

PyHal

API Documentation

April 20, 2017

Contents

Contents	1
1 Package hal	6
1.1 Modules	6
1.2 Variables	7
2 Package hal.charts	8
2.1 Modules	8
2.2 Variables	8
3 Module hal.charts.bar	9
3.1 Functions	9
4 Module hal.charts.correlation	10
4.1 Functions	10
5 Module hal.charts.plotter	11
5.1 Class Plot2d	11
5.1.1 Methods	11
5.1.2 Properties	11
5.2 Class Plot3d	12
5.2.1 Methods	12
5.2.2 Properties	13
5.3 Class Plot4d	13
5.3.1 Methods	13
5.3.2 Properties	14
6 Package hal.files	15
6.1 Modules	15
6.2 Variables	15
7 Module hal.files.models	16
7.1 Variables	16
7.2 Class FileSystem	16
7.2.1 Methods	16
7.2.2 Properties	19
7.3 Class Document	20
7.3.1 Methods	20

7.3.2	Properties	22
7.4	Class Directory	22
7.4.1	Methods	23
7.4.2	Properties	23
7.5	Class MP3Song	24
7.5.1	Methods	24
7.5.2	Properties	25
8	Package hal.internet	26
8.1	Modules	26
8.2	Variables	26
9	Module hal.internet.engines	27
9.1	Class SearchEngineResult	27
9.1.1	Methods	27
9.1.2	Properties	27
9.2	Class SearchEngine	27
9.2.1	Methods	28
9.2.2	Properties	28
10	Module hal.internet.github	29
10.1	Variables	29
10.2	Class GithubRawApi	29
10.2.1	Methods	29
10.2.2	Properties	30
10.3	Class GithubApi	30
10.3.1	Methods	30
10.3.2	Properties	31
10.4	Class GithubUser	31
10.4.1	Methods	31
10.4.2	Properties	32
10.5	Class GithubUserRepository	32
10.5.1	Methods	32
10.5.2	Properties	33
11	Module hal.internet.parser	34
11.1	Functions	34
11.2	Variables	34
11.3	Class HtmlTable	34
11.3.1	Methods	35
11.3.2	Properties	35
12	Module hal.internet.selenium	36
12.1	Variables	36
12.2	Class SeleniumForm	36
12.2.1	Methods	36
13	Module hal.internet.web	38
13.1	Functions	38
13.2	Variables	38
13.3	Class Webpage	38
13.3.1	Methods	39

13.3.2 Properties	40
14 Module hal.internet.youtube	41
14.1 Functions	41
14.2 Variables	42
15 Package hal.maths	43
15.1 Modules	43
15.2 Variables	43
16 Module hal.maths.crypt	44
16.1 Class MD5	44
16.1.1 Methods	44
16.1.2 Properties	44
16.2 Class MD6	44
16.2.1 Methods	45
16.2.2 Properties	45
16.2.3 Class Variables	45
16.3 Class SHA	46
16.3.1 Methods	46
16.3.2 Properties	47
16.3.3 Class Variables	47
16.4 Class DES	47
16.4.1 Methods	48
16.4.2 Properties	48
16.4.3 Class Variables	48
16.5 Class ARC	49
16.5.1 Methods	49
16.5.2 Properties	49
16.5.3 Class Variables	49
16.6 Class AES	50
16.6.1 Methods	50
16.6.2 Properties	50
16.7 Class HMAC	50
16.7.1 Methods	51
16.7.2 Properties	51
16.8 Class BLOWFISH	51
16.8.1 Methods	51
16.8.2 Properties	52
16.9 Class IDEA	52
16.9.1 Methods	52
16.9.2 Properties	53
16.10 Class CAST128	53
16.10.1 Methods	53
16.10.2 Properties	53
16.11 Class Dsa	54
16.11.1 Methods	54
16.11.2 Properties	54
17 Module hal.maths.maths	55
17.1 Functions	55
17.2 Variables	55

17.3 Class Integer	55
17.3.1 Methods	55
17.3.2 Properties	56
17.3.3 Class Variables	56
17.4 Class EightQueen	56
17.4.1 Methods	57
17.4.2 Properties	57
18 Package hal.ml	58
18.1 Modules	58
18.2 Variables	58
19 Package hal.ml.analysis	59
19.1 Modules	59
19.2 Variables	59
20 Module hal.ml.analysis.correlation	60
20.1 Functions	60
21 Package hal.ml.data	62
21.1 Modules	62
21.2 Variables	62
22 Module hal.ml.data.parser	63
22.1 Functions	63
22.2 Variables	63
22.3 Class Parser	63
22.3.1 Methods	63
22.3.2 Properties	64
22.4 Class CSVParser	64
22.4.1 Methods	64
22.4.2 Properties	64
23 Module hal.ml.features	65
23.1 Functions	65
24 Package hal.ml.models	66
24.1 Modules	66
24.2 Variables	66
25 Module hal.ml.models.classification	67
25.1 Functions	67
26 Module hal.ml.models.pipelined	68
26.1 Functions	68
27 Module hal.ml.models.regression	69
27.1 Functions	69
28 Module hal.ml.models.time_series	70
28.1 Functions	70
29 Module hal.ml.predict	71

29.1 Class BasePrediction	71
29.1.1 Methods	71
29.1.2 Properties	71
30 Package hal.ml.utils	72
30.1 Modules	72
30.2 Variables	72
31 Module hal.ml.utils.matrix	73
31.1 Functions	73
32 Module hal.ml.utils.misc	76
32.1 Functions	76
33 Package hal.profile	78
33.1 Modules	78
33.2 Variables	78
34 Module hal.profile.performance	79
34.1 Class EightQueenTest	79
34.1.1 Methods	79
34.1.2 Properties	80
35 Package hal.strings	81
35.1 Modules	81
35.2 Variables	81
36 Module hal.strings.utils	82
36.1 Functions	82
36.2 Variables	82
37 Package hal.time	83
37.1 Modules	83
37.2 Variables	83
38 Module hal.time.utils	84
38.1 Functions	84
38.2 Variables	84
39 Package hal.wrappers	85
39.1 Modules	85
39.2 Variables	85
40 Module hal.wrappers.methods	86
40.1 Functions	86
Index	87

1 Package hal

1.1 Modules

- **charts** (Section 2, p. 8)
 - **bar** (Section 3, p. 9)
 - **correlation** (Section 4, p. 10)
 - **plotter**: Show elegant plots in any dimension.
(Section 5, p. 11)
- **files** (Section 6, p. 15)
 - **models**: Main entities in files, such as documents, folders.
(Section 7, p. 16)
- **internet** (Section 8, p. 26)
 - **engines**: Abstract search engines.
(Section 9, p. 27)
 - **github**: Common classes and entities in Github
(Section 10, p. 29)
 - **parser**: Parse anything there is on the Internet.
(Section 11, p. 34)
 - **selenium**: Some utils methods for a selenium webdriver
(Section 12, p. 36)
 - **web**: Deal with webpages.
(Section 13, p. 38)
 - **youtube**: Get rss feed for youtube channel.
(Section 14, p. 41)
- **maths**: MATHS: important and scalable math functions
(Section 15, p. 43)
 - **crypt**: Perform fast hash, encryption and calculations related to cryptography.
(Section 16, p. 44)
 - **maths**: A few elegant and powerful mathematical functions.
(Section 17, p. 55)
- **ml** (Section 18, p. 58)
 - **analysis** (Section 19, p. 59)
 - * **correlation** (Section 20, p. 60)
 - **data** (Section 21, p. 62)
 - * **parser**: Parsers for raw databases.
(Section 22, p. 63)
 - **features**: Collection of methods to find weights of features and select the best ones.
(Section 23, p. 65)
 - **models** (Section 24, p. 66)
 - * **classification**: Prediction methods based on classification algorithms.
(Section 25, p. 67)
 - * **pipelined**: Prediction methods based on multiple models mixed up.
(Section 26, p. 68)
 - * **regression**: Prediction methods based on regression algorithms.
(Section 27, p. 69)
 - * **time_series**: Multi-purpose prediction methods to be used in time-series.
(Section 28, p. 70)
 - **predict**: " General model to make prediction about everything.
(Section 29, p. 71)
 - **utils** (Section 30, p. 72)

- * **matrix**: Functions to deal with matrices.
(Section 31, p. 73)
- * **misc**: Various tools and utilities to deal with database and machine learning.
(Section 32, p. 76)
- **profile** (Section 33, p. 78)
 - **performance**: Perform benchmarks and tests on your PC.
(Section 34, p. 79)
- **strings** (Section 35, p. 81)
 - **utils**: Typical operations on strings made easy
(Section 36, p. 82)
- **time** (Section 37, p. 83)
 - **utils** (Section 38, p. 84)
- **wrappers** (Section 39, p. 85)
 - **methods**: Typical (and useful) function wrappers
(Section 40, p. 86)

1.2 Variables

Name	Description
<code>__package__</code>	Value: None

2 Package hal.charts

2.1 Modules

- **bar** (*Section 3, p. 9*)
- **correlation** (*Section 4, p. 10*)
- **plotter**: Show elegant plots in any dimension.
(*Section 5, p. 11*)

2.2 Variables

Name	Description
__package__	Value: None

3 Module *hal.charts.bar*

3.1 Functions

create_bar_chart(*title, x_labels, y_values, y_label*)

```
:param title: str
    Title of chart
:param x_labels: [] of str
    Names for each variable
:param y_values: [] of float
    Values of x labels
:param y_label: str
    Label of y axis
:return: Subplot
    Bar chart
```

create_multiple_bar_chart(*title, x_labels, mul_y_values, mul_y_labels*)

```
:param title: str
    Title of chart
:param x_labels: [] of str
    Names for each variable
:param mul_y_values: [] of [] of float
    List of values of x labels
:param mul_y_labels: [] of str
    List of labels for each y value
:return: Subplot
    Bar chart
```

create_symlog_bar_chart(*title, x_labels, y_values, y_label*)

```
:param title: str
    Title of chart
:param x_labels: [] of str
    Names for each variable
:param y_values: [] of float
    Values of x labels
:param y_label: str
    Label of y axis
:return: return
    Symlog bar chart
```

4 Module *hal.charts.correlation*

4.1 Functions

```
create_correlation_matrix_plot(correlation_matrix, title, feature_list)
```

```
:param correlation_matrix: [] of []  
    Correlation matrix of features  
:param title: str  
    Title of plot  
:param feature_list: [] of str  
    List of names of features  
:return: void  
    shows the given correlation matrix as image
```

5 Module *hal.charts.plotter*

Show elegant plots in any dimension.

5.1 Class *Plot2d*

object  **hal.charts.plotter.Plot2d**

2d plot

5.1.1 Methods

scatter(*vectorx*, *vectory*)

```
:param vectorx: vector in x axis
:param vectory: vector in y axis
:return: 2d scatter plot
```

param(*self*, *functionx*, *functiony*, *min*, *max*, *points*)

```
:param functionx: function in x value
:param functiony: function in y value
::param min: minimum value
:param max: maximum value
:param points: number of points to display
:return: 2d parametric graph of given function from min to max
```

plot(*self*, *function*, *min*, *max*, *points*)

```
:param function: function to plot
:param min: minimum value
:param max: maximum value
:param points: number of points
:return: plot 2d function
```

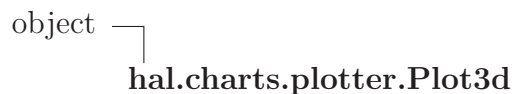
Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __init__(), __new__(), __reduce__(),
__reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

5.1.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

5.2 Class Plot3d



5.2.1 Methods

scatter(*vectorx, vectory, vectorz*)

```

:param vectorx: vector in x axis
:param vectory: vector in y axis
:param vectorz: vector in z axis
:return: plot 3d scattered points
  
```

param(*self, functionx, functiony, functionz, min, max, points*)

```

:param functionx: function in x
:param functiony: function in y
:param functionz: function in z
:param min: minimum
:param max: maximum
:param points: number of points
:return: 3d parametric graph of given function from min to max
  
```

```
plot(self, function, minx, maxx, pointsx, miny, maxy, pointsy)
```

```
:param function: function to plot
:param minx: minimum of x-values
:param maxx: maximum of x-values
:param pointsx: points in x axis
:param miny: minimum of y-values
:param maxy: maximum of y-values
:param pointsy: points in y axis
:return: plot 3d function
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __init__(), __new__(), __reduce__(),
__reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

5.2.2 Properties

Name	Description
<i>Inherited from object</i>	
__class__	

5.3 Class Plot4d

```
object └─ hal.charts.plotter.Plot4d
```

5.3.1 Methods

```
scatter(vectorx, vectory, vectorz, vectorw)
```

```
:param vectorx: vector in x axis
:param vectory: vector in y axis
:param vectorz: vector in z axis
:param vectorw: vector in w axis
:return: plot 4d scattered points
```

param(*self, functionx, functiony, functionz, functionw, min, max, points*)

```
:param functionx: function in x
:param functiony: function in y
:param functionz: function in z
:param functionw: function in w
:param min: minimum
:param max: maximum
:param points: number of points
:return: 4d parametric graph of given function from min to max
```

plot(*self, function, minx, maxx, miny, maxy, minz, maxz, precision, kind*)

```
:param function: function to plot
:param minx: minimum of x-values
:param maxx: maximum of x-values
:param miny: minimum of y-values
:param maxy: maximum of y-values
:param minz: minimum of z-values
:param maxz: maximum of z-values
:param precision: precision
:param kind: slice: x cont -> 3d plot with y,z variables in plane and w as "z"-axis
              contour: x cont -> 3d plot with y,z variables in plane and w colored
:return: plot 4d function
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __init__(), __new__(), __reduce__(),
__reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

5.3.2 Properties

Name	Description
<i>Inherited from object</i>	
__class__	

6 Package hal.files

6.1 Modules

- **models:** Main entities in files, such as documents, folders.
(Section 7, p. 16)

6.2 Variables

Name	Description
--package--	Value: None

7 Module `hal.files.models`

Main entities in files, such as documents, folders.

7.1 Variables

Name	Description
<code>BAD_CHARS</code>	Value: <code>[".", ":", "\"", "\xe2\x80\x99", "&", "720p", "1080p", "y..."]</code>
<code>RUSSIAN_CHARS</code>	Value: <code>["\xd1\x88", "\xd0\xb0", "\xd0\xb1", "\xd0\xbb", "\xd0\xba..."]</code>
<code>VIDEO_FORMAT</code>	Value: <code>[".", ".3g2", ".3gp", ".amv", ".asf", ".avi", ".drc", ".f..."]</code>
<code>ARCHIVE_FORMAT</code>	Value: <code>[".7z", "._?_", ".?Q?", ".?Z?", ".a", ".ace", ".afa", ".a..."]</code>
<code>SUBTITLE_FORMAT</code>	Value: <code>[".srt", ".sub", ".sbv"]</code>
<code>TEXT_FORMAT</code>	Value: <code>[".cnf", ".conf", ".cfg", ".chm", ".epub", ".log", ".asc"...]</code>
<code>IMAGE_FORMAT</code>	Value: <code>[".ani", ".bmp", ".cal", ".fax", ".gif", ".img", ".jbg", "..."]</code>
<code>AUDIO_FORMAT</code>	Value: <code>[".3gp", ".aa", ".aac", ".aax", ".act", ".aiff", ".amr", "..."]</code>
<code>PATH_SEPARATOR</code>	Value: <code>"/" if "posix" in os.name else "\\\"</code>

7.2 Class `FileSystem`



7.2.1 Methods

<code>__init__(self, path)</code>
<pre> :param path: string Path to file Overrides: object.__init__ </pre>

fix_raw_path(*path*)

```
:param path: string
    Path to fix
:return: string
    Right path
```

remove_year(*name*)

```
:param name: string
    Name to edit
:return: string
    Given string bu with no years.
```

remove_brackets(*name*)

```
:param name: string
    Name to edit
:return: string
    Given string bu with no barckets.
```

extract_name_max_chars(*name*, *max_chars*=64, *blank*=" ")

```
:param name: string
    Name to edit
:param max_chars: int
    Maximum chars of new name
:param blank: string
    Char that represents the blank between words.
:return: string
    Name edited to contain at most max_chars (truncate to nearest word)
```

```
prettify(name, bad_chars=BAD_CHARS, r=" ")
```

```
:param name: string
    Name to edit
:param bad_chars: []
    List of bad strings to remove
:param r: string
    Default blanks in name.
:return: string
    Prettier name from given one: replace bad chars with good ones.
```

```
ls_dir(path, include_hidden=False)
```

```
:param path: string
    Path to directory to get list of files and folders
:param include_hidden: bool
    Whether to include hidden files in list.
:return: list
    List of paths in given directory.
```

```
ls_recurse(path, include_hidden=False)
```

```
:param path: string
    Path to directory to get list of files and folders
:param include_hidden: bool
    Whether to include hidden files in list.
:return: list
    List of paths in given directory recursively.
```

ls(*path*, *recurse*, *include_hidden=False*)

:param *path*: string
 Path to directory to get list of files and folders
:param *recurse*: bool
 Whether to recurse into subdirectories or not.
:param *include_hidden*: bool
 Whether to include hidden files in list.
:return: list
 List of paths in given directory recursively.

is_archive_mac(*self*)

:return: True iff document is an MACOSX archive.

is_russian(*self*)

:return: True iff document has a russian name.

trash(*self*)

:return: void
 Trash given file/folder

rename(*self*, *new_path*)

:param *new_path*: string
 New path to use
:return: void
 Rename to new path

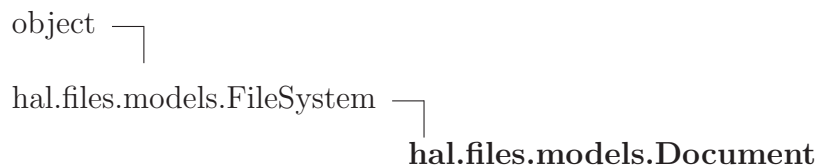
Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

7.2.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

7.3 Class Document



7.3.1 Methods

`--init--(self, path)`

:param path: string
Path to file

Overrides: object.--init--

`move_file_to_directory(file_path, directory_path)`

:param file_path: string
Path to file to move
:param directory_path: string
Path to target directory where to move file
:return: void
Move file to given directory

`move_file_to_file(old_path, new_path)`

:param old_path: string
Old path of file to move
:param new_path: string
New path (location) of file
:return: void
Move file from old location to new one

write_data_to_file(*data*, *out_file*)

:param data: string
 Data to write to file.
:param out_file: string
 Path to output file.
:return: void
 Writes given data to given path file.

extract_name_extension(*file_name*)

:param file_name: string
 Name of file
:return: tuple string, string
 Name of file, extension of file

get_path_name(*self*)

:return: tuple string, string
 Name of path, name of file (or folder)

is_video(*self*)

:return: True iff document is a video.

is_subtitle(*self*)

:return: True iff document is a subtitle.

is_text(*self*)

:return: True iff document is a text file.

is_image (<i>self</i>)
:return: True iff document is an image.

is_audio (<i>self</i>)
:return: True iff document is an audio.

is_hidden (<i>self</i>)
:return: bool
True iff path is hidden

Inherited from hal.files.models.FileSystem(Section 7.2)

extract_name_max_chars(), fix_raw_path(), is_archive_mac(), is_russian(), ls(), ls_dir(),
ls_recurse(), prettify(), remove_brackets(), remove_year(), rename(), trash()

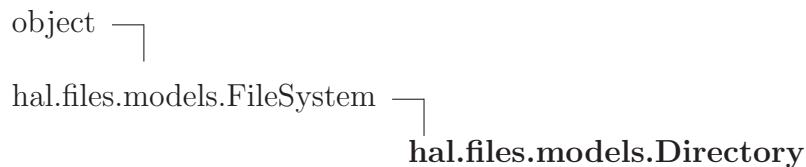
Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

7.3.2 Properties

Name	Description
<i>Inherited from object</i>	
__class__	

7.4 Class Directory



7.4.1 Methods

<code>__init__(self, path)</code>

:param path: string Path to file

Overrides: object.__init__

<code>create_new(path)</code>

:param path: string Path to directory to create

:return: void Creates new directory

<code>get_path_name(self)</code>

:return: tuple string, string Name of path, name of file (or folder)

<code>is_empty(self)</code>

:return: Bool True iff empty

Inherited from `hal.files.models.FileSystem` (Section 7.2)

`extract_name_max_chars()`, `fix_raw_path()`, `is_archive_mac()`, `is_russian()`, `ls()`, `ls_dir()`,
`ls_recurse()`, `prettify()`, `remove_brackets()`, `remove_year()`, `rename()`, `trash()`

Inherited from `object`

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

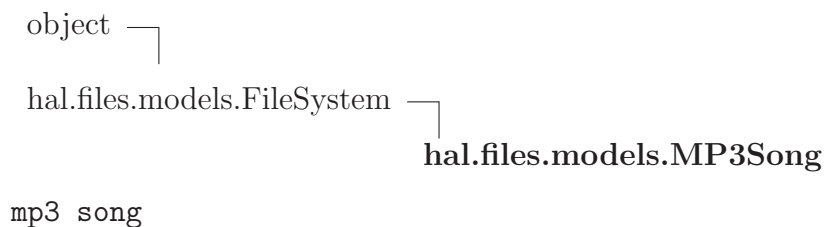
7.4.2 Properties

Name	Description
<i>Inherited from <code>object</code></i>	

continued on next page

Name	Description
<code>--class--</code>	

7.5 Class MP3Song



7.5.1 Methods

```

__init__(self, path)

:param path: string
    Path to file
Overrides: object.__init__ extit(inherited documentation)

```

```
set_name(self, name)
```

```
set_artist(self, artist)
```

```
set_album(self, album)
```

```
set_nr_track(self, nr_track)
```

```
set_year(self, year)
```

Inherited from hal.files.models.FileSystem(Section 7.2)

```

extract_name_max_chars(), fix_raw_path(), is_archive_mac(), is_russian(), ls(), ls_dir(),
ls_recurse(), prettify(), remove_brackets(), remove_year(), rename(), trash()

```

Inherited from object

```

__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

```


7.5.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

8 Package *hal.internet*

8.1 Modules

- **engines**: Abstract search engines.
(Section 9, p. 27)
- **github**: Common classes and entities in Github
(Section 10, p. 29)
- **parser**: Parse anything there is on the Internet.
(Section 11, p. 34)
- **selenium**: Some utils methods for a selenium webdriver
(Section 12, p. 36)
- **web**: Deal with webpages.
(Section 13, p. 38)
- **youtube**: Get rss feed for youtube channel.
(Section 14, p. 41)

8.2 Variables

Name	Description
<code>--package--</code>	Value: None

9 Module *hal.internet.engines*

Abstract search engines.

9.1 Class *SearchEngineResult*



9.1.1 Methods

```
__init__(self, title, link, description="")
x.__init__(...) initializes x; see help(type(x)) for signature
Overrides: object.__init__ extit(inherited documentation)
```

```
__str__(self)
str(x)
Overrides: object.__str__ extit(inherited documentation)
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __subclasshook__()
```

9.1.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

9.2 Class *SearchEngine*



9.2.1 Methods

__init__(*self*, *url*, *blank_replace*="+")

:param url: string

Url of search engine used in all query.

:param blank_replace:

Every search engine has to replace blanks in query

Overrides: object.__init__

parse_query(*self*, *query*)

:param query: string

Query to search engine.

:return: string

Parse given query in order to meet search criteria of search engine.

get_search_page(*self*, *query*, *using_tor*=False)

:param query: string

Query to search engine.

:param using_tor: bool

Whether use tor or not to fetch web pages

:return: string

Get HTML source of search page of given query.

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`, `__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

9.2.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

10 Module hal.internet.github

Common classes and entities in Github

10.1 Variables

Name	Description
GITHUB_URL_BASE	Value: "https://github.com"
API_TOKEN_FILE	Value: "api_token"
API_TOKEN	Value: open(API_TOKEN_FILE).read().strip()

10.2 Class GithubRawApi

object └─
 hal.internet.github.GithubRawApi

Wrapper for generic Github API

10.2.1 Methods

```
__init__(self, url=API_URL_BASE, get_api_content_now=False)

:param url: str
    Url of API content to get
:param get_api_content_now: bool
    True iff you want to get API content response when building object
Overrides: object.__init__
```

```
__getitem__(self, key)

:param key: str
    Dictionary key to find specific user field
:return: str
    Dictionary value of given key
```

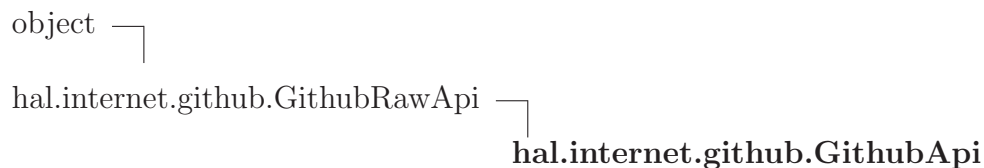
Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

10.2.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

10.3 Class GithubApi



Wrapper for generic Github API

10.3.1 Methods

<code>__init__(self, api_type)</code> <hr/> :param api_type: str Type of API to build Overrides: object.__init__
<code>get_trending_daily()</code> <hr/> :return: [] List of GithubUserRepository

Inherited from hal.internet.github.GithubRawApi(Section 10.2)

`__getitem__()`

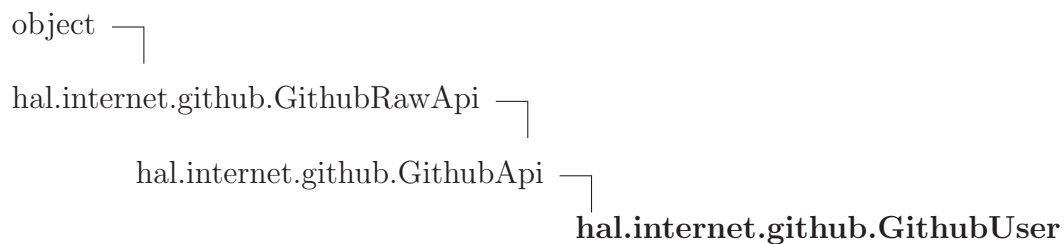
Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

10.3.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

10.4 Class GithubUser



Model of a generic Github user profile

10.4.1 Methods

```
__init__(self, username)
```

```
:param username: str
    Username of user
```

```
Overrides: object.__init__
```

```
get_repos(self)
```

```
:return: []
    List of GithubUserRepository
```

```
get_starred_repos(self)
```

```
:return: []
    List of GithubUserRepository
```

```
get_trending_daily_not_starred(self)
```

Inherited from hal.internet.github.GithubApi(Section 10.3)

get_trending_daily()

Inherited from hal.internet.github.GithubRawApi(Section 10.2)

__getitem__()

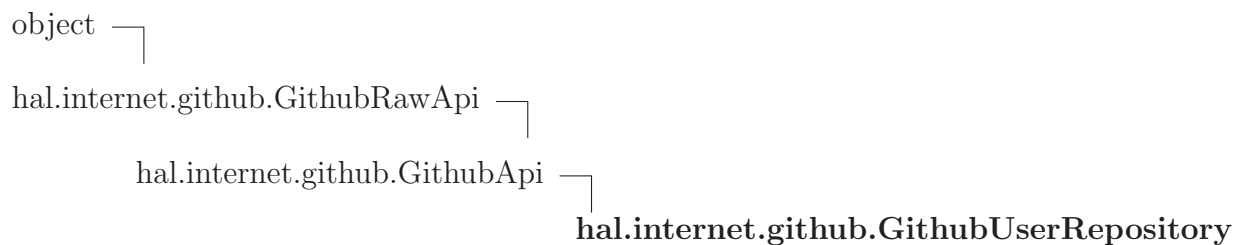
Inherited from object

__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

10.4.2 Properties

Name	Description
<i>Inherited from object</i>	
__class__	

10.5 Class GithubUserRepository



Model of a generic Github user repository

10.5.1 Methods

__init__(self, username, repository_name)
<pre> :param username: str Username of user :param repository_name: str Name of repository Overrides: object.__init__ </pre>

<code>--eq--(self, other)</code>

Inherited from hal.internet.github.GithubApi(Section 10.3)

`get_trending_daily()`

Inherited from hal.internet.github.GithubRawApi(Section 10.2)

`--getitem--()`

Inherited from object

`--delattr--()`, `--format--()`, `--getattr--()`, `--hash--()`, `--new--()`, `--reduce--()`, `--reduce_ex--()`,
`--repr--()`, `--setattr--()`, `--sizeof--()`, `--str--()`, `--subclasshook--()`

10.5.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

11 Module *hal.internet.parser*

Parse anything there is on the Internet.

11.1 Functions

is_string_well_formatted(*string*)

```
:param string: string
    String to parse
:return: bool
    True iff string is good formatted
```

html_stripper(*string*)

```
:param string: string
    String to parse
:return: string
    Given string with raw HTML elements removed
```

11.2 Variables

Name	Description
<code>--package--</code>	Value: <code>'hal.internet'</code>

11.3 Class *HtmlTable*



11.3.1 Methods

<code>__init__(self, html_source)</code>

<code>:param html_source: string</code> Html source of table

Overrides: <code>object.__init__</code>

<code>parse(self)</code>

<code>:return: list of list</code> List of list of values in table

Inherited from str

`__add__()`, `__contains__()`, `__eq__()`, `__format__()`, `__ge__()`, `__getattr__()`, `__getitem__()`,
`__getnewargs__()`, `__getslice__()`, `__gt__()`, `__hash__()`, `__le__()`, `__len__()`, `__lt__()`, `__mod__()`,
`__mul__()`, `__ne__()`, `__new__()`, `__repr__()`, `__rmod__()`, `__rmul__()`, `__sizeof__()`, `__str__()`,
`capitalize()`, `center()`, `count()`, `decode()`, `encode()`, `endswith()`, `expandtabs()`, `find()`,
`format()`, `index()`, `isalnum()`, `isalpha()`, `isdigit()`, `islower()`, `isspace()`, `istitle()`, `isupper()`,
`join()`, `ljust()`, `lower()`, `lstrip()`, `partition()`, `replace()`, `rfind()`, `rindex()`, `rjust()`,
`rpartition()`, `rsplit()`, `rstrip()`, `split()`, `splitlines()`, `startswith()`, `strip()`, `swapcase()`,
`title()`, `translate()`, `upper()`, `zfill()`

Inherited from object

`__delattr__()`, `__reduce__()`, `__reduce_ex__()`, `__setattr__()`, `__subclasshook__()`

11.3.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

12 Module hal.internet.selenium

Some utils methods for a selenium webdriver

12.1 Variables

Name	Description
<code>--package--</code>	Value: None

12.2 Class SeleniumForm

Great and simple static methods to deal with selenium webdrivers.

12.2.1 Methods

fill_form_field(*browser, field_name, field_value*)

```
:param browser: webdriver
    Browser to use to submit form.
:param field_name :string
    Name of field to fill
:param field_value: string
    Value with which to fill field.
:return: void
    Fill given field wiht given value.
```

fill_login_form(*browser, username, username_field, userpassword, userpassword_field*)

```
:param browser: webdriver
    Browser to use to submit form.
:param username: string
    Username of user to login.
:param username_field: string
    Name of field to fill with username.
:param userpassword: string
    Password of user to login.
:param userpassword_field: string
    Name of field to fill with userpassword.
:return: void
    Form filled with given information.
```

submit_form(*browser, button_name*)

```
:param browser: webdriver
    Browser to use to submit form.
:param button_name: string
    Name of button to press to submit form
:return: void
    Submit form.
```

13 Module *hal.internet.web*

Deal with webpages.

13.1 Functions

is_url(*candidate_url*)

```
:param candidate_url: str
    Possible url to check for url
:return: bool
    True iff candidate is a valid url
```


download_url(*url*, *local_file*)

```
:param url: string
    Url to download
:param local_file: string
    Save url as this path
:return: void
    Download link to local file
```

13.2 Variables

Name	Description
CHROME_USER_AGENT	Value: ["Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US) AppleWe...
URL_VALID_REGEX	Value: re.compile(r"^(?:http ftp)s?://"r"(?:[A-Z0-9](?:[A-Z0...

13.3 Class Webpage

object  **hal.internet.web.Webpage**
representation of URL (web page)

13.3.1 Methods

`__init__(self, url, using_tor=False)`

:param url: string
 Url of webpage

:param using_tor: bool
 Whether using tor or not to fetch source page

Overrides: object.__init__

`parse_url(raw_url)`

:param raw_url: url to parse
:return: parses correctly url

`get_scheme(self)`

:return: get scheme (HTTP, HTTPS, FTP ..) from given url

`get_hostname(self)`

:return: extract hostname from given url

`get_domain(self)`

:return: get domain from given url

`get_html_source(self, tor=False)`

:return: str
 HTML source of webpage

```
get_links(self, recall, timeout)
```

```
:param recall: max time to attempt to fetch url
:param timeout: max time (s) to wait for web_page response
:return: array of out_links
```

```
open_in_browser(self, times)
```

```
:param times: int
    Times to open webpage in browser
:return: void
    Open a wendrive and go to webpage
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

13.3.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

14 Module *hal.internet.youtube*

Get rss feed for youtube channel.

14.1 Functions

```
get_channel_page_from_name(channel_name)
```

```
:param channel_name: string
    name of channel (e.g in "https://www.youtube.com/user/caseyneistat" you should t
:param youtube_channel_url: string
    base url of youtube channels.
@return string
    source page of youtube channel.
```

```
get_channel_id_from_name(channel_name)
```

```
:param channel_name: string
    name of channel (e.g in "https://www.youtube.com/user/caseyneistat" you should t
:return string
    id of youtube channel
```

```
get_channel_feed_url_from_id(channel_id)
```

```
:param channel_id: string
    Id of channel (e.g in "https://www.youtube.com/channel/UC2zjki3bJIaXmgV_LBQ2jTg"
:return string
    rss url feed of youtube channel.
```

```
get_channel_feed_url_from_name(channel_name)
```

```
:param channel_name: string
    name of channel (e.g in "https://www.youtube.com/user/caseyneistat" you should t
:return string
    rss url feed of youtube channel.
```

```

get_channel_feed_url_from_video(video_url)

:param video_url: string
    Url of video (e.g in https://www.youtube.com/watch?v=KB_iTbDrkxE)
:return string
    rss url feed of youtube channel.

```

14.2 Variables

Name	Description
YOUTUBE_USER_BASE-URL	Value: "https://www.youtube.com/user/"
YOUTUBE_FEED_BASE-URL	Value: "https://www.youtube.com/feeds/videos.xml?channel_id="

15 Package *hal.maths*

MATHS: important and scalable math functions

15.1 Modules

- **crypt**: Perform fast hash, encryption and calculations related to cryptography.
(Section 16, p. 44)
- **maths**: A few elegant and powerful mathematical functions.
(Section 17, p. 55)

15.2 Variables

Name	Description
<code>--package--</code>	Value: None

16 Module hal.maths.crypt

Perform fast hash, encryption and calculations related to cryptography.

16.1 Class MD5

```
object └─ hal.maths.crypt.MD5
md5 hash
```

16.1.1 Methods

```
__init__(self, string)
x.__init__(...) initializes x; see help(type(x)) for signature
Overrides: object.__init__ exitit(inherited documentation)
```

hash(<i>self</i>)
:return: hash plaintext

Inherited from object

```
--delattr--, --format--, --getattrattribute--, --hash--, --new--, --reduce--, --reduce_ex--,
--repr--, --setattr--, --sizeof--, --str--, --subclasshook--()
```

16.1.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

16.2 Class MD6

```
object └─
        hal.maths.crypt.MD6
```

md6 hash

16.2.1 Methods**`__init__(self, string, size)`**`x.__init__(...)` initializes `x`; see `help(type(x))` for signatureOverrides: `object.__init__` `exitit` (inherited documentation)**`hash(self)`****:return:** return md6 hash**`hex(self, data, size)`****:param data:** plaintext**:param size:** bytes**:return:** hex representation**`raw(self, data, size)`****:param data:** plaintext**:param size:** bytes**:return:** raw representation***Inherited from object***`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`**16.2.2 Properties**

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

16.2.3 Class Variables

Name	Description
ALLOWED_SIZE	Value: [64, 128, 224, 256, 384, 512]

16.3 Class SHA

object —
 hal.maths.crypt.SHA
 general SHA hash

16.3.1 Methods

```
__init__(self, string, size, salt=None)
```

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature
 Overrides: `object.__init__` `exitit`(inherited documentation)

```
hash(self)
```

:return: hash of given size

```
hash_sha1(self)
```

:return: sha1 hash

```
hash_sha224(self)
```

:return: sha224 hash

```
hash_sha256(self)
```

:return: sha256 hash

hash_sha384(<i>self</i>)
:return: sha384 hash

hash_sha512(<i>self</i>)
:return: sha512 hash

hash_shasalted(<i>self</i>)
:return: sha512 hash

Inherited from object

`--delattr--()`, `--format--()`, `--getattr--()`, `--hash--()`, `--new--()`, `--reduce--()`, `--reduce_ex--()`,
`--repr--()`, `--setattr--()`, `--sizeof--()`, `--str--()`, `--subclasshook--()`

16.3.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

16.3.3 Class Variables

Name	Description
ALLOWED_SIZE	Value: [1, 224, 256, 384, 512]

16.4 Class DES

```

object └─
          hal.maths.crypt.DES
DES hash
```

16.4.1 Methods

`__init__(self, string, key, size)`

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature

Overrides: `object.__init__` `exitit`(inherited documentation)

`hash(self)`

:return: hash of given size

`hash_des(self)`

:return: des hash

`hash_des3(self)`

:return: des3 hash

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

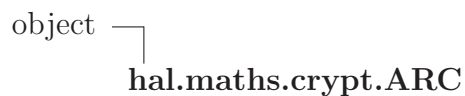
16.4.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

16.4.3 Class Variables

Name	Description
<code>ALLOWED_SIZE</code>	Value: [1, 3]

16.5 Class ARC



ARC hash

16.5.1 Methods

```
__init__(self, string, key, size)
```

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature

Overrides: `object.__init__` `extit`(inherited documentation)

```
hash(self)
```

:return: hash of given size

```
hash_ar2(self)
```

:return: des hash

```
hash_arc4(self)
```

:return: des3 hash

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

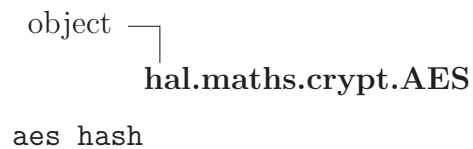
16.5.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

16.5.3 Class Variables

Name	Description
ALLOWED_SIZE	Value: [2, 4]

16.6 Class AES



16.6.1 Methods

```
__init__(self, string, key)
x.__init__(...) initializes x; see help(type(x)) for signature
Overrides: object.__init__ exitit(inherited documentation)
```

```
hash(self)
```

```
:return: hash plaintext
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

16.6.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>--class--</code>	

16.7 Class HMAC



hmac hash

16.7.1 Methods

```
__init__(self, string, key)
```

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature

Overrides: `object.__init__` extit(inherited documentation)

```
hash(self)
```

:return: hash plaintext

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

16.7.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

16.8 Class BLOWFISH

```

object └─
          hal.maths.crypt.BLOWFISH

```

blowfish hash

16.8.1 Methods

```
__init__(self, string, key)
```

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature

Overrides: `object.__init__` extit(inherited documentation)

```
hash(self)
```

```
:return: hash plaintext
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

16.8.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

16.9 Class IDEA

```
object └─
          hal.maths.crypt.IDEA
```

IDEA hash

16.9.1 Methods

```
__init__(self, string, key)
```

```
x.__init__(...) initializes x; see help(type(x)) for signature
```

```
Overrides: object.__init__ extit(inherited documentation)
```

```
hash(self)
```

```
:return: IDEA hash
```

```
change_key(self, key)
```

```
:param key: new key
```

```
:return: change key
```

```
encrypt(self)
```

```
:return: encrypt with key
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

16.9.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

16.10 Class CAST128

```
object └─
          hal.maths.crypt.CAST128
```

CAST 128 hash

16.10.1 Methods

```
__init__(self, string, key)
```

```
x.__init__(...) initializes x; see help(type(x)) for signature
```

```
Overrides: object.__init__ extit(inherited documentation)
```

```
encrypt(self)
```

```
decrypt(self)
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

16.10.2 Properties

Name	Description
<i>Inherited from object</i>	
__class__	

16.11 Class Dsa

```

object └─
          hal.maths.crypt.Dsa
dsa hash

```

16.11.1 Methods

```
__init__(self, string)
```

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature

Overrides: `object.__init__` extit(inherited documentation)

```
hash(self)
```

:return: hash plaintext

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

16.11.2 Properties

Name	Description
<i>Inherited from object</i>	
__class__	

17 Module *hal.maths.maths*

A few elegant and powerful mathematical functions.

17.1 Functions

get_prime(*bits*)

:param bits: size of number to generate (bits)
:return: prime number of given size

blumblumshub(*seed, amount, prime0, prime1*)

:param seed: seeder
:param amount: amount of number to generate
:param prime0: one prime number
:param prime1: the second prime number
:return: pseudo-number generator

17.2 Variables

Name	Description
<code>--package--</code>	Value: <code>'hal.maths'</code>

17.3 Class Integer

object └─ **hal.maths.maths.Integer**

17.3.1 Methods

--init--(*self, string*)

`x.__init__(...)` initializes `x`; see `help(type(x))` for signature
Overrides: `object.__init__` extit(inherited documentation)

```
is_probably_prime(self)
```

```
:return: test with miller-rabin
```

```
test_miller_rabin(self, precision)
```

```
:param precision: number of rounds to perform (higher -> better precision)
:return: True iff probably prime
```

Inherited from object

```
__delattr__(), __format__(), __getattr__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(),
__repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

17.3.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

17.3.3 Class Variables

Name	Description
LOW_PRIMES	Value: [2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, ...]

17.4 Class EightQueen

```
object └─ hal.maths.maths.EightQueen
```

8 queen problem solver

17.4.1 Methods

<code>__init__(self, board_size)</code>

<code>x.__init__(...)</code> initializes <code>x</code> ; see <code>help(type(x))</code> for signature Overrides: <code>object.__init__</code> <code>extit</code> (inherited documentation)

<code>under_attack(col, queens)</code>

<code>solve(self, n)</code>

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

17.4.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

18 Package hal.ml

18.1 Modules

- **analysis** (*Section 19, p. 59*)
 - **correlation** (*Section 20, p. 60*)
- **data** (*Section 21, p. 62*)
 - **parser**: Parsers for raw databases.
(*Section 22, p. 63*)
- **features**: Collection of methods to find weights of features and select the best ones.
(*Section 23, p. 65*)
- **models** (*Section 24, p. 66*)
 - **classification**: Prediction methods based on classification algorithms.
(*Section 25, p. 67*)
 - **pipelined**: Prediction methods based on multiple models mixed up.
(*Section 26, p. 68*)
 - **regression**: Prediction methods based on regression algorithms.
(*Section 27, p. 69*)
 - **time_series**: Multi-purpose prediction methods to be used in time-series.
(*Section 28, p. 70*)
- **predict**: " General model to make prediction about everything.
(*Section 29, p. 71*)
- **utils** (*Section 30, p. 72*)
 - **matrix**: Functions to deal with matrices.
(*Section 31, p. 73*)
 - **misc**: Various tools and utilities to deal with database and machine learning.
(*Section 32, p. 76*)

18.2 Variables

Name	Description
--package--	Value: None

19 Package *hal.ml.analysis*

19.1 Modules

- **correlation** (*Section 20, p. 60*)

19.2 Variables

Name	Description
<code>--package--</code>	Value: None

20 Module *hal.ml.analysis.correlation*

20.1 Functions

get_correlation_matrix(*matrix*)

:param matrix: [] of []
List of features to get correlation matrix
:return: [] of []
correlation matrix

show_correlation_matrix(*correlation_matrix*, *title*, *feature_list*)

:param correlation_matrix: [] of []
Correlation matrix of features
:param title: str
Title of plot
:param feature_list: [] of str
List of names of features
:return: void
shows the given correlation matrix as image

get_correlation_matrix_of_columns(*headers_to_test*, *headers*, *data*)

:param headers_to_test: [] of str
List of columns to get correlation matrix of
:param headers: [] of str
List of all headers in matrix
:param data: [] of []
Matrix of float values
:return: [] of []
Correlation matrix of selected columns

show_correlation_matrix_of_columns(*title, headers_to_test, headers, data*)

```
:param title: str
    Title to show
:param headers_to_test: [] of str
    List of columns to get correlation matrix of
:param headers: [] of str
    List of all headers in matrix
:param data: [] of []
    Matrix of float values
:return: void
    Shows on screen correlation matrix of selected headers
```

save_correlation_matrix_of_columns(*title, headers_to_test, headers, data, out_file*)

```
:param title: str
    Title to show
:param headers_to_test: [] of str
    List of columns to get correlation matrix of
:param headers: [] of str
    List of all headers in matrix
:param data: [] of []
    Matrix of float values
:param out_file: str
    Output file
:return: void
    Saves correlation matrix of selected headers
```

save_correlation_matrix_of_data_files_in_folder(*folder_path*)

```
:param folder_path: str
    Folder containing logs data
:return: void
    Saves each file's correlation matrix of common headers
```

21 Package *hal.ml.data*

21.1 Modules

- **parser**: Parsers for raw databases.
(Section 22, p. 63)

21.2 Variables

Name	Description
--package--	Value: None

22 Module *hal.ml.data.parser*

Parsers for raw databases.

22.1 Functions

parse_csv_file(*file_path*)

```
:param file_path: str
    Path to file to parse
:return: tuple [], [] of []
    headers of csv file and data
```

22.2 Variables

Name	Description
<code>--package--</code>	Value: <code>'hal.ml.data'</code>

22.3 Class Parser

object —
 hal.ml.data.parser.Parser

Known Subclasses: *hal.ml.data.parser.CSVParser*

22.3.1 Methods

--init--(*self*, *database_file*)

```
:param database_file: a raw .csv file that contains any data about anything
Overrides: object.--init--
```

get_lines(*self*)

Inherited from object

```
--delattr--(), --format--(), --getattrattribute--(), --hash--(), --new--(), --reduce--(), --reduce_ex--(),
```

`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

22.3.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

22.4 Class CSVParser



22.4.1 Methods

<code>__init__(self, database_file)</code>
:param database_file: a raw .csv file that contains any data about anything
Overrides: <code>object.__init__</code>

<code>parse_data(self)</code>
store values in array, store lines in array; the result is a 2D matrix

Inherited from hal.ml.data.parser.Parser(Section 22.3)

`get_lines()`

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`, `__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

22.4.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

23 Module *hal.ml.features*

Collection of methods to find weights of features and select the best ones.

23.1 Functions

<code>select_k_best(x, y, k)</code>
select k best features in dataset

<code>get_best_features(x, y)</code>
finds the optimal number of features

<code>get_features($x, y, n_features_to_select$)</code>
finds the optimal features

24 Package *hal.ml.models*

24.1 Modules

- **classification**: Prediction methods based on classification algorithms.
(Section 25, p. 67)
- **pipelined**: Prediction methods based on multiple models mixed up.
(Section 26, p. 68)
- **regression**: Prediction methods based on regression algorithms.
(Section 27, p. 69)
- **time_series**: Multi-purpose prediction methods to be used in time-series.
(Section 28, p. 70)

24.2 Variables

Name	Description
--package--	Value: None

25 Module `hal.ml.models.classification`

Prediction methods based on classification algorithms.

25.1 Functions

<code>extra_trees_classifier()</code>

<code>random_forest()</code>

<code>knn()</code>

very fast and slightly more accurate than AdaBoost

<code>ada_boost()</code>

fast, accurate but too uncertainty

<code>bayes_gauss()</code>

slower than svr but equally accurate

<code>bayes_bernoulli()</code>

26 Module `hal.ml.models.pipelined`

Prediction methods based on multiple models mixed up.

26.1 Functions

<code>logistic_rbm()</code>

<code>anova_svm()</code>

27 Module `hal.ml.models.regression`

Prediction methods based on regression algorithms.

27.1 Functions

<code>support_vector_machine()</code>

<code>super fast and precise</code>

<code>logistic_regression()</code>

28 Module `hal.ml.models.time_series`

Multi-purpose prediction methods to be used in time-series.

28.1 Functions

`test_stationarity`(*timeseries*)

`arma`(*dates, values, start=None, end=None, plot=False*)

Predict days values using ARMA algorithm.

:param *dates*: list of str date

:param *values*: list of float values

:param *start*: start predicting in this day

:param *end*: end of prediction

:param *plot*: whether to plot or not values in graph

`arima`(*dates, values, start=None, end=None*)

Predict days values using ARIMA algorithm.

:param *dates*: list of str date

:param *values*: list of float values

:param *start*: start predicting in this day

:param *end*: end of prediction

`var`(*dates, values, start=None, end=None*)

Predict days values using ARIMA algorithm.

:param *dates*: list of str date

:param *values*: list of float values

:param *start*: start predicting in this day

:param *end*: end of prediction

`dynamic_var`(*dates, values, start=None, end=None*)

Predict days values using ARIMA algorithm.

:param *dates*: list of str date

:param *values*: list of float values

:param *start*: start predicting in this day

:param *end*: end of prediction

29 Module *hal.ml.predict*

" General model to make prediction about everything.

29.1 Class *BasePrediction*

object └─ **hal.ml.predict.BasePrediction**

29.1.1 Methods

__init__(*self*, *model*, *rounds*)

x.**__init__**(...) initializes *x*; see `help(type(x))` for signature

Overrides: `object.__init__` `exitit`(inherited documentation)

train(*self*, *x*, *y*)

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

29.1.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

30 Package `hal.ml.utils`

30.1 Modules

- **matrix**: Functions to deal with matrices.
(Section 31, p. 73)
- **misc**: Various tools and utilities to deal with database and machine learning.
(Section 32, p. 76)

30.2 Variables

Name	Description
<code>--package--</code>	Value: None

31 Module *hal.ml.utils.matrix*

Functions to deal with matrices.

31.1 Functions

precision(*matrix*)

Calculates accuracy on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

recall(*matrix*)

Calculates recall on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

tn_rate(*matrix*)

Calculates true negative rate on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

accuracy(*matrix*)

Calculates recall on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

f1_score(*matrix*)

Calculates f1 score on database

:param matrix: 2x2 matrix that looks like
 True Positive - False Negative
 | - |
 False Positive - True Negative

get_column_of_matrix(*column_index, matrix*)

:param column_index: int >= 0
 Column index to take
 :param matrix: [] of []
 Matrix
 :return: []
 Column of array at position given

get_subset_of_matrix(*headers_to_sample, all_headers, data*)

:param headers_to_sample: [] of str
 List of columns to get
 :param all_headers: [] of str
 List of all headers in matrix
 :param data: [] of []
 Matrix of float values
 :return: [] of []
 Correlation matrix of selected columns

remove_column_from_matrix(*headers, header_to_remove, data*)

:param headers: [] of str
 Column names
 :param header_to_remove: str
 Name of column to remove
 :param data: matrix ([] of [])
 Data
 :return: headers, data
 Headers without header removed and data without column removed

add_columns_to_matrix(*headers, data, new_headers, new_columns*)

:param headers: headers: [] of str
 Column names
:param data: matrix ([] of [])
 Data
:param new_headers: [] of str
 Names of new columns
:param new_columns: ([] of [])
 New columns to add
:return: headers, data
 New headers (with new headers) and data with new columns

32 Module *hal.ml.utils.misc*

Various tools and utilities to deal with database and machine learning.

32.1 Functions

precision(*matrix*)

Calculates accuracy on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

recall(*matrix*)

Calculates recall on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

tn_rate(*matrix*)

Calculates true negative rate on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

accuracy(*matrix*)

Calculates recall on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

| - |

False Positive - True Negative

f1_score(*matrix*)

Calculates f1 score on database

:param matrix: 2x2 matrix that looks like

True Positive - False Negative

False Positive - True Negative

pearson(*x*, *y*)

Pearson coefficient of arrays

normalize_array(*a*)

:param a: [] of float

Array of floats

:return: [] of float

Normalized (in [0, 1]) input array

33 Package hal.profile

33.1 Modules

- **performance:** Perform benchmarks and tests on your PC.
(Section 34, p. 79)

33.2 Variables

Name	Description
--package--	Value: None

34 Module `hal.profile.performance`

Perform benchmarks and tests on your PC.

34.1 Class `EightQueenTest`

object └─ `hal.profile.performance.EightQueenTest`

Test CPU by solving eight-queen problem

34.1.1 Methods

```
__init__(self, size)

x.__init__(...) initializes x; see help(type(x)) for signature
Overrides: object.__init__ exitit(inherited documentation)
```

```
welcome()

:return: string
    Welcomes user to this test sessions
```

```
introduction()

:return: string
    Welcomes user to this test sessions
```

```
run_test_with_size(size)

:param size: int
    Number of rows in grid
:return: int
    Time to solve problem with given size
```

update_std_out_and_log (<i>self</i> , <i>string</i>)

<pre>:param string: string Stuff to print :return: void Prints to stdout and updates log</pre>

start (<i>self</i>)

Inherited from object

`__delattr__()`, `__format__()`, `__getattr__()`, `__hash__()`, `__new__()`, `__reduce__()`, `__reduce_ex__()`,
`__repr__()`, `__setattr__()`, `__sizeof__()`, `__str__()`, `__subclasshook__()`

34.1.2 Properties

Name	Description
<i>Inherited from object</i>	
<code>__class__</code>	

35 Package *hal.strings*

35.1 Modules

- **utils**: Typical operations on strings made easy
(Section 36, p. 82)

35.2 Variables

Name	Description
--package--	Value: None

36 Module *hal.strings.utils*

Typical operations on strings made easy

36.1 Functions

how_similar_are(*a*, *b*)

```
:param a: str
    First string
:param b: str
    Second string
:return: float in [0, 1]
    Similarity of a VS b
```

get_average_length_of_word(*words*)

```
:param words: [] of str
    Words
:return: float
    Average length of word on list
```

36.2 Variables

Name	Description
<code>--package--</code>	Value: <code>'hal.strings'</code>

37 Package hal.time

37.1 Modules

- **utils** (*Section 38, p. 84*)

37.2 Variables

Name	Description
--package--	Value: None

38 Module *hal.time.utils*

38.1 Functions

parse_hh_mm_ss(*h*)

```
:param h: str
    Hours, minutes and seconds in the form hh:mm:ss to parse
:return: datetime.time
    Time parsed
```

get_seconds(*s*)

```
:param s: str
    Datetime in the form %H:%M:%S
:return: int
    Seconds in time
```

parse_hh_mm(*h*)

```
:param h: str
    Hours and minutes in the form hh:mm to parse
:return: datetime.time
    Time parsed
```

38.2 Variables

Name	Description
MONTHS_NAMES	Value: [datetime.strftime(datetime(year=1, month= m, day= 1), "...
MONTHS	Value: {i: MONTHS_NAMES [i] for i in range(len(MONTHS_NAMES))}

39 Package *hal.wrappers*

39.1 Modules

- **methods:** Typical (and useful) function wrappers
(*Section 40, p. 86*)

39.2 Variables

Name	Description
--package--	Value: None

40 Module *hal.wrappers.methods*

Typical (and useful) function wrappers

40.1 Functions

<code>handle_exceptions(<i>function</i>)</code>
<code>:param function: callback function</code> <code> function to wrap</code>
<code>:return: callback function return type</code> <code> wraps callback function</code>

Index

- hal (*package*), 6–7
 - hal.charts (*package*), 8
 - hal.charts.bar (*module*), 9
 - hal.charts.correlation (*module*), 10
 - hal.charts.plotter (*module*), 11–14
 - hal.files (*package*), 15
 - hal.files.models (*module*), 16–25
 - hal.internet (*package*), 26
 - hal.internet.engines (*module*), 27–28
 - hal.internet.github (*module*), 29–33
 - hal.internet.parser (*module*), 34–35
 - hal.internet.selenium (*module*), 36–37
 - hal.internet.web (*module*), 38–40
 - hal.internet.youtube (*module*), 41–42
 - hal.maths (*package*), 43
 - hal.maths.crypt (*module*), 44–54
 - hal.maths.maths (*module*), 55–57
 - hal.ml (*package*), 58
 - hal.ml.analysis (*package*), 59
 - hal.ml.data (*package*), 62
 - hal.ml.features (*module*), 65
 - hal.ml.models (*package*), 66
 - hal.ml.predict (*module*), 71
 - hal.ml.utils (*package*), 72
 - hal.profile (*package*), 78
 - hal.profile.performance (*module*), 79–80
 - hal.strings (*package*), 81
 - hal.strings.utils (*module*), 82
 - hal.time (*package*), 83
 - hal.time.utils (*module*), 84
 - hal.wrappers (*package*), 85
 - hal.wrappers.methods (*module*), 86