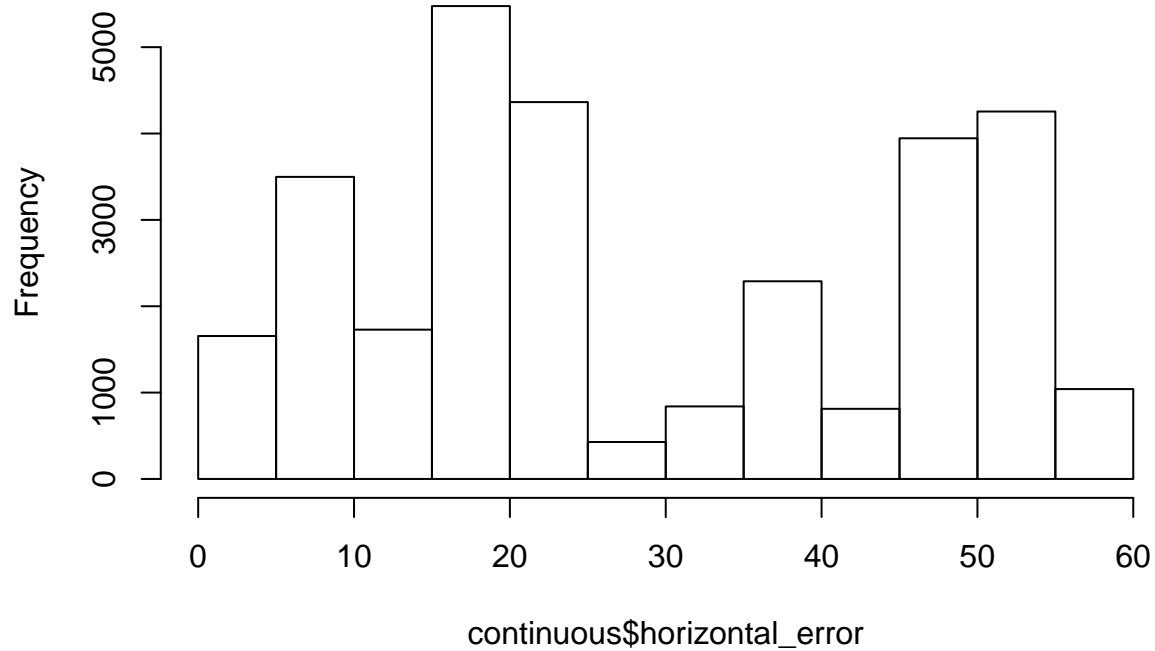


```
hist(continuous$y_error,  
     main = "Continuous y_error")
```



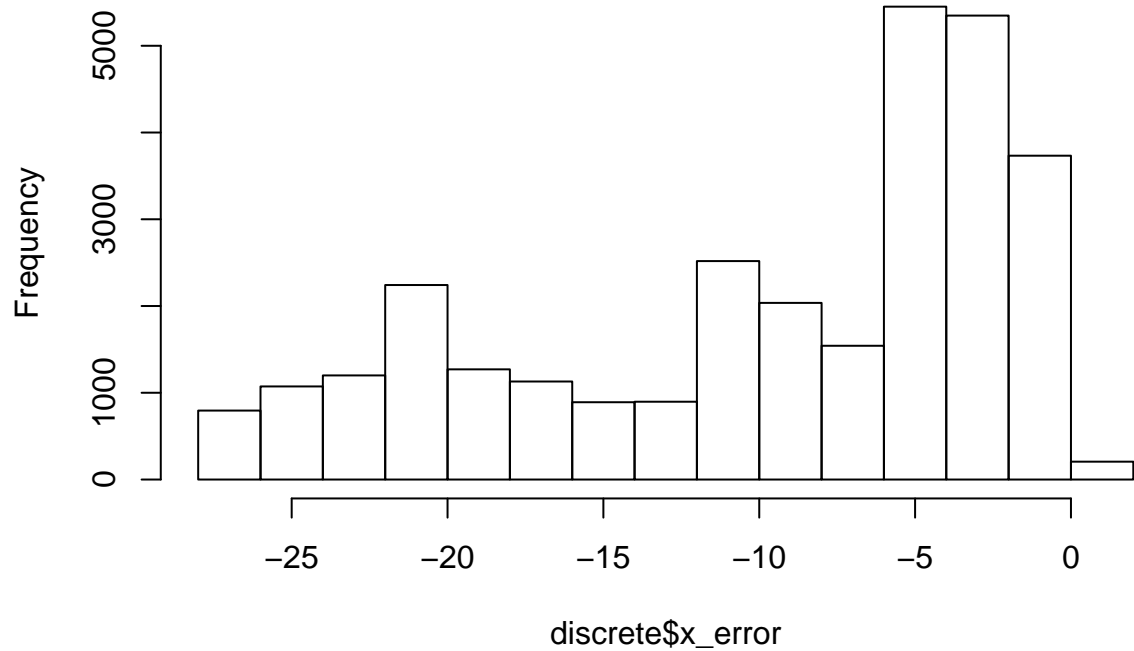
```
hist(continuous$horizontal_error,  
     main = "Continuous total distance error")
```

Continuous total distance error



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

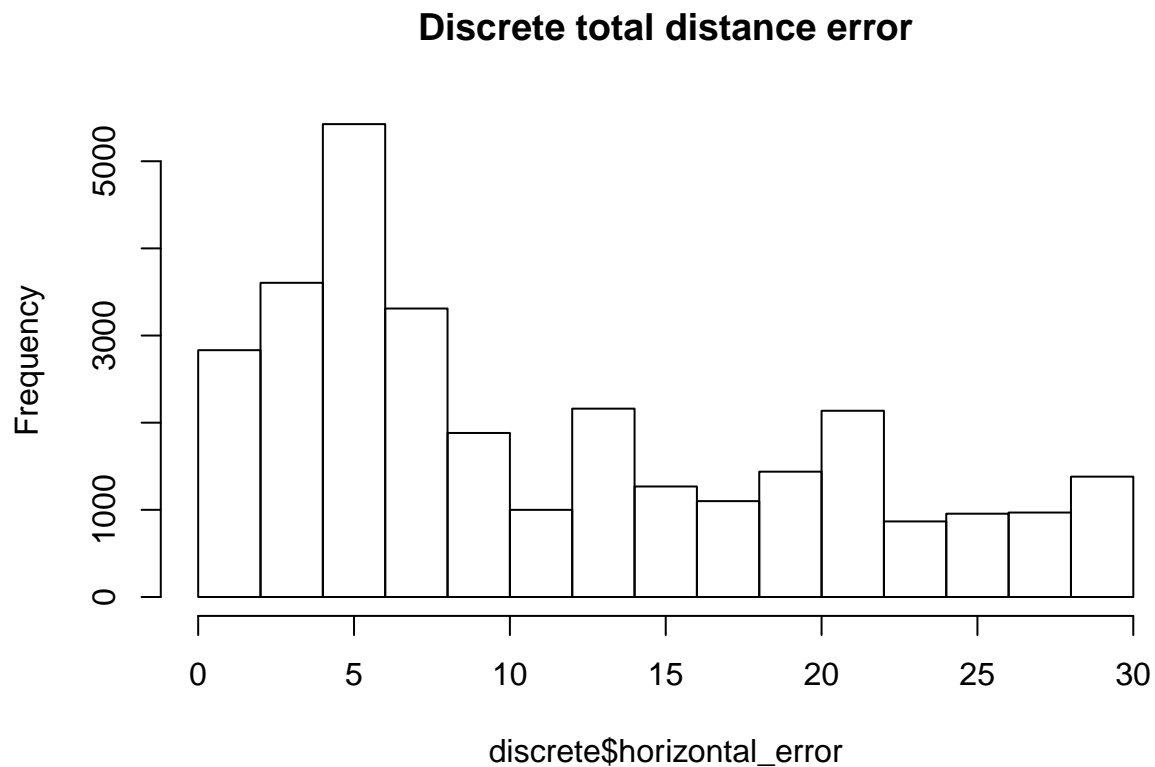
Discrete x_error



```
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 - 10:05:38 PM
## \begin{table}[h] \centering
## \caption{Continuous Filter Estimate for two-mobile-no-gps Experiment}
## \label{tab:two_mobile_no_gps_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 & 30,332 & 4.070 & 16.216 & $-19.334 & 35.904 \ll
## y\_position & 30,332 & $-0.765 & 27.091 & $-59.782 & 38.424 \ll
## yaw & 30,332 & $-0.406 & 1.412 & $-3.140 & 3.141 \ll
## x\_variance & 30,332 & 45.366 & 26.317 & 0.082 & 93.523 \ll
## y\_variance & 30,332 & 46.737 & 29.006 & 0.082 & 119.795 \ll
## yaw\_variance & 30,332 & 55.424 & 33.368 & 0.099 & 130.542 \ll
## yaw\_error & 30,332 & 0.008 & 1.813 & $-3.141 & 3.142 \ll
## x\_error & 30,332 & $-10.404 & 16.928 & $-44.815 & 12.107 \ll

```

```

## y\_error & 30,332 & $-4.982 & 26.820 & $-43.944 & 50.786 \\
## horizontal\_error & 30,332 & 29.003 & 17.256 & 0.00002 & 56.411 \\
## \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 - 10:05:38 PM
## \begin{table}[h] \centering
## \caption{Discrete Filter Estimate for two-mobile-no-gps Experiment}
## \label{tab:two_mobile_no_gps_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 & 30,332 & 3.346 & 6.527 & $-6.017 & 18.197 \\
## y\_position & 30,332 & $-1.450 & 3.735 & $-13.909 & 4.740 \\
## yaw & 30,332 & $-0.427 & 1.406 & $-3.141 & 3.141 \\
## x\_variance & 30,332 & 0.124 & 0.144 & 0.0001 & 1.748 \\
## y\_variance & 30,332 & 0.127 & 0.162 & 0.0001 & 2.534 \\
## yaw\_variance & 30,332 & 55.436 & 33.374 & 0.105 & 130.595 \\
## x\_error & 30,332 & $-9.680 & 7.910 & $-27.108 & 0.190 \\
## y\_error & 30,332 & $-4.297 & 4.685 & $-13.860 & 4.913 \\
## horizontal\_error & 30,332 & 11.204 & 8.435 & 0.00002 & 29.943 \\
## yaw\_error & 30,332 & 0.007 & 1.812 & $-3.141 & 3.142 \\
## \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)
}

```