C - Particle Filter

0.1.0

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1.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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2.1 File List

Here is a list of all files with brief descriptions:

Chapter 3

Class Documentation

3.1 measurement Struct Reference

```
#include <particle_filter.h>
```

Public Attributes

- double x
- double y

3.1.1 Member Data Documentation

3.1.1.1 double measurement::x

3.1.1.2 double measurement::y

The documentation for this struct was generated from the following file:

- src/particle_filter.h

3.2 particle Struct Reference

```
#include <particle_filter.h>
```

Public Attributes

- double x
- double y
- double w

3.2.1 Member Data Documentation

3.2.1.1 double particle::w

3.2.1.2 double particle::x

3.2.1.3 double particle::y

The documentation for this struct was generated from the following file:

- src/particle_filter.h

Chapter 4

File Documentation

4.1 src/gauss_sample.c File Reference

```
#include <stdio.h>
#include <math.h>
```

Functions

- float box_muller (float m, float s)
- int main (int argc, char ∗argv[ ])

4.1.1 Function Documentation

4.1.1.1 float box_muller (float *m,* float *s*)

4.1.1.2 int main (int *argc,* char ∗ *argv[ ]*)

4.2 src/particle_filter.c File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <particle_filter.h>
#include <random_number_gen.h>
#include <math.h>
#include <time.h>
```

Macros

- #define PI 3.14159265358979323846

Functions

- void init_particles (struct particle particles[N])
- double normpdf (double x, double mu, double sigma)

  Calculates the value of x of a normal distribution with mean mu and standard deviation sigma.

- void weighted_sample (struct particle ps[ ], struct particle res[ ], double weights[ ], int samples)
- double max (double arr[ ], int size)
- void resampling_wheel (struct particle ps[ ], struct particle res[ ], double weights[ ], int samples)
- void particle_filter (struct particle xs[N], struct measurement ∗z)
- void create_fake_measurements (struct measurement zs[M])
- void zs_to_csv (struct measurement zs[M], char filename[ ])
- struct particle weighted_average (struct particle ps[ ], int size)
- int main (int argc, char ∗argv[ ])

4.2.1 Macro Definition Documentation

4.2.1.1 #define PI 3.14159265358979323846

4.2.2 Function Documentation

4.2.2.1 void create_fake_measurements (struct **measurement** *zs[M]*)

4.2.2.2 void init_particles (struct **particle** *particles[N]*)

4.2.2.3 int main (int *argc,* char ∗ *argv[ ]*)

4.2.2.4 double max (double *arr[ ],* int *size*)

4.2.2.5 double normpdf (double *x,* double *mu,* double *sigma*)

Calculates the value of x of a normal distribution with mean mu and standard deviation sigma.

Parameters

x	
mu	Mean of the normal distribution
sigma	Standard deviation of the normal distribution

Returns

Value of the normal distribution at position x

4.2.2.6 void particle_filter (struct **particle** *xs[N],* struct **measurement** ∗ *z*)

4.2.2.7 void resampling_wheel (struct **particle** *ps[ ],* struct **particle** *res[ ],* double *weights[ ],* int *samples*)

4.2.2.8 struct **particle** weighted_average (struct **particle** *ps[ ],* int *size*)

4.2.2.9 void weighted_sample (struct **particle** *ps[ ],* struct **particle** *res[ ],* double *weights[ ],* int *samples*)

4.2.2.10 void zs_to_csv (struct **measurement** *zs[M],* char *filename[ ]*)

4.3 src/particle_filter.h File Reference

Classes

- struct particle
- struct measurement

Macros

- #define N 100 /∗ Total number of particles ∗/
- #define M 200 /∗ Number of fake measurements ∗/
- #define max_x 200
- #define max_y 200

Functions

- double normpdf (double x, double mu, double sigma)

  Calculates the value of x of a normal distribution with mean mu and standard deviation sigma.
- void init_particles (struct particle particles[N])
- void particle_filter (struct particle particles[N], struct measurement ∗m)

4.3.1 Macro Definition Documentation

4.3.1.1 #define M 200 /∗ Number of fake measurements ∗/

4.3.1.2 #define max_x 200

4.3.1.3 #define max_y 200

4.3.1.4 #define N 100 /∗ Total number of particles ∗/

4.3.2 Function Documentation

4.3.2.1 void init_particles (struct particle *particles[N]*)

4.3.2.2 double normpdf (double *x*, double *mu*, double *sigma*)

Calculates the value of x of a normal distribution with mean mu and standard deviation sigma.

Parameters

x	
mu	Mean of the normal distribution
sigma	Standard deviation of the normal distribution

Returns

Value of the normal distribution at position x

4.3.2.3 void particle_filter (struct particle *particles[N]*, struct measurement ∗ *m*)

4.4 src/random_number_gen.c File Reference

```
#include <math.h>
#include <stdlib.h>
#include <time.h>
```

Functions

- void init ()
- double randn (double mu, double sigma)
- double randu (double a, double b)

4.4.1 Function Documentation

4.4.1.1 void init ( )

4.4.1.2 double randn (double *mu,* double *sigma*)

4.4.1.3 double randu (double *a,* double *b*)

4.5 src/random_number_gen.h File Reference

Functions

- double randn (double mu, double sigma)
- double randu (double a, double b)

4.5.1 Function Documentation

4.5.1.1 double randn (double *mu,* double *sigma*)

4.5.1.2 double randu (double *a,* double *b*)

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