

XnuFilter

0.01

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Contents

| | | |
|----------|---|-----------|
| 1 | Namespace Index | 1 |
| 1.1 | Namespace List | 1 |
| 2 | Class Index | 3 |
| 2.1 | Class Hierarchy | 3 |
| 3 | Class Index | 5 |
| 3.1 | Class List | 5 |
| 4 | File Index | 7 |
| 4.1 | File List | 7 |
| 5 | Namespace Documentation | 9 |
| 5.1 | xnu Namespace Reference | 9 |
| 5.1.1 | Detailed Description | 9 |
| 5.1.2 | Function Documentation | 9 |
| 5.1.2.1 | StringToBool | 9 |
| 5.1.2.2 | StringToNumeric | 10 |
| 6 | Class Documentation | 11 |
| 6.1 | xnu::XNU< Tint > Class Template Reference | 11 |
| 6.1.1 | Detailed Description | 12 |
| 6.1.2 | Constructor & Destructor Documentation | 12 |
| 6.1.2.1 | XNU | 12 |
| 6.1.2.2 | XNU | 12 |
| 6.1.2.3 | ~XNU | 12 |
| 6.1.3 | Member Function Documentation | 12 |

| | | |
|----------|--|-----------|
| 6.1.3.1 | Filter | 12 |
| 6.1.4 | Member Data Documentation | 12 |
| 6.1.4.1 | Alphabet | 12 |
| 6.1.4.2 | Blast | 13 |
| 6.1.4.3 | Dayhoff | 13 |
| 6.1.4.4 | Lambda120 | 13 |
| 6.1.4.5 | Lambda250 | 13 |
| 6.1.4.6 | Lambda60 | 13 |
| 6.1.4.7 | M | 13 |
| 6.1.4.8 | Pam120 | 14 |
| 6.1.4.9 | Pam250 | 15 |
| 6.1.4.10 | Pam60 | 16 |
| 6.2 | xnu::XnuScores Class Reference | 17 |
| 6.2.1 | Detailed Description | 18 |
| 6.2.2 | Constructor & Destructor Documentation | 18 |
| 6.2.2.1 | XnuScores | 18 |
| 6.2.2.2 | ~XnuScores | 18 |
| 6.2.3 | Member Data Documentation | 18 |
| 6.2.3.1 | Alphabet | 18 |
| 6.2.3.2 | Blast | 19 |
| 6.2.3.3 | Dayhoff | 19 |
| 6.2.3.4 | Lambda120 | 19 |
| 6.2.3.5 | Lambda250 | 19 |
| 6.2.3.6 | Lambda60 | 19 |
| 6.2.3.7 | M | 19 |
| 6.2.3.8 | Pam120 | 20 |
| 6.2.3.9 | Pam250 | 21 |
| 6.2.3.10 | Pam60 | 22 |
| 7 | File Documentation | 25 |
| 7.1 | src/include/ConvertString.hpp File Reference | 25 |
| 7.2 | src/include/XNU.hpp File Reference | 25 |
| 7.3 | src/include/XNUData.hpp File Reference | 26 |

Chapter 1

Namespace Index

1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

| | |
|-------------------------------|---|
| xnu | |
| XNU namespace | 9 |

Chapter 2

Class Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

| | |
|----------------------------|--------------------|
| xnu::XnuScores | 17 |
| xnu::XNU< Tint > | 11 |

Chapter 3

Class Index

3.1 Class List

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

| | |
|--|----|
| xnu::XNU< Tint > | |
| XNU filter class | 11 |
| xnu::XnuScores | |
| XnuScores class containing default matrices and parameters | 17 |

Chapter 4

File Index

4.1 File List

Here is a list of all files with brief descriptions:

| | |
|--|----|
| src/include/ ConvertString.hpp | 25 |
| src/include/ XNU.hpp | 25 |
| src/include/ XNUData.hpp | 26 |

Chapter 5

Namespace Documentation

5.1 xnu Namespace Reference

[XNU](#) namespace.

Classes

- class [XNU](#)
[XNU](#) filter class.
- class [XnuScores](#)
[XnuScores](#) class containing default matrices and parameters.

Functions

- template<typename Tnum >
Tnum [StringToNumeric](#) (const string &str)
- bool [StringToBool](#) (const string &str)

5.1.1 Detailed Description

[XNU](#) namespace.

5.1.2 Function Documentation

5.1.2.1 bool xnu::StringToBool (const string & *str*) [inline]

StringToBool function converts a numeric value to a bool

Parameters

| | |
|------------|-----------------|
| <i>str</i> | [const string&] |
|------------|-----------------|

5.1.2.2 `template<typename Tnum > Tnum xnu::StringToNumeric (const string & str)`
`[inline]`

StringToNumeric function converts a string to a specified numeric value type

Parameters

| | |
|------------|-----------------|
| <i>str</i> | [const string&] |
|------------|-----------------|

Chapter 6

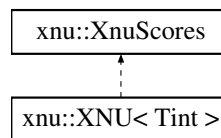
Class Documentation

6.1 xnu::XNU< Tint > Class Template Reference

XNU filter class.

```
#include <XNU.hpp>
```

Inheritance diagram for xnu::XNU< Tint >:



Public Member Functions

- [XNU](#) ()
- [XNU](#) (unordered_map< string, string > &Param)
- [~XNU](#) ()
- string [Filter](#) (const string &str)

Protected Attributes

- double [Lambda60](#)
- double [Lambda120](#)
- double [Lambda250](#)
- vector< int > [M](#)
- vector< vector< int > > [Pam60](#)
- vector< vector< int > > [Pam120](#)
- vector< vector< int > > [Pam250](#)

- string [Alphabet](#)
- vector< double > [Dayhoff](#)
- vector< double > [Blast](#)

6.1.1 Detailed Description

template<typename Tint>class xnu::XNU< Tint >

[XNU](#) filter class.

6.1.2 Constructor & Destructor Documentation

6.1.2.1 template<typename Tint > xnu::XNU< Tint >::XNU ()

Default constructor

6.1.2.2 template<typename Tint > xnu::XNU< Tint >::XNU (unordered_map< string, string > & Param)

Constructor overload

Parameters

| | |
|--------------|---------------------------------|
| <i>Param</i> | [unordered_map<string,string>&] |
|--------------|---------------------------------|

6.1.2.3 template<typename Tint > xnu::XNU< Tint >::~XNU ()

Destructor

6.1.3 Member Function Documentation

6.1.3.1 template<typename Tint > string xnu::XNU< Tint >::Filter (const string & str)

Function executing filtering procedure

Parameters

| | |
|------------|-----------------|
| <i>str</i> | [const string&] |
|------------|-----------------|

6.1.4 Member Data Documentation

6.1.4.1 string xnu::XnuScores::Alphabet [protected, inherited]

The protein Alphabet

Alphabet = "ARNDCQEGHILKMFPSTWYVBZX*-";

6.1.4.2 `vector<double> xnu::XnuScores::Blast` [protected, inherited]

Blast = { 0.081, 0.057, 0.045, 0.054, 0.015, 0.039, 0.061, 0.068, 0.022, 0.057, 0.093, 0.056, 0.025, 0.040, 0.049, 0.068, 0.058, 0.013, 0.032, 0.067 };

6.1.4.3 `vector<double> xnu::XnuScores::Dayhoff` [protected, inherited]

Dayhoff = { 0.087, 0.041, 0.040, 0.047, 0.033, 0.038, 0.050, 0.088, 0.034, 0.037, 0.085, 0.081, 0.015, 0.040, 0.051, 0.070, 0.058, 0.010, 0.030, 0.065 };

6.1.4.4 `double xnu::XnuScores::Lambda120` [protected, inherited]

Lambda for PAM120 matrix

Lambda120 = 0.346574

6.1.4.5 `double xnu::XnuScores::Lambda250` [protected, inherited]

Lambda for PAM250 matrix

Lambda250 = 0.231049

6.1.4.6 `double xnu::XnuScores::Lambda60` [protected, inherited]

Lambda for PAM60 matrix

Lambda60 = 0.346574

6.1.4.7 `vector<int> xnu::XnuScores::M` [protected, inherited]

Mdm matrix

```

M      = { 9867,  2,  9, 10,  3,  8, 17, 21,  2,  6,  4,  2,  6,  2, 22, 35
, 32, 0,  2, 18,
      1, 9913,  1,  0,  1, 10,  0,  0, 10,  3,  1, 19,  4,  1,  4,
      6,  1,  8,  0,  1,
      4,  1, 9822, 36,  0,  4,  6,  6, 21,  3,  1, 13,  0,  1,  2,
20,  9,  1,  4,  1,
      6,  0, 42, 9859,  0,  6, 53,  6,  4,  1,  0,  3,  0,  0,  1,
      5,  3,  0,  0,  1,
      1,  1,  0,  0, 9973,  0,  0,  0,  1,  1,  0,  0,  0,  0,  1,
      5,  1,  0,  3,  2,
      3,  9,  4,  5,  0, 9876, 27,  1, 23,  1,  3,  6,  4,  0,  6,
      2,  2,  0,  0,  1,
      10,  0,  7, 56,  0, 35, 9865,  4,  2,  3,  1,  4,  1,  0,  3,
      4,  2,  0,  1,  2,
      21,  1, 12, 11,  1,  3,  7, 9935,  1,  0,  1,  2,  1,  1,  3,
21,  3,  0,  0,  5,
      1,  8, 18,  3,  1, 20,  1,  0, 9912,  0,  1,  1,  0,  2,  3,
      1,  1,  1,  4,  1,
      2,  2,  3,  1,  2,  1,  2,  0,  0, 9872,  9,  2, 12,  7,  0,
      1,  7,  0,  1, 33,
      3,  1,  3,  0,  0,  6,  1,  1,  4, 22, 9947,  2, 45, 13,  3,
      1,  3,  4,  2, 15,
      2, 37, 25,  6,  0, 12,  7,  2,  2,  4,  1, 9926, 20,  0,  3,
      8, 11,  0,  1,  1,
      1,  1,  0,  0,  0,  2,  0,  0,  0,  5,  8,  4, 9874,  1,  0,
      1,  2,  0,  0,  4,
      1,  1,  1,  0,  0,  0,  0,  1,  2,  8,  6,  0,  4, 9946,  0,
      2,  1,  3, 28,  0,
      13,  5,  2,  1,  1,  8,  3,  2,  5,  1,  2,  2,  1,  1, 9926,
12,  4,  0,  0,  2,
      28, 11, 34,  7, 11,  4,  6, 16,  2,  2,  1,  7,  4,  3, 17,
9840, 38,  5,  2,  2,
      22,  2, 13,  4,  1,  3,  2,  2,  1, 11,  2,  8,  6,  1,  5, 32
, 9871,  0,  2,  9,
      0,  2,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  1,  0,  1
,  0, 9976,  1,  0,
      1,  0,  3,  0,  3,  0,  1,  0,  4,  1,  1,  0,  0, 21,  0,  1
,  1,  2, 9945,  1,
      13,  2,  1,  1,  3,  2,  2,  3,  3, 57, 11,  1, 17,  1,  3,  2
, 10,  0,  2, 9901};

```

6.1.4.8 `vector<vector<int>> xnu::XnuScores::Pam120` [protected, inherited]

This matrix was produced by "pam" Version 1.0.2, [18-Sep-91]

PAM 120, substitution matrix, scale = $\ln(2)/2$, = 0.346574

Lowest score = -8, Highest score = 12

```

Pam120 = {{ 3, -3, -1,  0, -3, -1,  0,  1, -3, -1, -3, -2, -2, -4,  1,
1,  1, -7, -4,  0,  1,  0,  0, -8, -999999},
          {-3,  6, -1, -3, -4,  1, -3, -4,  1, -2, -4,  2, -1, -5, -1,
-1, -2,  1, -5, -3, -1,  0,  0, -8, -999999},
          {-1, -1,  4,  2, -5,  0,  1,  0,  2, -2, -4,  1, -3, -4, -2,
1,  0, -4, -2, -3,  4,  1,  0, -8, -999999},
          { 0, -3,  2,  5, -7,  1,  3,  0,  0, -3, -5, -1, -4, -7, -3,
0, -1, -8, -5, -3,  5,  3,  0, -8, -999999},
          {-3, -4, -5, -7,  9, -7, -7, -4, -4, -3, -7, -7, -6, -6, -4,
0, -3, -8, -1, -3, -4, -6,  0, -8, -999999},

```

```
6.1.4.9 vector<vector<int> > xnu::XnuScores::Pam250 [protected,
inherited]
```

Lowest score = -8, Highest score = 17

```

Pam250 = {{ 2, -2, 0, 0, -2, 0, 0, 1, -1, -1, -2, -1, -1, -3, 1
, 1, 1, -6, -3, 0, 2, 1, 0, -8, -999999}},
          {-2, 6, 0, -1, -4, 1, -1, -3, 2, -2, -3, 3, 0, -4, 0
, 0, -1, 2, -4, -2, 1, 2, 0, -8, -999999}},
          { 0, 0, 2, 2, -4, 1, 1, 0, 2, -2, -3, 1, -2, -3, 0
, 1, 0, -4, -2, -2, 4, 3, 0, -8, -999999}},
          { 0, -1, 2, 4, -5, 2, 3, 1, 1, -2, -4, 0, -3, -6, -1
, 0, 0, -7, -4, -2, 5, 4, 0, -8, -999999}},

```

```
6.1.4.10 vector<vector<int> > xnu::XnuScores::Pam60 [protected,
inherited]
```

Lowest score = -12, Highest score = 13

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```

        { -2, -6, 2, 7, -10, -1, 3, -2, -2, -5, -9, -2,
-7, -11, -5, -2, -3, -11, -8, -6, 6, 3, 0, -12, -999999},
        { -5, -6, -7, -10, 9, -10, -10, -7, -6, -4, -11, -10, -
10, -9, -6, -1, -5, -12, -2, -4, -8, -9, 0, -12, -999999},
        { -3, 0, -2, -1, -10, 7, 2, -5, 2, -5, -3, -1,
-2, -9, -1, -3, -4, -9, -8, -5, 0, 7, 0, -12, -999999},
        { -1, -6, 0, 3, -10, 2, 7, -2, -3, -4, -7, -3,
-5, -10, -3, -2, -4, -12, -7, -4, 3, 6, 0, -12, -999999},
        { 0, -7, -1, -2, -7, -5, -2, 6, -6, -7, -8, -5,
-6, -7, -4, 0, -3, -11, -10, -4, -1, -2, 0, -12, -999999},
        { -5, 0, 1, -2, -6, 2, -3, -6, 8, -6, -4, -4,
-7, -4, -2, -4, -5, -5, -2, -5, 1, 1, 0, -12, -999999},
        { -3, -4, -4, -5, -4, -5, -4, -7, -6, 7, 0, -4,
1, -1, -6, -4, -1, -10, -4, 3, -3, -4, 0, -12, -999999},
        { -4, -6, -5, -9, -11, -3, -7, -8, -4, 0, 6, -6,
2, -1, -5, -6, -5, -4, -5, -1, -6, -4, 0, -12, -999999},
        { -5, 2, 0, -2, -10, -1, -3, -5, -4, -4, -6, 6,
0, -10, -4, -2, -2, -8, -7, -6, 0, -1, 0, -12, -999999},
        { -3, -2, -6, -7, -10, -2, -5, -6, -7, 1, 2, 0,
10, -2, -6, -4, -2, -9, -7, 0, -5, -2, 0, -12, -999999},
        { -6, -7, -6, -11, -9, -9, -10, -7, -4, -1, -1, -10,
-2, 8, -7, -5, -6, -3, 3, -5, -7, -9, 0, -12, -999999},
        { 0, -2, -4, -5, -6, -1, -3, -4, -2, -6, -5, -4,
-6, -7, 7, 0, -2, -10, -10, -4, -3, -1, 0, -12, -999999},
        { 1, -2, 1, -2, -1, -3, -2, 0, -4, -4, -6, -2,
-4, -5, 0, 5, 1, -4, -5, -4, 1, -2, 0, -12, -999999},
        { 1, -4, -1, -3, -5, -4, -4, -3, -5, -1, -5, -2,
-2, -6, -2, 1, 6, -9, -5, -1, 0, -3, 0, -12, -999999},
        { -10, 0, -6, -11, -12, -9, -12, -11, -5, -10, -4, -8,
-9, -3, -10, -4, -9, 13, -3, -11, -7, -9, 0, -12, -999999},
        { -6, -8, -3, -8, -2, -8, -7, -10, -2, -4, -5, -7,
-7, 3, -10, -5, -5, -3, 9, -5, -4, -6, 0, -12, -999999},
        { -1, -5, -5, -6, -4, -5, -4, -4, -5, 3, -1, -6,
0, -5, -4, -4, -1, -11, -5, 6, -4, -4, 0, -12, -999999},
        { -1, -3, 6, 6, -8, 0, 3, -1, 1, -3, -6, 0,
-5, -7, -3, 1, 0, -7, -4, -4, 7, 3, 0, -12, -999999},
        { -1, -1, 0, 3, -9, 7, 6, -2, 1, -4, -4, -1,
-2, -9, -1, -2, -3, -9, -6, -4, 3, 7, 0, -12, -999999},
        { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, -12, -999999},
        { -12, -12, -12, -12, -12, -12, -12, -12, -12, -12, -12, -12, -
12, -12, -12, -12, -12, -12, -12, -12, -12, 1, -999999},
        { -999999, -999999, -999999, -999999, -999999, -999999, -999999,
-999999, -999999, -999999, -999999,
-999999, -999999, -999999, -999999, -999999, -999999,
-999999, -999999, -999999, -999999 }
};

```

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

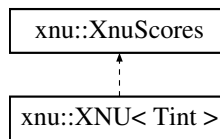
- [src/include/XNU.hpp](#)

6.2 xnu::XnuScores Class Reference

[XnuScores](#) class containing default matrices and parameters.

```
#include <XNUData.hpp>
```

Inheritance diagram for xnu::XnuScores:



Public Member Functions

- [XnuScores](#) ()
- [~XnuScores](#) ()

Protected Attributes

- double [Lambda60](#)
- double [Lambda120](#)
- double [Lambda250](#)
- vector< int > [M](#)
- vector< vector< int > > [Pam60](#)
- vector< vector< int > > [Pam120](#)
- vector< vector< int > > [Pam250](#)
- string [Alphabet](#)
- vector< double > [Dayhoff](#)
- vector< double > [Blast](#)

6.2.1 Detailed Description

[XnuScores](#) class containing default matrices and parameters.

6.2.2 Constructor & Destructor Documentation

6.2.2.1 `xnu::XnuScores::XnuScores ()` `[inline]`

[XnuScores](#) constructor

6.2.2.2 `xnu::XnuScores::~~XnuScores ()` `[inline]`

[XnuScores](#) destructor

6.2.3 Member Data Documentation

6.2.3.1 `string xnu::XnuScores::Alphabet` `[protected]`

The protein Alphabet

Alphabet = "ARNDCQEGHILKMFPSTWYVBZX*-";

6.2.3.2 `vector<double> xnu::XnuScores::Blast` [protected]

Blast = { 0.081, 0.057, 0.045, 0.054, 0.015, 0.039, 0.061, 0.068, 0.022, 0.057, 0.093, 0.056, 0.025, 0.040, 0.049, 0.068, 0.058, 0.013, 0.032, 0.067 };

6.2.3.3 `vector<double> xnu::XnuScores::Dayhoff` [protected]

Dayhoff = { 0.087, 0.041, 0.040, 0.047, 0.033, 0.038, 0.050, 0.088, 0.034, 0.037, 0.085, 0.081, 0.015, 0.040, 0.051, 0.070, 0.058, 0.010, 0.030, 0.065 };

6.2.3.4 `double xnu::XnuScores::Lambda120` [protected]

Lambda for PAM120 matrix

Lambda120 = 0.346574

6.2.3.5 `double xnu::XnuScores::Lambda250` [protected]

Lambda for PAM250 matrix

Lambda250 = 0.231049

6.2.3.6 `double xnu::XnuScores::Lambda60` [protected]

Lambda for PAM60 matrix

Lambda60 = 0.346574

6.2.3.7 `vector<int> xnu::XnuScores::M` [protected]

Mdm matrix

```

M      = { 9867,  2,  9, 10,  3,  8, 17, 21,  2,  6,  4,  2,  6,  2, 22, 35
, 32, 0,  2, 18,
          1, 9913,  1,  0,  1, 10,  0,  0, 10,  3,  1, 19,  4,  1,  4,
          6,  1,  8,  0,  1,
          4,  1, 9822, 36,  0,  4,  6,  6, 21,  3,  1, 13,  0,  1,  2,
20,  9,  1,  4,  1,
          6,  0, 42, 9859,  0,  6, 53,  6,  4,  1,  0,  3,  0,  0,  1,
          5,  3,  0,  0,  1,
          1,  1,  0,  0, 9973,  0,  0,  0,  1,  1,  0,  0,  0,  0,  1,
          5,  1,  0,  3,  2,
          3,  9,  4,  5,  0, 9876, 27,  1, 23,  1,  3,  6,  4,  0,  6,
          2,  2,  0,  0,  1,
          10,  0,  7, 56,  0, 35, 9865,  4,  2,  3,  1,  4,  1,  0,  3,
          4,  2,  0,  1,  2,
          21,  1, 12, 11,  1,  3,  7, 9935,  1,  0,  1,  2,  1,  1,  3,
21,  3,  0,  0,  5,
          1,  8, 18,  3,  1, 20,  1,  0, 9912,  0,  1,  1,  0,  2,  3,
          1,  1,  1,  4,  1,
          2,  2,  3,  1,  2,  1,  2,  0,  0, 9872,  9,  2, 12,  7,  0,
          1,  7,  0,  1, 33,
          3,  1,  3,  0,  0,  6,  1,  1,  4, 22, 9947,  2, 45, 13,  3,
          1,  3,  4,  2, 15,
          2, 37, 25,  6,  0, 12,  7,  2,  2,  4,  1, 9926, 20,  0,  3,
          8, 11,  0,  1,  1,
          1,  1,  0,  0,  0,  2,  0,  0,  0,  5,  8,  4, 9874,  1,  0,
          1,  2,  0,  0,  4,
          1,  1,  1,  0,  0,  0,  0,  1,  2,  8,  6,  0,  4, 9946,  0,
          2,  1,  3, 28,  0,
          13,  5,  2,  1,  1,  8,  3,  2,  5,  1,  2,  2,  1,  1, 9926,
12,  4,  0,  0,  2,
          28, 11, 34,  7, 11,  4,  6, 16,  2,  2,  1,  7,  4,  3, 17,
9840, 38,  5,  2,  2,
          22,  2, 13,  4,  1,  3,  2,  2,  1, 11,  2,  8,  6,  1,  5, 32
, 9871,  0,  2,  9,
          0,  2,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  1,  0,  1
,  0, 9976,  1,  0,
          1,  0,  3,  0,  3,  0,  1,  0,  4,  1,  1,  0,  0, 21,  0,  1
,  1,  2, 9945,  1,
          13,  2,  1,  1,  3,  2,  2,  3,  3, 57, 11,  1, 17,  1,  3,  2
, 10,  0,  2, 9901};

```

6.2.3.8 `vector<vector<int>> xnu::XnuScores::Pam120` [protected]

This matrix was produced by "pam" Version 1.0.2, [18-Sep-91]

PAM 120, substitution matrix, scale = $\ln(2)/2$, = 0.346574

Lowest score = -8, Highest score = 12

```

Pam120 = {{ 3, -3, -1,  0, -3, -1,  0,  1, -3, -1, -3, -2, -2, -4,  1,
1,  1, -7, -4,  0,  1,  0,  0, -8, -999999},
          {-3,  6, -1, -3, -4,  1, -3, -4,  1, -2, -4,  2, -1, -5, -1,
-1, -2,  1, -5, -3, -1,  0,  0, -8, -999999},
          {-1, -1,  4,  2, -5,  0,  1,  0,  2, -2, -4,  1, -3, -4, -2,
1,  0, -4, -2, -3,  4,  1,  0, -8, -999999},
          { 0, -3,  2,  5, -7,  1,  3,  0,  0, -3, -5, -1, -4, -7, -3,
0, -1, -8, -5, -3,  5,  3,  0, -8, -999999},
          {-3, -4, -5, -7,  9, -7, -7, -4, -4, -3, -7, -7, -6, -6, -4,
0, -3, -8, -1, -3, -4, -6,  0, -8, -999999},
          {-1,  1,  0,  1, -7,  6,  2, -3,  3, -3, -2,  0, -1, -6,  0,

```



```

-2, -2, -6, -5, -3, 1, 5, 0, -8, -999999},
{ 0, -3, 1, 3, -7, 2, 5, -1, -1, -3, -4, -1, -3, -7, -2,
-1, -2, -8, -5, -3, 3, 5, 0, -8, -999999},
{ 1, -4, 0, 0, -4, -3, -1, 5, -4, -4, -5, -3, -4, -5, -2,
1, -1, -8, -6, -2, 1, -1, 0, -8, -999999},
{-3, 1, 2, 0, -4, 3, -1, -4, 7, -4, -3, -2, -4, -3, -1,
-2, -3, -3, -1, -3, 2, 2, 0, -8, -999999},
{-1, -2, -2, -3, -3, -3, -3, -4, -4, 6, 1, -3, 1, 0, -3,
-2, 0, -6, -2, 3, -2, -2, 0, -8, -999999},
{-3, -4, -4, -5, -7, -2, -4, -5, -3, 1, 5, -4, 3, 0, -3,
-4, -3, -3, -2, 1, -3, -2, 0, -8, -999999},
{-2, 2, 1, -1, -7, 0, -1, -3, -2, -3, -4, 5, 0, -7, -2,
-1, -1, -5, -5, -4, 1, 0, 0, -8, -999999},
{-2, -1, -3, -4, -6, -1, -3, -4, -4, 1, 3, 0, 8, -1, -3,
-2, -1, -6, -4, 1, -3, -1, 0, -8, -999999},
{-4, -5, -4, -7, -6, -6, -7, -5, -3, 0, 0, -7, -1, 8, -5,
-3, -4, -1, 4, -3, -4, -5, 0, -8, -999999},
{ 1, -1, -2, -3, -4, 0, -2, -2, -1, -3, -3, -2, -3, -5, 6,
1, -1, -7, -6, -2, -1, 0, 0, -8, -999999},
{ 1, -1, 1, 0, 0, -2, -1, 1, -2, -2, -4, -1, -2, -3, 1,
3, 2, -2, -3, -2, 1, 0, 0, -8, -999999},
{ 1, -2, 0, -1, -3, -2, -2, -1, -3, 0, -3, -1, -1, -4, -1,
2, 4, -6, -3, 0, 1, -1, 0, -8, -999999},
{-7, 1, -4, -8, -8, -6, -8, -8, -3, -6, -3, -5, -6, -1, -7,
-2, -6, 12, -2, -8, -5, -6, 0, -8, -999999},
{-4, -5, -2, -5, -1, -5, -5, -6, -1, -2, -2, -5, -4, 4, -6,
-3, -3, -2, 8, -3, -2, -4, 0, -8, -999999},
{ 0, -3, -3, -3, -3, -3, -3, -2, -3, 3, 1, -4, 1, -3, -2,
-2, 0, -8, -3, 5, -2, -2, 0, -8, -999999},
{ 1, -1, 4, 5, -4, 1, 3, 1, 2, -2, -3, 1, -3, -4, -1,
1, 1, -5, -2, -2, 6, 4, 0, -8, -999999},
{ 0, 0, 1, 3, -6, 5, 5, -1, 2, -2, -2, 0, -1, -5, 0,
0, -1, -6, -4, -2, 4, 6, 0, -8, -999999},
{ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, -8, -999999},
{-8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8,
-8, -8, -8, -8, -8, -8, -8, 1, -999999},
{-999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999, -999999}};

```

6.2.3.9 vector<vector<int>> xnu::XnuScores::Pam250 [protected]

This matrix was produced by "pam" Version 1.0.2, [18-Sep-91]

PAM 250, substitution matrix, scale = $\ln(2)/3$, = 0.231049

Lowest score = -8, Highest score = 17

```

Pam250 = {{ 2, -2, 0, 0, -2, 0, 0, 1, -1, -1, -2, -1, -1, -3, 1
, 1, 1, -6, -3, 0, 2, 1, 0, -8, -999999},
{-2, 6, 0, -1, -4, 1, -1, -3, 2, -2, -3, 3, 0, -4, 0
, 0, -1, 2, -4, -2, 1, 2, 0, -8, -999999},
{ 0, 0, 2, 2, -4, 1, 1, 0, 2, -2, -3, 1, -2, -3, 0
, 1, 0, -4, -2, -2, 4, 3, 0, -8, -999999},
{ 0, -1, 2, 4, -5, 2, 3, 1, 1, -2, -4, 0, -3, -6, -1
, 0, 0, -7, -4, -2, 5, 4, 0, -8, -999999},
{-2, -4, -4, -5, 12, -5, -5, -3, -3, -2, -6, -5, -5, -4, -3
, 0, -2, -8, 0, -2, -3, -4, 0, -8, -999999},

```

```

{ 0, 1, 1, 2, -5, 4, 2, -1, 3, -2, -2, 1, -1, -5, 0
, -1, -1, -5, -4, -2, 3, 5, 0, -8, -999999},
{ 0, -1, 1, 3, -5, 2, 4, 0, 1, -2, -3, 0, -2, -5, -1
, 0, 0, -7, -4, -2, 4, 5, 0, -8, -999999},
{ 1, -3, 0, 1, -3, -1, 0, 5, -2, -3, -4, -2, -3, -5, 0
, 1, 0, -7, -5, -1, 2, 1, 0, -8, -999999},
{-1, 2, 2, 1, -3, 3, 1, -2, 6, -2, -2, 0, -2, -2, 0
, -1, -1, -3, 0, -2, 3, 3, 0, -8, -999999},
{-1, -2, -2, -2, -2, -2, -2, -3, -2, 5, 2, -2, 2, 1, -2
, -1, 0, -5, -1, 4, -1, -1, 0, -8, -999999},
{-2, -3, -3, -4, -6, -2, -3, -4, -2, 2, 6, -3, 4, 2, -3
, -3, -2, -2, -1, 2, -2, -1, 0, -8, -999999},
{-1, 3, 1, 0, -5, 1, 0, -2, 0, -2, -3, 5, 0, -5, -1
, 0, 0, -3, -4, -2, 2, 2, 0, -8, -999999},
{-1, 0, -2, -3, -5, -1, -2, -3, -2, 2, 4, 0, 6, 0, -2
, -2, -1, -4, -2, 2, -1, 0, 0, -8, -999999},
{-3, -4, -3, -6, -4, -5, -5, -5, -2, 1, 2, -5, 0, 9, -5
, -3, -3, 0, 7, -1, -3, -4, 0, -8, -999999},
{ 1, 0, 0, -1, -3, 0, -1, 0, 0, -2, -3, -1, -2, -5, 6
, 1, 0, -6, -5, -1, 1, 1, 0, -8, -999999},
{ 1, 0, 1, 0, 0, -1, 0, 1, -1, -1, -3, 0, -2, -3, 1
, 2, 1, -2, -3, -1, 2, 1, 0, -8, -999999},
{ 1, -1, 0, 0, -2, -1, 0, 0, -1, 0, -2, 0, -1, -3, 0
, 1, 3, -5, -3, 0, 2, 1, 0, -8, -999999},
{-6, 2, -4, -7, -8, -5, -7, -3, -5, -2, -3, -4, 0, -6
, -2, -5, 17, 0, -6, -4, -4, 0, -8, -999999},
{-3, -4, -2, -4, 0, -4, -4, -5, 0, -1, -1, -4, -2, 7, -5
, -3, -3, 0, 10, -2, -2, -3, 0, -8, -999999},
{ 0, -2, -2, -2, -2, -2, -2, -1, -2, 4, 2, -2, 2, -1, -1
, -1, 0, -6, -2, 4, 0, 0, 0, -8, -999999},
{ 2, 1, 4, 5, -3, 3, 4, 2, 3, -1, -2, 2, -1, -3, 1
, 2, 2, -4, -2, 0, 6, 5, 0, -8, -999999},
{ 1, 2, 3, 4, -4, 5, 5, 1, 3, -1, -1, 2, 0, -4, 1
, 1, 1, -4, -3, 0, 5, 6, 0, -8, -999999},
{ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
, 0, 0, 0, 0, 0, 0, 0, 0, -8, -999999},
{-8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8, -8
, -8, -8, -8, -8, -8, -8, -8, -8, 1, -999999},
{-999999, -999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999, -999999, -
999999, -999999, -999999, -999999, -999999 }
};

```

6.2.3.10 `vector<vector<int>> xnu::XnuScores::Pam60` [protected]

This matrix was produced by "pam" Version 1.0.2 [18-Sep-91]

PAM 60 substitution matrix, scale = $\ln(2)/2 = 0.346574$

Lowest score = -12, Highest score = 13

```

Pam60 = {{ 5, -5, -2, -2, -5, -3, -1, 0, -5, -3, -4, -5,
-3, -6, 0, 1, 1, -10, -6, -1, -1, -1, 0, -12, -999999},
{ -5, 8, -3, -6, -6, 0, -6, -7, 0, -4, -6, 2,
-2, -7, -2, -2, -4, 0, -8, -5, -3, -1, 0, -12, -999999},
{ -2, -3, 6, 2, -7, -2, 0, -1, 1, -4, -5, 0,
-6, -6, -4, 1, -1, -6, -3, -5, 6, 0, 0, -12, -999999},
{ -2, -6, 2, 7, -10, -1, 3, -2, -2, -5, -9, -2,
-7, -11, -5, -2, -3, -11, -8, -6, 6, 3, 0, -12, -999999},
{ -5, -6, -7, -10, 9, -10, -10, -7, -6, -4, -11, -10, -

```

```

10, -9, -6, -1, -5, -12, -2, -4, -8, -9, 0, -12, -999999},
    { -3, 0, -2, -1, -10, 7, 2, -5, 2, -5, -3, -1,
-2, -9, -1, -3, -4, -9, -8, -5, 0, 7, 0, -12, -999999},
    { -1, -6, 0, 3, -10, 2, 7, -2, -3, -4, -7, -3,
-5, -10, -3, -2, -4, -12, -7, -4, 3, 6, 0, -12, -999999},
    { 0, -7, -1, -2, -7, -5, -2, 6, -6, -7, -8, -5,
-6, -7, -4, 0, -3, -11, -10, -4, -1, -2, 0, -12, -999999},
    { -5, 0, 1, -2, -6, 2, -3, -6, 8, -6, -4, -4,
-7, -4, -2, -4, -5, -5, -2, -5, 1, 1, 0, -12, -999999},
    { -3, -4, -4, -5, -4, -5, -4, -7, -6, 7, 0, -4,
1, -1, -6, -4, -1, -10, -4, 3, -3, -4, 0, -12, -999999},
    { -4, -6, -5, -9, -11, -3, -7, -8, -4, 0, 6, -6,
2, -1, -5, -6, -5, -4, -5, -1, -6, -4, 0, -12, -999999},
    { -5, 2, 0, -2, -10, -1, -3, -5, -4, -4, -6, 6,
0, -10, -4, -2, -2, -8, -7, -6, 0, -1, 0, -12, -999999},
    { -3, -2, -6, -7, -10, -2, -5, -6, -7, 1, 2, 0,
10, -2, -6, -4, -2, -9, -7, 0, -5, -2, 0, -12, -999999},
    { -6, -7, -6, -11, -9, -9, -10, -7, -4, -1, -1, -10,
-2, 8, -7, -5, -6, -3, 3, -5, -7, -9, 0, -12, -999999},
    { 0, -2, -4, -5, -6, -1, -3, -4, -2, -6, -5, -4,
-6, -7, 7, 0, -2, -10, -10, -4, -3, -1, 0, -12, -999999},
    { 1, -2, 1, -2, -1, -3, -2, 0, -4, -4, -6, -2,
-4, -5, 0, 5, 1, -4, -5, -4, 1, -2, 0, -12, -999999},
    { 1, -4, -1, -3, -5, -4, -4, -3, -5, -1, -5, -2,
-2, -6, -2, 1, 6, -9, -5, -1, 0, -3, 0, -12, -999999},
    { -10, 0, -6, -11, -12, -9, -12, -11, -5, -10, -4, -8,
-9, -3, -10, -4, -9, 13, -3, -11, -7, -9, 0, -12, -999999},
    { -6, -8, -3, -8, -2, -8, -7, -10, -2, -4, -5, -7,
-7, 3, -10, -5, -5, -3, 9, -5, -4, -6, 0, -12, -999999},
    { -1, -5, -5, -6, -4, -5, -4, -4, -5, 3, -1, -6,
0, -5, -4, -4, -1, -11, -5, 6, -4, -4, 0, -12, -999999},
    { -1, -3, 6, 6, -8, 0, 3, -1, 1, -3, -6, 0,
-5, -7, -3, 1, 0, -7, -4, -4, 7, 3, 0, -12, -999999},
    { -1, -1, 0, 3, -9, 7, 6, -2, 1, -4, -4, -1,
-2, -9, -1, -2, -3, -9, -6, -4, 3, 7, 0, -12, -999999},
    { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -12, -999999},
    { -12, -12, -12, -12, -12, -12, -12, -12, -12, -12, -12, -12, -
12, -12, -12, -12, -12, -12, -12, -12, 1, -999999},
    { -999999, -999999, -999999, -999999, -999999, -999999, -999999,
, -999999, -999999, -999999, -999999, -999999, -999999,
-999999, -999999, -999999, -999999, -999999, -999999, -999999,
-999999, -999999, -999999, -999999 } };

```

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

- [src/include/XNUData.hpp](#)

Chapter 7

File Documentation

7.1 src/include/ConvertString.hpp File Reference

```
#include <string> #include <sstream>
```

Namespaces

- namespace [xnu](#)
[XNU](#) namespace.

Functions

- template<typename Tnum >
Tnum [xnu::StringToNumeric](#) (const string &str)
- bool [xnu::StringToBool](#) (const string &str)

7.2 src/include/XNU.hpp File Reference

```
#include <cctype> #include <cmath> #include <XNUData.-  
hpp> #include <vector> #include <cstring> #include <string> ×
```

Classes

- class [xnu::XNU< Tint >](#)
[XNU](#) filter class.

Namespaces

- namespace [xnu](#)
[XNU](#) namespace.

7.3 src/include/XNUData.hpp File Reference

```
#include <vector> #include <string>
```

Classes

- class [xnu::XnuScores](#)
[XnuScores](#) class containing default matrices and parameters.

Namespaces

- namespace [xnu](#)
[XNU](#) namespace.