

FragScanTibo

0.1

Gegenereerd door Doxygen 1.8.18

1 Klasse Index	1
1.1 Klasse Lijst	1
2 Bestand Index	3
2.1 Bestandslijst	3
3 Klassen Documentatie	5
3.1 HMM Struct Referentie	5
3.1.1 Documentatie van data members	5
3.1.1.1 E1_dist	5
3.1.1.2 E_dist	6
3.1.1.3 e_M	6
3.1.1.4 e_M_1	6
3.1.1.5 N	6
3.1.1.6 pi	6
3.1.1.7 S1_dist	6
3.1.1.8 S_dist	6
3.1.1.9 tr	6
3.1.1.10 tr_E	7
3.1.1.11 tr_E_1	7
3.1.1.12 tr_I_I	7
3.1.1.13 tr_M_I	7
3.1.1.14 tr_R_R	7
3.1.1.15 tr_S	7
3.1.1.16 tr_S_1	7
3.2 thread_data Struct Referentie	8
3.2.1 Documentatie van data members	8
3.2.1.1 aa	8
3.2.1.2 cg	8
3.2.1.3 dna	9
3.2.1.4 format	9
3.2.1.5 hmm	9
3.2.1.6 obs_head	9
3.2.1.7 obs_seq	9
3.2.1.8 out	9
3.2.1.9 train	9
3.2.1.10 wholegenome	10
3.3 TRAIN Struct Referentie	10
3.3.1 Documentatie van data members	10
3.3.1.1 E1_dist	10
3.3.1.2 E_dist	10
3.3.1.3 noncoding	10
3.3.1.4 rtrans	11

3.3.1.5 S1_dist	11
3.3.1.6 S_dist	11
3.3.1.7 start	11
3.3.1.8 start1	11
3.3.1.9 stop	11
3.3.1.10 stop1	11
3.3.1.11 trans	11
4 Bestand Documentatie	13
4.1 src/hmm.h Bestand Referentie	13
4.1.1 Gedetailleerde Beschrijving	15
4.1.2 Documentatie van macro's	15
4.1.2.1 A	15
4.1.2.2 C	16
4.1.2.3 E_STATE	16
4.1.2.4 E_STATE_1	16
4.1.2.5 G	16
4.1.2.6 I1_STATE	16
4.1.2.7 I1_STATE_1	16
4.1.2.8 I2_STATE	16
4.1.2.9 I2_STATE_1	16
4.1.2.10 I3_STATE	17
4.1.2.11 I3_STATE_1	17
4.1.2.12 I4_STATE	17
4.1.2.13 I4_STATE_1	17
4.1.2.14 I5_STATE	17
4.1.2.15 I5_STATE_1	17
4.1.2.16 I6_STATE	17
4.1.2.17 I6_STATE_1	17
4.1.2.18 M1_STATE	18
4.1.2.19 M1_STATE_1	18
4.1.2.20 M2_STATE	18
4.1.2.21 M2_STATE_1	18
4.1.2.22 M3_STATE	18
4.1.2.23 M3_STATE_1	18
4.1.2.24 M4_STATE	18
4.1.2.25 M4_STATE_1	18
4.1.2.26 M5_STATE	19
4.1.2.27 M5_STATE_1	19
4.1.2.28 M6_STATE	19
4.1.2.29 M6_STATE_1	19
4.1.2.30 NOSTATE	19

4.1.2.31 NUM_STATE	19
4.1.2.32 R_STATE	19
4.1.2.33 S_STATE	19
4.1.2.34 S_STATE_1	20
4.1.2.35 T	20
4.1.2.36 TR_DD	20
4.1.2.37 TR_DM	20
4.1.2.38 TR_ER	20
4.1.2.39 TR_ES	20
4.1.2.40 TR_ES1	20
4.1.2.41 TR_GE	20
4.1.2.42 TR_GG	21
4.1.2.43 TR_II	21
4.1.2.44 TR_IM	21
4.1.2.45 TR_MD	21
4.1.2.46 TR_MI	21
4.1.2.47 TR_MM	21
4.1.2.48 TR_RR	21
4.1.2.49 TR_RS	21
4.1.3 Documentatie van functies	22
4.1.3.1 free_hmm()	22
4.1.3.2 get_corrected_dna()	22
4.1.3.3 get_prob_from_cg()	22
4.1.3.4 get_protein()	23
4.1.3.5 get_rc_dna()	23
4.1.3.6 get_train_from_file()	24
4.1.3.7 viterbi()	24
4.2 src/hmm_lib.c Bestand Referentie	26
4.2.1 Documentatie van functies	26
4.2.1.1 dump_memory()	27
4.2.1.2 free_hmm()	27
4.2.1.3 get_prob_from_cg()	27
4.2.1.4 get_train_from_file()	28
4.2.1.5 viterbi()	28
4.3 src/hmm_lib.h Bestand Referentie	30
4.3.1 Documentatie van functies	30
4.3.1.1 dump_memory()	30
4.3.1.2 get_rc_dna_indel()	31
4.4 src/run_hmm.c Bestand Referentie	31
4.4.1 Documentatie van macro's	32
4.4.1.1 ADD_LEN	32
4.4.1.2 STRINGLEN	32

4.4.2 Documentatie van functies	32
4.4.2.1 appendSeq()	32
4.4.2.2 main()	32
4.4.2.3 print_error()	33
4.4.2.4 print_file_error()	34
4.4.2.5 thread_func()	34
4.5 src/run_hmm.h Bestand Referentie	35
4.5.1 Documentatie van typedefs	36
4.5.1.1 thread_data	37
4.5.2 Documentatie van functies	37
4.5.2.1 print_error()	37
4.5.2.2 print_file_error()	38
4.5.2.3 thread_func()	38
4.6 src/util_lib.c Bestand Referentie	39
4.6.1 Documentatie van functies	40
4.6.1.1 dmatrix()	40
4.6.1.2 dvector()	41
4.6.1.3 free_dmatrix()	41
4.6.1.4 free_dvector()	41
4.6.1.5 free_imatrix()	42
4.6.1.6 free_ivector()	42
4.6.1.7 get_protein()	42
4.6.1.8 get_rc_dna()	43
4.6.1.9 get_rc_dna_indel()	43
4.6.1.10 imatrix()	44
4.6.1.11 ivector()	44
4.6.1.12 nt2int()	45
4.6.1.13 nt2int_rc()	45
4.6.1.14 nt2int_rc_indel()	45
4.6.1.15 print_usage()	46
4.6.1.16 tr2int()	46
4.6.1.17 trinucleotide()	46
4.6.1.18 trinucleotide_pep()	47
4.7 src/util_lib.h Bestand Referentie	47
4.7.1 Documentatie van functies	48
4.7.1.1 dmatrix()	48
4.7.1.2 dvector()	48
4.7.1.3 free_dmatrix()	49
4.7.1.4 free_dvector()	49
4.7.1.5 free_imatrix()	49
4.7.1.6 free_ivector()	50
4.7.1.7 get_protein()	50

4.7.1.8 imatrix()	50
4.7.1.9 ivector()	51
4.7.1.10 nt2int()	51
4.7.1.11 nt2int_rc()	51
4.7.1.12 print_usage()	52
4.7.1.13 tr2int()	52
4.7.1.14 trinucleotide()	52

Hoofdstuk 1

Klasse Index

1.1 Klasse Lijst

Hieronder volgen de klassen, structs en unions met voor elk een korte beschrijving:

HMM	5
thread_data	8
TRAIN	10

Hoofdstuk 2

Bestand Index

2.1 Bestandslijst

Hieronder volgt de lijst met alle bestanden, elk met een korte beschrijving:

src/hmm.h	13
src/hmm_lib.c	26
src/hmm_lib.h	30
src/run_hmm.c	31
src/run_hmm.h	35
src/util_lib.c	39
src/util_lib.h	47

Hoofdstuk 3

Klassen Documentatie

3.1 HMM Struct Referentie

```
#include <hmm.h>
```

Public Attributen

- double [pi](#) [29]
- int [N](#)
- double [tr](#) [14]
- double [e_M_1](#) [6][16][4]
- double [e_M](#) [6][16][4]
- double [tr_R_R](#) [4][4]
- double [tr_I_I](#) [4][4]
- double [tr_M_I](#) [4][4]
- double [tr_S](#) [61][64]
- double [tr_E](#) [61][64]
- double [tr_S_1](#) [61][64]
- double [tr_E_1](#) [61][64]
- double [S_dist](#) [6]
- double [E_dist](#) [6]
- double [S1_dist](#) [6]
- double [E1_dist](#) [6]

3.1.1 Documentatie van data members

3.1.1.1 E1_dist

```
double E1_dist[6]
```

3.1.1.2 E_dist

```
double E_dist[6]
```

3.1.1.3 e_M

```
double e_M[6][16][4]
```

3.1.1.4 e_M_1

```
double e_M_1[6][16][4]
```

3.1.1.5 N

```
int N
```

3.1.1.6 pi

```
double pi[29]
```

3.1.1.7 S1_dist

```
double S1_dist[6]
```

3.1.1.8 S_dist

```
double S_dist[6]
```

3.1.1.9 tr

```
double tr[14]
```

3.1.1.10 tr_E

```
double tr_E[61][64]
```

3.1.1.11 tr_E_1

```
double tr_E_1[61][64]
```

3.1.1.12 tr_I_I

```
double tr_I_I[4][4]
```

3.1.1.13 tr_M_I

```
double tr_M_I[4][4]
```

3.1.1.14 tr_R_R

```
double tr_R_R[4][4]
```

3.1.1.15 tr_S

```
double tr_S[61][64]
```

3.1.1.16 tr_S_1

```
double tr_S_1[61][64]
```

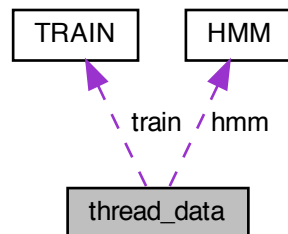
De documentatie voor deze struct is gegenereerd op grond van het volgende bestand:

- [src/hmm.h](#)

3.2 thread_data Struct Referentie

```
#include <run_hmm.h>
```

Collaboratie diagram voor thread_data:



Public Attributen

- FILE * [out](#)
- FILE * [aa](#)
- FILE * [dna](#)
- char * [obs_head](#)
- char * [obs_seq](#)
- int [wholegenome](#)
- int [cg](#)
- int [format](#)
- HMM * [hmm](#)
- TRAIN * [train](#)

3.2.1 Documentatie van data members

3.2.1.1 aa

```
FILE* aa
```

3.2.1.2 cg

```
int cg
```


3.2.1.3 dna

FILE* dna

3.2.1.4 format

int format

3.2.1.5 hmm

HMM* hmm

3.2.1.6 obs_head

char* obs_head

3.2.1.7 obs_seq

char* obs_seq

3.2.1.8 out

FILE* out

3.2.1.9 train

TRAIN* train

3.2.1.10 wholegenome

```
int wholegenome
```

De documentatie voor deze struct is gegenereerd op grond van het volgende bestand:

- [src/run_hmm.h](#)

3.3 TRAIN Struct Referentie

```
#include <hmm.h>
```

Public Attributen

- double [trans](#) [44][6][16][4]
- double [rtrans](#) [44][6][16][4]
- double [noncoding](#) [44][4][4]
- double [start](#) [44][61][64]
- double [stop](#) [44][61][64]
- double [start1](#) [44][61][64]
- double [stop1](#) [44][61][64]
- double [S_dist](#) [44][6]
- double [E_dist](#) [44][6]
- double [S1_dist](#) [44][6]
- double [E1_dist](#) [44][6]

3.3.1 Documentatie van data members

3.3.1.1 E1_dist

```
double E1_dist[44][6]
```

3.3.1.2 E_dist

```
double E_dist[44][6]
```

3.3.1.3 noncoding

```
double noncoding[44][4][4]
```

3.3.1.4 rtrans

```
double rtrans[44][6][16][4]
```

3.3.1.5 S1_dist

```
double S1_dist[44][6]
```

3.3.1.6 S_dist

```
double S_dist[44][6]
```

3.3.1.7 start

```
double start[44][61][64]
```

3.3.1.8 start1

```
double start1[44][61][64]
```

3.3.1.9 stop

```
double stop[44][61][64]
```

3.3.1.10 stop1

```
double stop1[44][61][64]
```

3.3.1.11 trans

```
double trans[44][6][16][4]
```

De documentatie voor deze struct is gegenereerd op grond van het volgende bestand:

- [src/hmm.h](#)

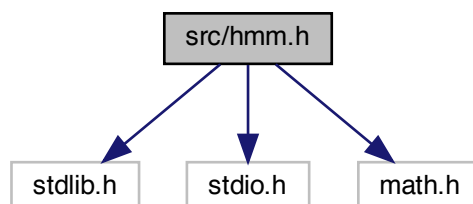
Hoofdstuk 4

Bestand Documentatie

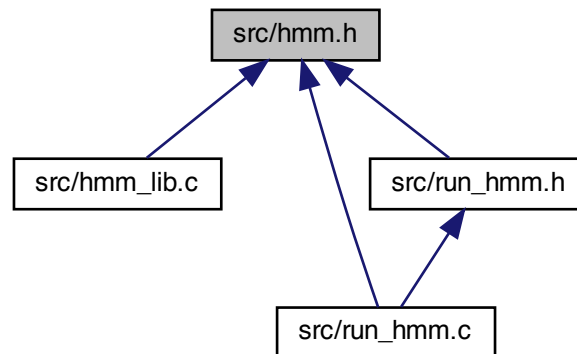
4.1 src/hmm.h Bestand Referentie

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

Include afhankelijkheidsgraaf voor hmm.h:



Deze graaf geeft aan welke bestanden direct of indirect afhankelijk zijn van dit bestand:



Klassen

- struct `HMM`
- struct `TRAIN`

Macros

- `#define A 0`
- `#define C 1`
- `#define G 2`
- `#define T 3`
- `#define NUM_STATE 29`
- `#define NOSTATE -1`
- `#define S_STATE 0`
- `#define E_STATE 1`
- `#define R_STATE 2`
- `#define S_STATE_1 3`
- `#define E_STATE_1 4`
- `#define M1_STATE 5`
- `#define M2_STATE 6`
- `#define M3_STATE 7`
- `#define M4_STATE 8`
- `#define M5_STATE 9`
- `#define M6_STATE 10`
- `#define M1_STATE_1 11`
- `#define M2_STATE_1 12`
- `#define M3_STATE_1 13`
- `#define M4_STATE_1 14`
- `#define M5_STATE_1 15`
- `#define M6_STATE_1 16`
- `#define I1_STATE 17`
- `#define I2_STATE 18`

- `#define I3_STATE` 19
- `#define I4_STATE` 20
- `#define I5_STATE` 21
- `#define I6_STATE` 22
- `#define I1_STATE_1` 23
- `#define I2_STATE_1` 24
- `#define I3_STATE_1` 25
- `#define I4_STATE_1` 26
- `#define I5_STATE_1` 27
- `#define I6_STATE_1` 28
- `#define TR_MM` 0
- `#define TR_MI` 1
- `#define TR_MD` 2
- `#define TR_II` 3
- `#define TR_IM` 4
- `#define TR_DD` 5
- `#define TR_DM` 6
- `#define TR_GE` 7
- `#define TR_GG` 8
- `#define TR_ER` 9
- `#define TR_RS` 10
- `#define TR_RR` 11
- `#define TR_ES` 12
- `#define TR_ES1` 13

Functies

- `int get_prob_from_cg` (`HMM` *hmm, `TRAIN` *train, `char` *O)
- `void get_train_from_file` (`char` *filename, `HMM` *hmm_ptr, `char` *mfilename, `char` *mfilename1, `char` *nfilename, `char` *sfilename, `char` *p1filename, `char` *p1filename, `char` *dfilename, `TRAIN` *train_ptr)
- `void viterbi` (`HMM` *hmm_ptr, `TRAIN` *train_ptr, `char` *O, `FILE` *out_filename, `FILE` *log_filename, `FILE` *dna_filename, `char` *head, `int` metagene, `int` cg, `int` format)
- `void free_hmm` (`HMM` *hmm)
- `void get_protein` (`char` *dna, `char` *protein, `int` strand, `int` whole_genome)
- `void get_rc_dna` (`char` *dna, `char` *dna1)
- `void get_corrected_dna` (`char` *dna, `char` *dna_f)

4.1.1 Gedetailleerde Beschrijving

This is the header file for the hmm datastructure.

4.1.2 Documentatie van macro's

4.1.2.1 A

```
#define A 0
```

4.1.2.2 C

```
#define C 1
```

4.1.2.3 E_STATE

```
#define E_STATE 1
```

4.1.2.4 E_STATE_1

```
#define E_STATE_1 4
```

4.1.2.5 G

```
#define G 2
```

4.1.2.6 I1_STATE

```
#define I1_STATE 17
```

4.1.2.7 I1_STATE_1

```
#define I1_STATE_1 23
```

4.1.2.8 I2_STATE

```
#define I2_STATE 18
```

4.1.2.9 I2_STATE_1

```
#define I2_STATE_1 24
```


4.1.2.10 I3_STATE

```
#define I3_STATE 19
```

4.1.2.11 I3_STATE_1

```
#define I3_STATE_1 25
```

4.1.2.12 I4_STATE

```
#define I4_STATE 20
```

4.1.2.13 I4_STATE_1

```
#define I4_STATE_1 26
```

4.1.2.14 I5_STATE

```
#define I5_STATE 21
```

4.1.2.15 I5_STATE_1

```
#define I5_STATE_1 27
```

4.1.2.16 I6_STATE

```
#define I6_STATE 22
```

4.1.2.17 I6_STATE_1

```
#define I6_STATE_1 28
```

4.1.2.18 M1_STATE

```
#define M1_STATE 5
```

4.1.2.19 M1_STATE_1

```
#define M1_STATE_1 11
```

4.1.2.20 M2_STATE

```
#define M2_STATE 6
```

4.1.2.21 M2_STATE_1

```
#define M2_STATE_1 12
```

4.1.2.22 M3_STATE

```
#define M3_STATE 7
```

4.1.2.23 M3_STATE_1

```
#define M3_STATE_1 13
```

4.1.2.24 M4_STATE

```
#define M4_STATE 8
```

4.1.2.25 M4_STATE_1

```
#define M4_STATE_1 14
```

4.1.2.26 M5_STATE

```
#define M5_STATE 9
```

4.1.2.27 M5_STATE_1

```
#define M5_STATE_1 15
```

4.1.2.28 M6_STATE

```
#define M6_STATE 10
```

4.1.2.29 M6_STATE_1

```
#define M6_STATE_1 16
```

4.1.2.30 NOSTATE

```
#define NOSTATE -1
```

4.1.2.31 NUM_STATE

```
#define NUM_STATE 29
```

4.1.2.32 R_STATE

```
#define R_STATE 2
```

4.1.2.33 S_STATE

```
#define S_STATE 0
```

4.1.2.34 S_STATE_1

```
#define S_STATE_1 3
```

4.1.2.35 T

```
#define T 3
```

4.1.2.36 TR_DD

```
#define TR_DD 5
```

4.1.2.37 TR_DM

```
#define TR_DM 6
```

4.1.2.38 TR_ER

```
#define TR_ER 9
```

4.1.2.39 TR_ES

```
#define TR_ES 12
```

4.1.2.40 TR_ES1

```
#define TR_ES1 13
```

4.1.2.41 TR_GE

```
#define TR_GE 7
```

4.1.2.42 TR_GG

```
#define TR_GG 8
```

4.1.2.43 TR_II

```
#define TR_II 3
```

4.1.2.44 TR_IM

```
#define TR_IM 4
```

4.1.2.45 TR_MD

```
#define TR_MD 2
```

4.1.2.46 TR_MI

```
#define TR_MI 1
```

4.1.2.47 TR_MM

```
#define TR_MM 0
```

4.1.2.48 TR_RR

```
#define TR_RR 11
```

4.1.2.49 TR_RS

```
#define TR_RS 10
```

4.1.3 Documentatie van functies

4.1.3.1 free_hmm()

```
void free_hmm (
    HMM * hmm )
```

Hier is de call graaf voor deze functie:



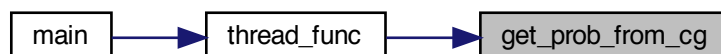
4.1.3.2 get_corrected_dna()

```
void get_corrected_dna (
    char * dna,
    char * dna_f )
```

4.1.3.3 get_prob_from_cg()

```
int get_prob_from_cg (
    HMM * hmm,
    TRAIN * train,
    char * O )
```

Hier is de caller graaf voor deze functie:



4.1.3.4 get_protein()

```
void get_protein (
    char * dna,
    char * protein,
    int strand,
    int whole_genome )
```

Hier is de caller graaf voor deze functie:



4.1.3.5 get_rc_dna()

```
void get_rc_dna (
    char * dna,
    char * dna1 )
```

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:



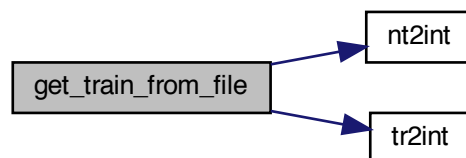
4.1.3.6 get_train_from_file()

```
void get_train_from_file (
    char * filename,
    HMM * hmm_ptr,
    char * mfilename,
    char * mfilename1,
    char * nfilename,
    char * sfilename,
    char * pfilename,
    char * slfilename,
    char * plfilename,
    char * dfilename,
    TRAIN * train_ptr )
```

Reads files.

1. Reads transition file and store in hmm datastructure

Hier is de call graaf voor deze functie:



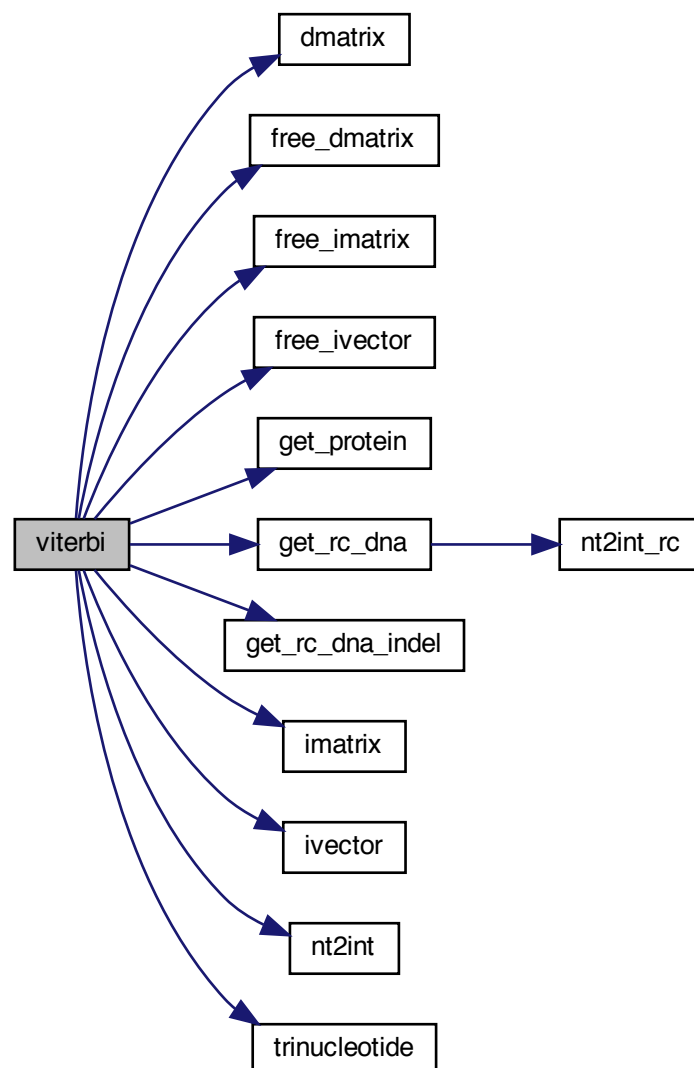
Hier is de caller graaf voor deze functie:



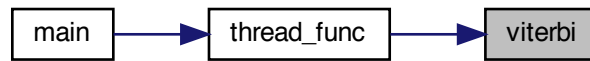
4.1.3.7 viterbi()

```
void viterbi (  
    HMM * hmm_ptr,  
    TRAIN * train_ptr,  
    char * O,  
    FILE * out_filename,  
    FILE * log_filename,  
    FILE * dna_filename,  
    char * head,  
    int metagene,  
    int cg,  
    int format )
```

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:

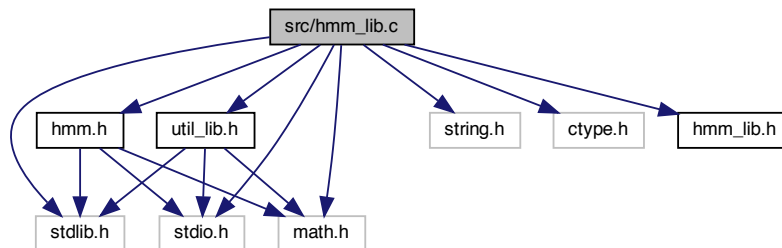


4.2 src/hmm_lib.c Bestand Referentie

```

#include <stdio.h>
#include <math.h>
#include <string.h>
#include <stdlib.h>
#include <ctype.h>
#include "hmm.h"
#include "util_lib.h"
#include "hmm_lib.h"
  
```

Include afhankelijkheidsgraaf voor hmm_lib.c:



Functionies

- void `viterbi` (`HMM` *hmm_ptr, `TRAIN` *train_ptr, char *O, FILE *fp_out, FILE *fp_aa, FILE *fp_dna, char *head, int whole_genome, int cg, int format)
- int `get_prob_from_cg` (`HMM` *hmm_ptr, `TRAIN` *train_ptr, char *O)
- void `get_train_from_file` (char *filename, `HMM` *hmm_ptr, char *mfilename, char *mfilename1, char *nfilename, char *sfilename, char *pfilename, char *s1filename, char *p1filename, char *dfilename, `TRAIN` *train_ptr)
- void `free_hmm` (`HMM` *hmm_ptr)
- void `dump_memory` (void *p, int size)

4.2.1 Documentatie van functies

4.2.1.1 dump_memory()

```
void dump_memory (
    void * p,
    int size )
```

4.2.1.2 free_hmm()

```
void free_hmm (
    HMM * hmm_ptr )
```

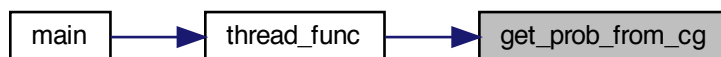
Hier is de call graaf voor deze functie:



4.2.1.3 get_prob_from_cg()

```
int get_prob_from_cg (
    HMM * hmm_ptr,
    TRAIN * train_ptr,
    char * O )
```

Hier is de caller graaf voor deze functie:



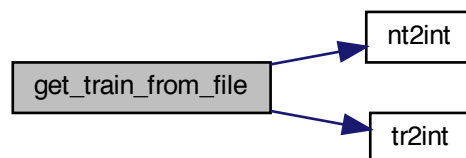
4.2.1.4 get_train_from_file()

```
void get_train_from_file (
    char * filename,
    HMM * hmm_ptr,
    char * mfilename,
    char * mfilename1,
    char * nfilename,
    char * sfilename,
    char * pfilename,
    char * slfilename,
    char * plfilename,
    char * dfilename,
    TRAIN * train_ptr )
```

Reads files.

1. Reads transition file and store in hmm datastructure

Hier is de call graaf voor deze functie:



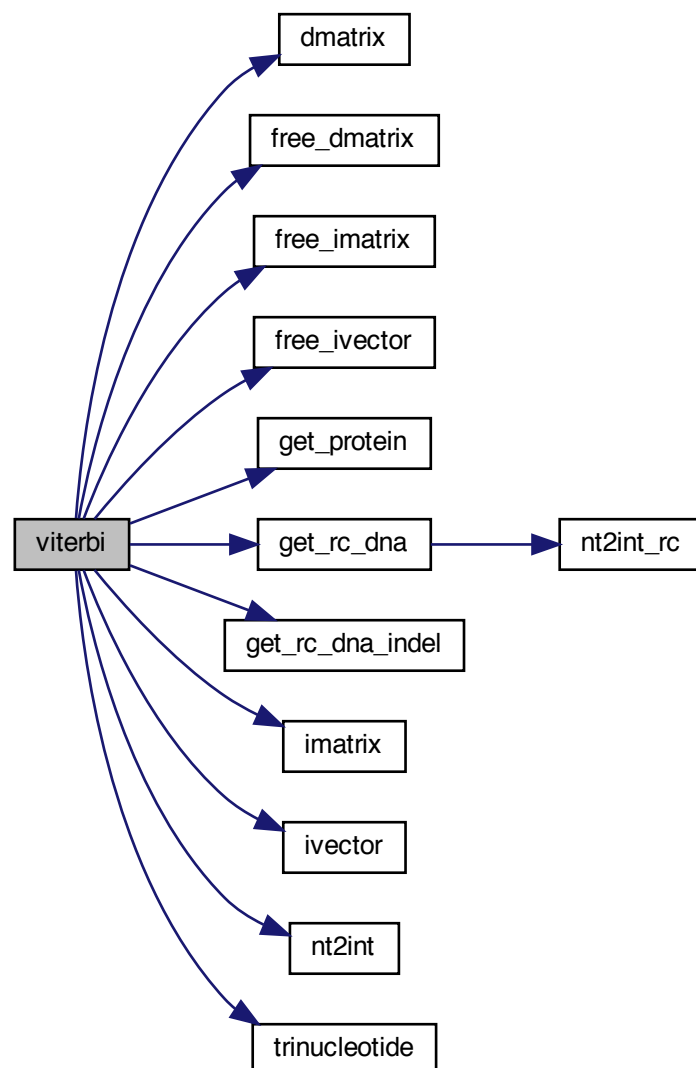
Hier is de caller graaf voor deze functie:



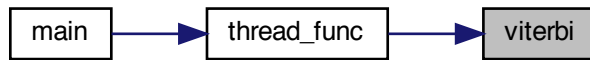
4.2.1.5 viterbi()

```
void viterbi (  
    HMM * hmm_ptr,  
    TRAIN * train_ptr,  
    char * O,  
    FILE * fp_out,  
    FILE * fp_aa,  
    FILE * fp_dna,  
    char * head,  
    int whole_genome,  
    int cg,  
    int format )
```

Hier is de call graaf voor deze functie:

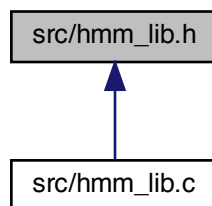


Hier is de caller graaf voor deze functie:



4.3 src/hmm_lib.h Bestand Referentie

Deze graaf geeft aan welke bestanden direct of indirect afhankelijk zijn van dit bestand:



Funcities

- void [dump_memory](#) (void *p, int size)
- void [get_rc_dna_indel](#) (char dna_f[300000], char dna_f1[300000])

4.3.1 Documentatie van functies

4.3.1.1 dump_memory()

```
void dump_memory (  
    void * p,  
    int size )
```

4.3.1.2 get_rc_dna_indel()

```
void get_rc_dna_indel (
    char dna_f[300000],
    char dna_f1[300000] )
```

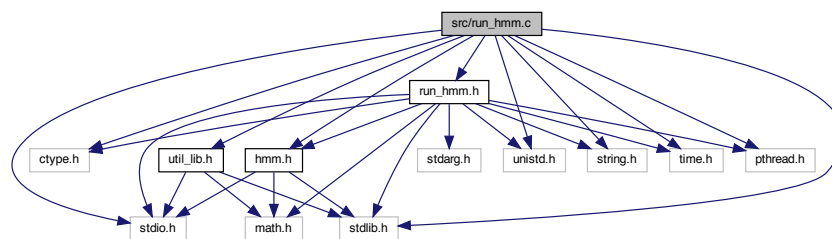
Hier is de caller graaf voor deze functie:



4.4 src/run_hmm.c Bestand Referentie

```
#include <ctype.h>
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <string.h>
#include <time.h>
#include "hmm.h"
#include "run_hmm.h"
#include "util_lib.h"
#include <pthread.h>
```

Include afhankelijkheidsgraaf voor run_hmm.c:



Macros

- #define `ADD_LEN` 1024
- #define `STRINGLEN` 4096

Functies

- int `main` (int argc, char **argv)
- void * `thread_func` (void *threadarr)
- int `appendSeq` (char *input, char **seq, int input_max)
- void `print_error` (const char *error_message,...)
- void `print_file_error` (const char *error_message, char *file)

4.4.1 Documentatie van macro's

4.4.1.1 ADD_LEN

```
#define ADD_LEN 1024
```

4.4.1.2 STRINGLEN

```
#define STRINGLEN 4096
```

4.4.2 Documentatie van functies

4.4.2.1 appendSeq()

```
int appendSeq (
    char * input,
    char ** seq,
    int input_max )
```

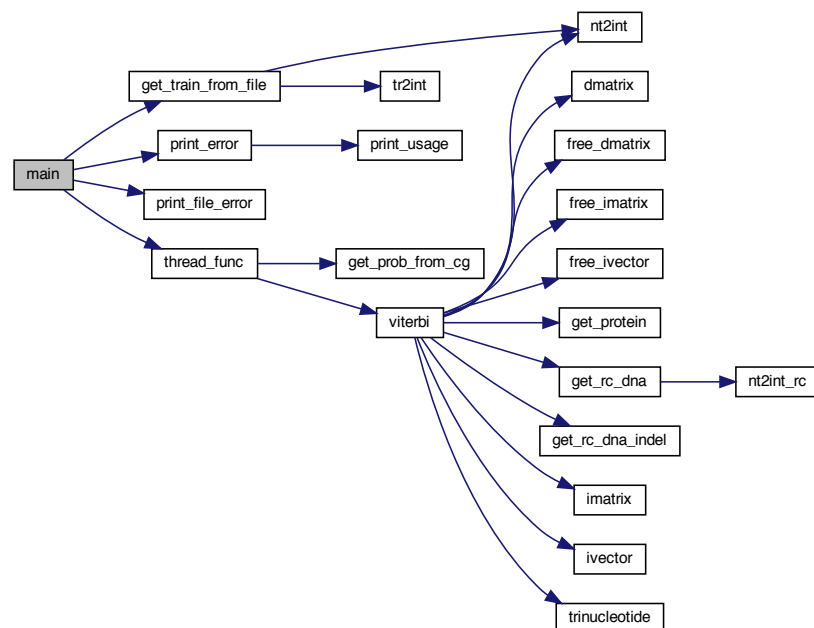
4.4.2.2 main()

```
int main (
    int argc,
    char ** argv )
```

Entry point of program

1. Initialization of variables and datatypes
2. Check File acessibility

Hier is de call graaf voor deze functie:



4.4.2.3 print_error()

```

void print_error (
    const char * error_message,
    ... )
  
```

Error function:

1. Print error message
2. Call [print_usage\(\)](#) from util_lib
3. EXIT program

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:



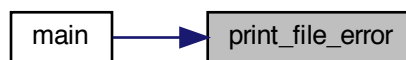
4.4.2.4 print_file_error()

```
void print_file_error (
    const char * error_message,
    char * file )
```

Error function:

1. Print error message
2. EXIT program

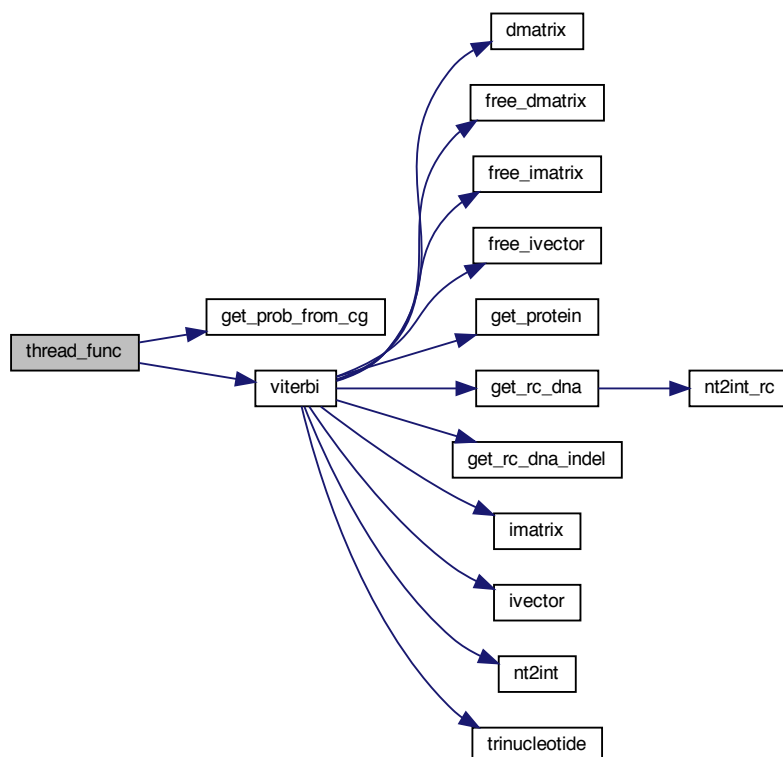
Hier is de caller graaf voor deze functie:



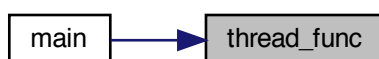
4.4.2.5 thread_func()

```
void* thread_func (
    void * threadarr )
```

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:



4.5 src/run_hmm.h Bestand Referentie

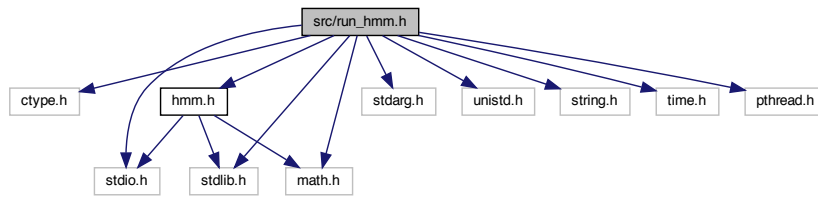
```

#include <ctype.h>
#include <stdio.h>
#include <stdlib.h>
#include <stdarg.h>
#include <math.h>
#include <unistd.h>
#include <string.h>
#include <time.h>

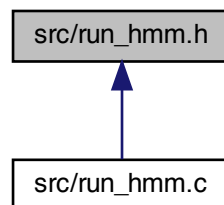
```

```
#include "hmm.h"
#include <pthread.h>
```

Include afhankelijkheidsgraaf voor run_hmm.h:



Deze graaf geeft aan welke bestanden direct of indirect afhankelijk zijn van dit bestand:



Klassen

- struct `thread_data`

Typedefs

- typedef struct `thread_data` `thread_data`

Functies

- void * `thread_func` (void *threadarr)
- void `print_error` (const char *error_message,...)
- void `print_file_error` (const char *error_message, char *file)

4.5.1 Documentatie van typedefs

4.5.1.1 thread_data

```
typedef struct thread_data thread_data
```

4.5.2 Documentatie van functies

4.5.2.1 print_error()

```
void print_error (
    const char * error_message,
    ... )
```

Error function:

1. Print error message
2. Call [print_usage\(\)](#) from util_lib
3. EXIT program

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:



4.5.2.2 print_file_error()

```
void print_file_error (
    const char * error_message,
    char * file )
```

Error function:

1. Print error message
2. EXIT program

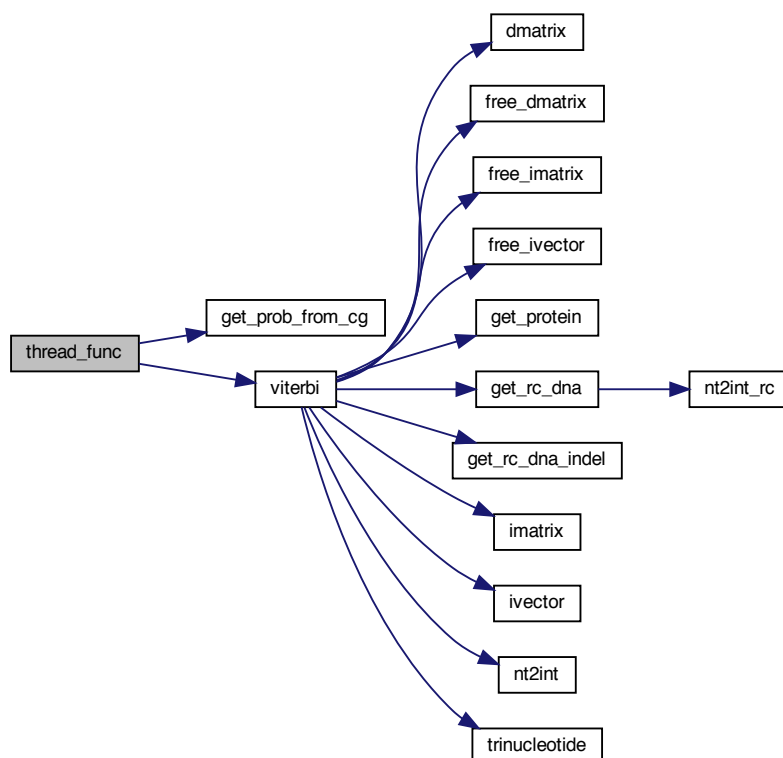
Hier is de caller graaf voor deze functie:



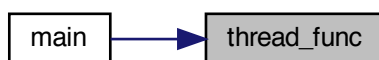
4.5.2.3 thread_func()

```
void* thread_func (
    void * threadarr )
```

Hier is de call graaf voor deze functie:



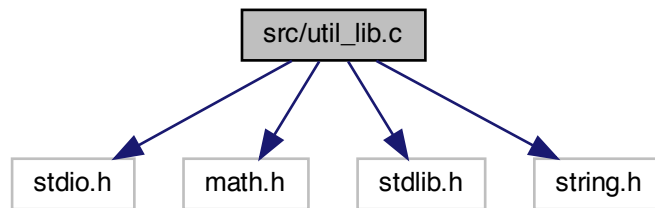
Hier is de caller graaf voor deze functie:



4.6 src/util_lib.c Bestand Referentie

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

Include afhankelijkheidsgraaf voor util_lib.c:



Funcities

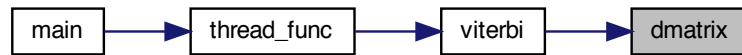
- double ** [dmatrix](#) (int num_row, int num_col)
- int ** [imatrix](#) (int num_row, int num_col)
- double * [dvector](#) (int nh)
- int * [ivector](#) (int nh)
- void [free_dvector](#) (double *v)
- void [free_ivector](#) (int *v)
- void [free_dmatrix](#) (double **m, int num_row)
- void [free_imatrix](#) (int **m, int num_row)
- int [tr2int](#) (char *tr)
- int [nt2int](#) (char nt)
- int [nt2int_rc](#) (char nt)
- int [nt2int_rc_indel](#) (char nt)
- int [trinucleotide](#) (char a, char b, char c)
- int [trinucleotide_pep](#) (char a, char b, char c)
- void [get_rc_dna](#) (char *dna, char *dna1)
- void [get_rc_dna_indel](#) (char *dna, char *dna1)
- void [get_protein](#) (char *dna, char *protein, int strand, int whole_genome)
- void [print_usage](#) ()

4.6.1 Documentatie van functies

4.6.1.1 [dmatrix\(\)](#)

```
double** dmatrix (  
    int num_row,  
    int num_col )
```


Makes an matrix with datatype double. Elements are double pointers en matrix is a double double pointer (**pointer). Exits when allocation fails. Hier is de caller graaf voor deze functie:



4.6.1.2 dvector()

```
double* dvector (
    int nh )
```

Makes an vector (array) with datatype double. Elements are doubles en vector is a double pointer. Exits when allocation fails.

4.6.1.3 free_dmatrix()

```
void free_dmatrix (
    double ** m,
    int num_row )
```

Frees the memory allocation of an matrix with datatype double. Hier is de caller graaf voor deze functie:



4.6.1.4 free_dvector()

```
void free_dvector (
    double * v )
```

Frees the memory allocation of an vector with datatype double. Hier is de caller graaf voor deze functie:



4.6.1.5 free_imatrix()

```
void free_imatrix (  
    int ** m,  
    int num_row )
```

Frees the memory allocation of an matrix with datatype int. Hier is de caller graaf voor deze functie:



4.6.1.6 free_ivector()

```
void free_ivector (  
    int * v )
```

Frees the memory allocation of an vector with datatype int. Hier is de caller graaf voor deze functie:



4.6.1.7 get_protein()

```
void get_protein (
    char * dna,
    char * protein,
    int strand,
    int whole_genome )
```

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:



4.6.1.8 get_rc_dna()

```
void get_rc_dna (
    char * dna,
    char * dna1 )
```

Hier is de call graaf voor deze functie:



Hier is de caller graaf voor deze functie:



4.6.1.9 get_rc_dna_indel()

```
void get_rc_dna_indel (  
    char * dna,  
    char * dna1 )
```

Hier is de call graaf voor deze functie:



4.6.1.10 imatrix()

```
int** imatrix (  
    int num_row,  
    int num_col )
```

Makes an matrix with datatype int. Elements are int pointers en matrix is a double int pointer. Exits when allocation fails. Hier is de caller graaf voor deze functie:



4.6.1.11 ivector()

```
int* ivector (
    int nh )
```

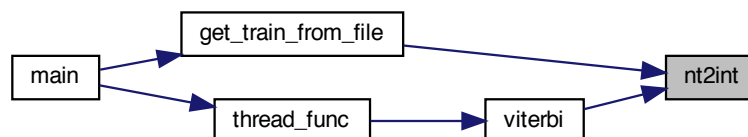
Makes an vector array) with datatype int. Elements are ints en vector is a int pointer. Exits when allocation fails. Hier is de caller graaf voor deze functie:



4.6.1.12 nt2int()

```
int nt2int (
    char nt )
```

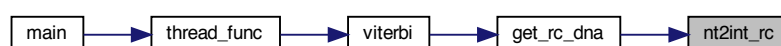
Hier is de caller graaf voor deze functie:



4.6.1.13 nt2int_rc()

```
int nt2int_rc (
    char nt )
```

Hier is de caller graaf voor deze functie:



4.6.1.14 nt2int_rc_indel()

```
int nt2int_rc_indel (
    char nt )
```

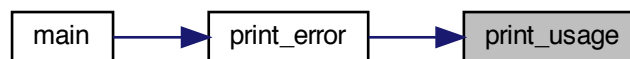
Hier is de caller graaf voor deze functie:



4.6.1.15 print_usage()

```
void print_usage ( )
```

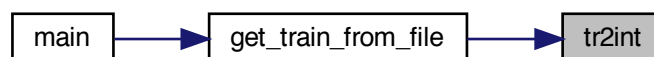
Hier is de caller graaf voor deze functie:



4.6.1.16 tr2int()

```
int tr2int (
    char * tr )
```

Converts a given transition to int. Use for example as indexing Hier is de caller graaf voor deze functie:



4.6.1.17 trinucleotide()

```
int trinucleotide (  
    char a,  
    char b,  
    char c )
```

Hier is de caller graaf voor deze functie:



4.6.1.18 trinucleotide_pep()

```
int trinucleotide_pep (  
    char a,  
    char b,  
    char c )
```

Hier is de caller graaf voor deze functie:

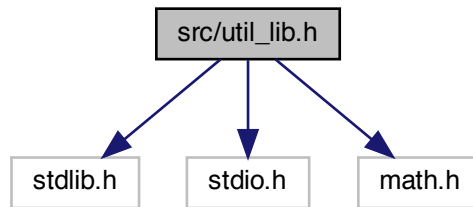


4.7 src/util_lib.h Bestand Referentie

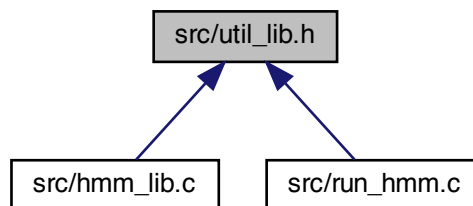
```
#include <stdlib.h>  
#include <stdio.h>
```

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

Include afhankelijkheidsgraaf voor util_lib.h:



Deze graaf geeft aan welke bestanden direct of indirect afhankelijk zijn van dit bestand:



Enumeraties

- enum `trenum` {
`MM` = 0, `MI` = 1, `MD` = 2, `II` = 3,
`IM` = 4, `DD` = 5, `DM` = 6, `GE` = 7,
`GG` = 8, `ER` = 9, `RS` = 10, `RR` = 11,
`ES` = 12, `ES1` = 13 }

Functies

- double ** `dmatrix` (int num_row, int num_col)
- double * `dvector` (int nh)
- int ** `imatrix` (int num_row, int num_col)
- int * `ivector` (int nh)
- void `free_dvector` (double *v)
- void `free_dmatrix` (double **m, int num_row)
- void `free_ivector` (int *v)
- void `free_imatrix` (int **m, int num_row)
- int `tr2int` (char *nt)

- int `nt2int` (char nt)
- int `nt2int_rc` (char nt)
- int `trinucleotide` (char a, char b, char c)
- void `get_protein` (char *dna, char *protein, int strand, int whole_genome)
- void `print_usage` ()

4.7.1 Documentatie van enumeratie types

4.7.1.1 trenom

```
enum trenom
```

Enumeratie waarden

MM	
MI	
MD	
II	
IM	
DD	
DM	
GE	
GG	
ER	
RS	
RR	
ES	
ES1	

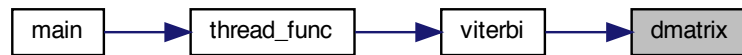
4.7.2 Documentatie van functies

4.7.2.1 dmatrix()

```
double** dmatrix (  
    int num_row,  
    int num_col )
```

Makes an matrix with datatype double. Elements are double pointers en matrix is a double double pointer

(**pointer). Exits when allocation fails. Hier is de caller graaf voor deze functie:



4.7.2.2 dvector()

```
double* dvector (
    int nh )
```

Makes an vector (array) with datatype double. Elements are doubles en vector is a double pointer. Exits when allocation fails.

4.7.2.3 free_dmatrix()

```
void free_dmatrix (
    double ** m,
    int num_row )
```

Frees the memory allocation of an matrix with datatype double. Hier is de caller graaf voor deze functie:



4.7.2.4 free_dvector()

```
void free_dvector (
    double * v )
```

Frees the memory allocation of an vector with datatype double. Hier is de caller graaf voor deze functie:



4.7.2.5 free_imatrix()

```
void free_imatrix (  
    int ** m,  
    int num_row )
```

Frees the memory allocation of an matrix with datatype int. Hier is de caller graaf voor deze functie:



4.7.2.6 free_ivector()

```
void free_ivector (  
    int * v )
```

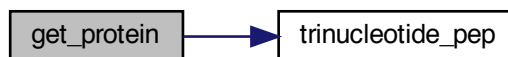
Frees the memory allocation of an vector with datatype int. Hier is de caller graaf voor deze functie:



4.7.2.7 get_protein()

```
void get_protein (
    char * dna,
    char * protein,
    int strand,
    int whole_genome )
```

Hier is de call graaf voor deze functie:



4.7.2.8 imatrix()

```
int** imatrix (
    int num_row,
    int num_col )
```

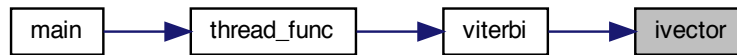
Makes an matrix with datatype int. Elements are int pointers en matrix is a double int pointer. Exits when allocation fails. Hier is de caller graaf voor deze functie:



4.7.2.9 ivector()

```
int* ivector (
    int nh )
```

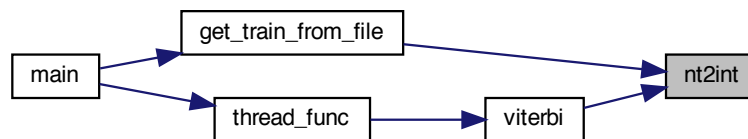
Makes an vector array) with datatype int. Elements are ints en vector is a int pointer. Exits when allocation fails.
Hier is de caller graaf voor deze functie:



4.7.2.10 nt2int()

```
int nt2int (  
    char nt )
```

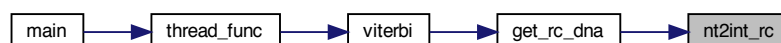
Hier is de caller graaf voor deze functie:



4.7.2.11 nt2int_rc()

```
int nt2int_rc (  
    char nt )
```

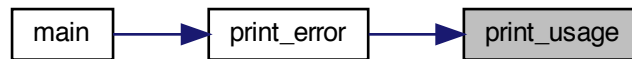
Hier is de caller graaf voor deze functie:



4.7.2.12 print_usage()

```
void print_usage ( )
```

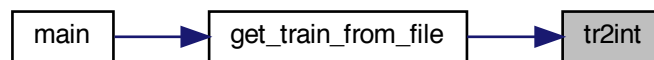
Hier is de caller graaf voor deze functie:



4.7.2.13 tr2int()

```
int tr2int (
    char * tr )
```

Converts a given transition to int. Use for example as indexing Hier is de caller graaf voor deze functie:



4.7.2.14 trinucleotide()

```
int trinucleotide (
    char a,
    char b,
    char c )
```

Hier is de caller graaf voor deze functie:

