

one_mobile_noiseless_no_gps Experiment Report

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This is a summary of the data from the one_mobile_noiseless_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.
## -1.921e-07  3.010e-05  4.472e-05  4.466e-05  5.931e-05  7.092e-05
```

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

```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## -7.126e-05 -6.029e-05 -4.565e-05 -4.561e-05 -3.102e-05  1.360e-09
```

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

```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## -3.1410000 -1.5610000 -0.0044750  0.0009888  1.5680000  3.1410000
```

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

```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## 1.564e-05  5.140e-05  6.715e-05  6.555e-05  7.989e-05  8.539e-05
```

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

```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## -1.921e-07  3.010e-05  4.472e-05  4.466e-05  5.931e-05  7.092e-05
```

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

```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## -7.126e-05 -6.029e-05 -4.565e-05 -4.561e-05 -3.102e-05  1.360e-09
```

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

```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## -3.1420000 -1.5630000 -0.0064430 -0.0003762  1.5650000  3.1410000
```

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

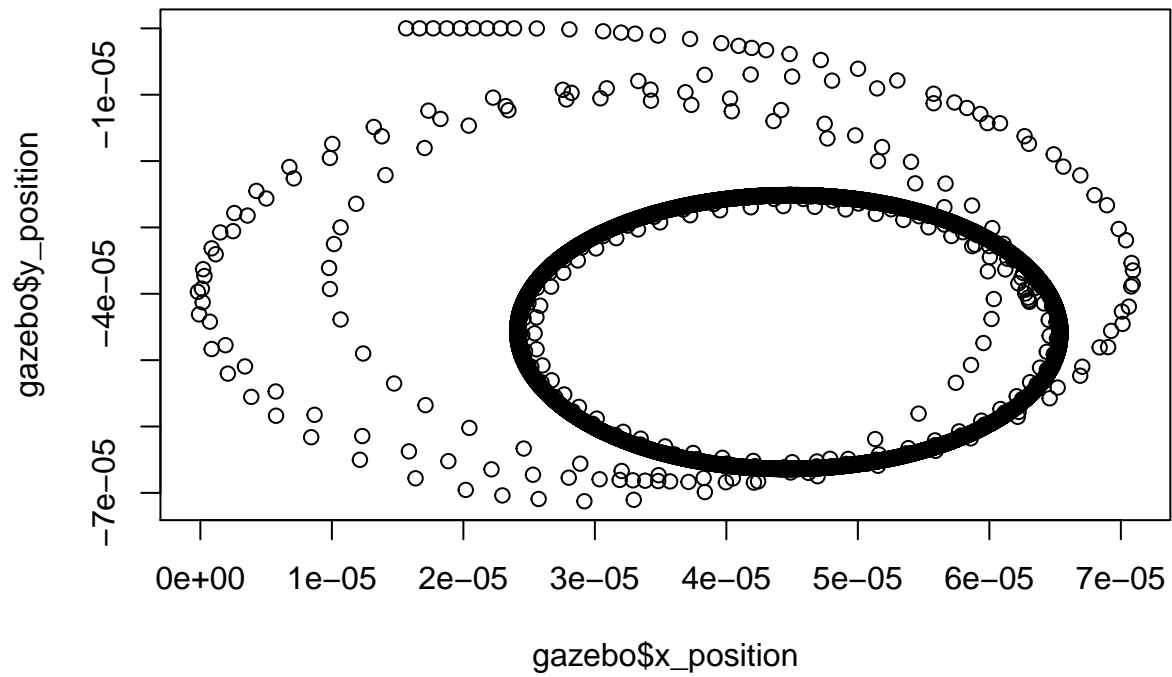
```
##      Min.    1st Qu.    Median      Mean    3rd Qu.      Max.
## 1.564e-05  5.140e-05  6.715e-05  6.555e-05  7.989e-05  8.539e-05
```

```
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")
```

Ground truth visited locations of robots



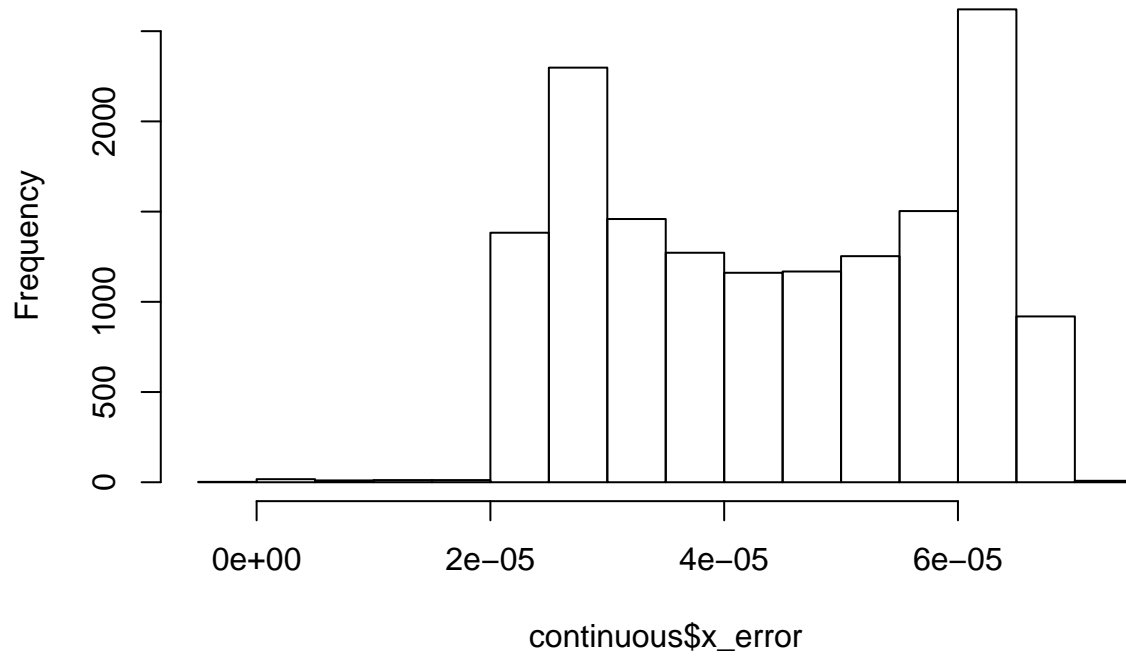
```
hist(gazebo$dist_from_origin,  
     main = "Distance from origin vs. time")
```

Distance from origin vs. time



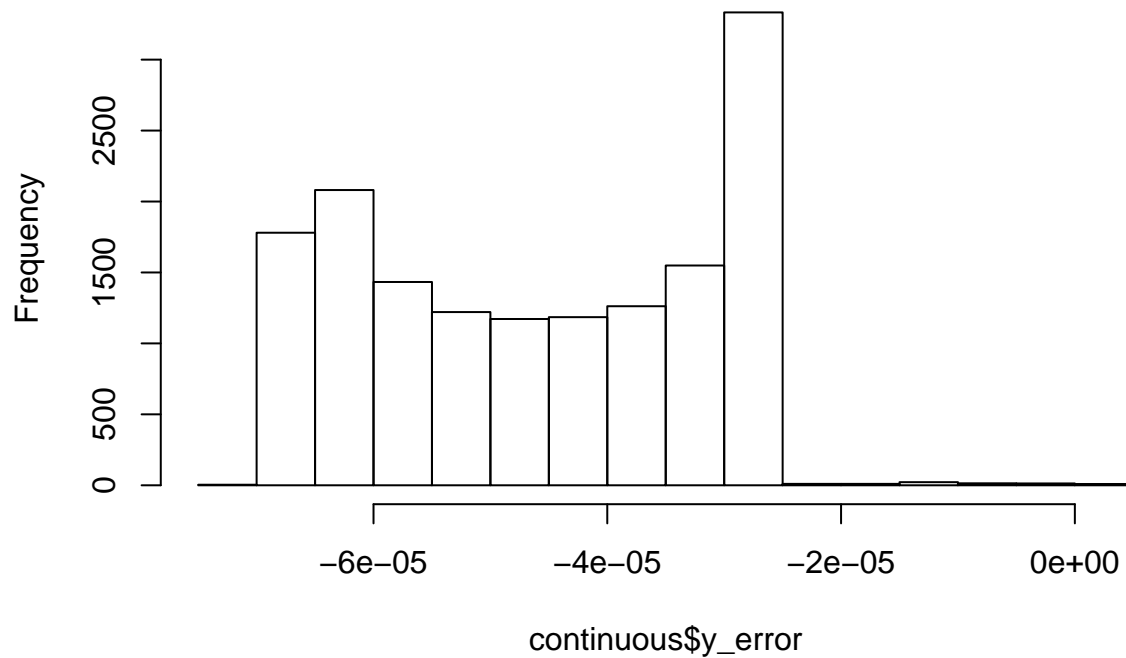
```
hist(continuous$x_error,  
     main = "Continuous x_error")
```

Continuous x_error



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

Continuous y_error



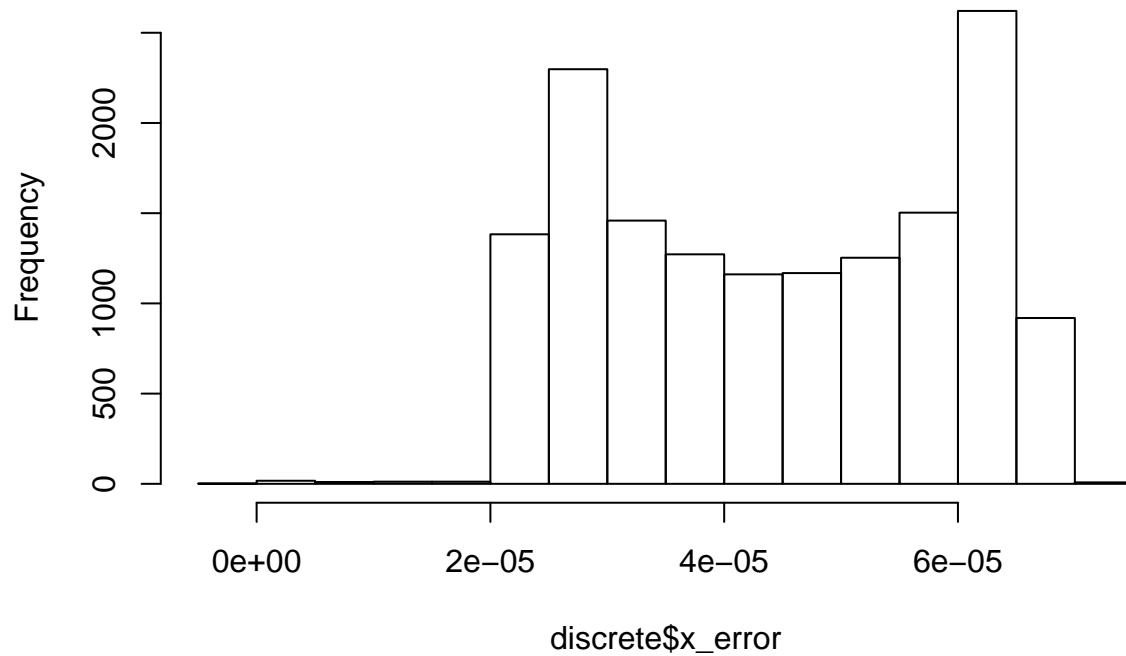
```
hist(continuous$horizontal_error,  
     main = "Continuous total distance error")
```

Continuous total distance error

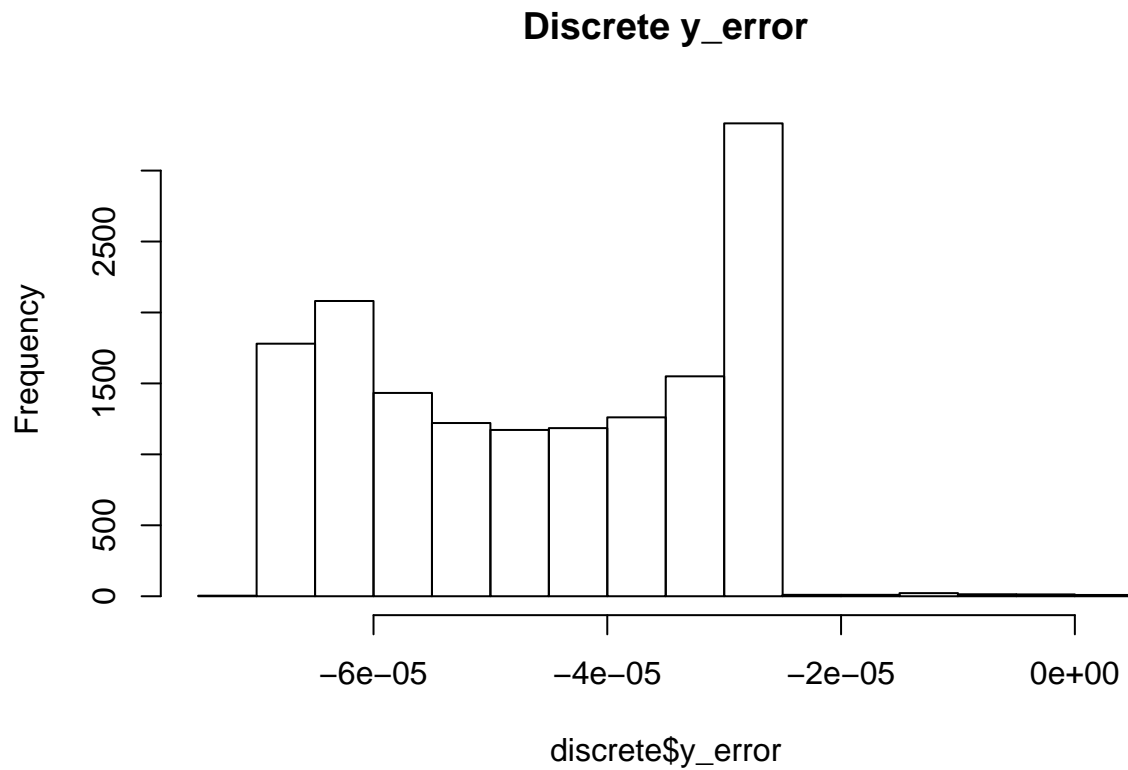


```
hist(discrete$x_error,  
     main = "Discrete x_error")
```

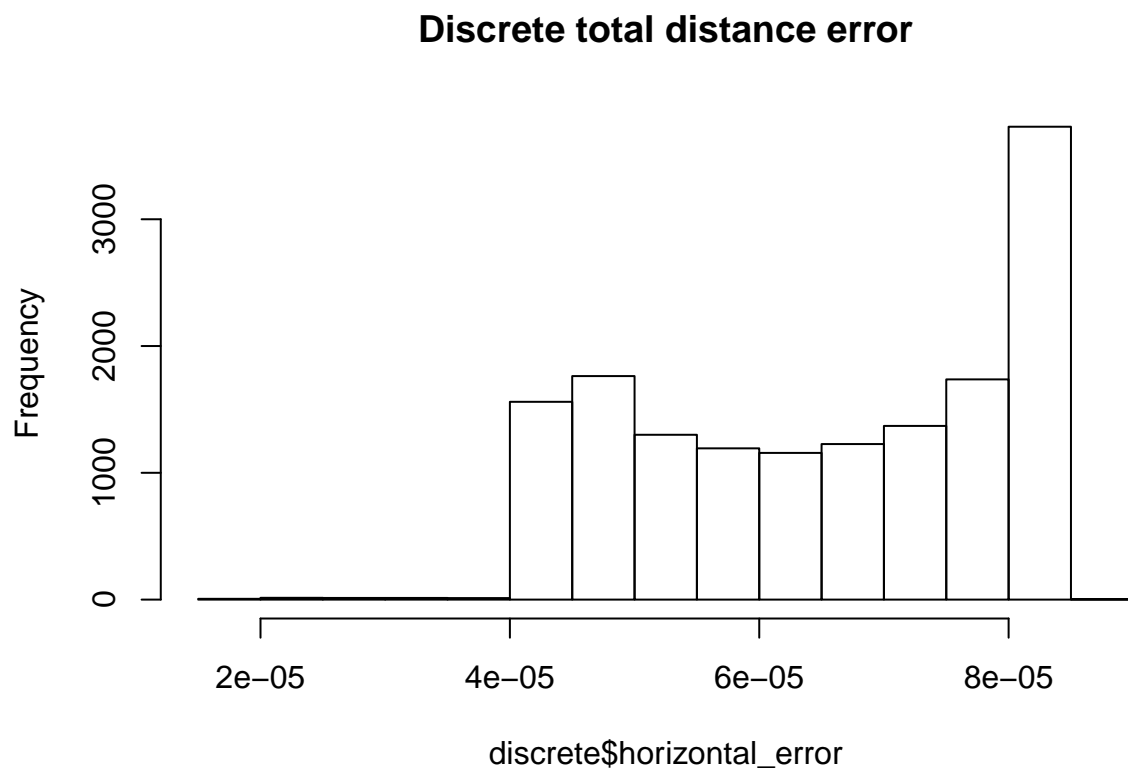
Discrete x_error



```
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 - 10:03:44 PM
## \begin{table}[h] \centering
## \caption{Continuous Filter Estimate for one-mobile-noiseless-no-gps Experiment}
## \label{tab:one_mobile_noiseless_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 & 15,098 & $-$0.000 & 0.000 & $-$0 & 0 \\\
## y\_position & 15,098 & 0.000 & 0.000 & $-$0 & 0 \\\
## yaw & 15,098 & 0.012 & 0.001 & $-$0.000 & 0.048 \\\
## x\_variance & 15,098 & 84.765 & 48.858 & 0.155 & 169.405 \\\
## y\_variance & 15,098 & 84.765 & 48.858 & 0.155 & 169.405 \\\
## yaw\_variance & 15,098 & 76.168 & 43.907 & 0.139 & 152.225 \\\
## yaw\_error & 15,098 & 0.001 & 1.812 & $-$3.141 & 3.141 \\\
## x\_error & 15,098 & 0.00004 & 0.00001 & $-$0.0000002 & 0.0001 \\\
## y\_error & 15,098 & $-$0.00005 & 0.00001 & $-$0.0001 & 0.000 \\\
## horizontal\_error & 15,098 & 0.0001 & 0.00001 & 0.00002 & 0.0001 \\\

```

```

## \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.edu
## % Date and time: Mon, Aug 15, 2016 - 10:03:44 PM
## \begin{table}[h] \centering
##   \caption{Discrete Filter Estimate for one-mobile-noiseless-no-gps Experiment}
##   \label{tab:one_mobile_noiseless_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 & 15,098 & 0.000 & 0.000 & $-0.000 & 0.000 \\
##     y\_position & 15,098 & $-0.000 & 0.000 & $-0.000 & 0.000 \\
##     yaw & 15,098 & 0.016 & 0.002 & $-0.000 & 0.049 \\
##     x\_variance & 15,098 & 84.761 & 48.858 & 0.156 & 169.394 \\
##     y\_variance & 15,098 & 84.761 & 48.858 & 0.156 & 169.394 \\
##     yaw\_variance & 15,098 & 76.165 & 43.907 & 0.139 & 152.215 \\
##     x\_error & 15,098 & 0.00004 & 0.00001 & $-0.0000002 & 0.0001 \\
##     y\_error & 15,098 & $-0.00005 & 0.00001 & $-0.0001 & 0.000 \\
##     horizontal\_error & 15,098 & 0.0001 & 0.00001 & 0.00002 & 0.0001 \\
##     yaw\_error & 15,098 & $-0.0004 & 1.812 & $-3.142 & 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)
}

```