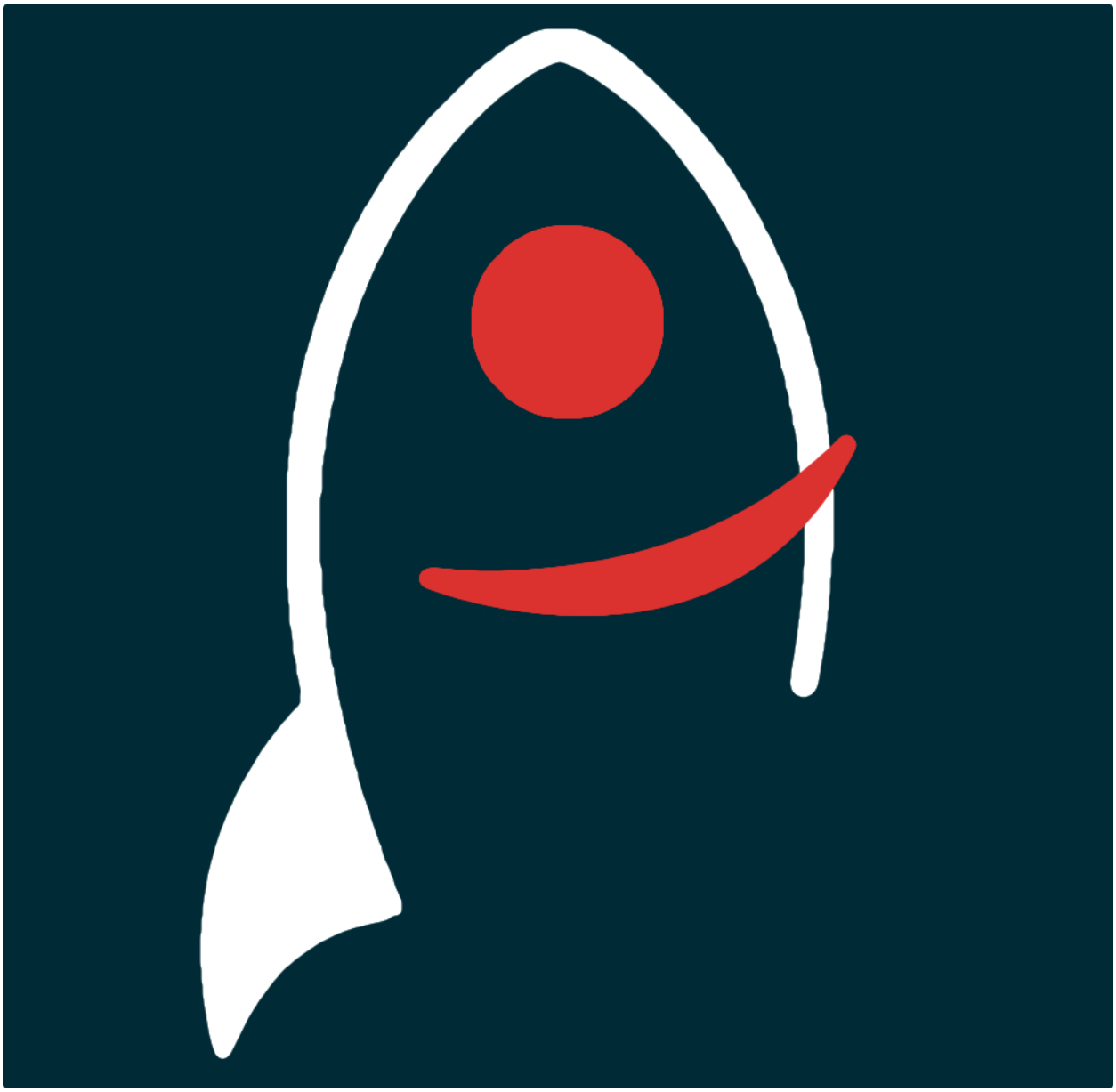

sherlock Documentation

Release v2.2.0

Dave Young

2021

TABLE OF CONTENTS

mine a library of historical and on-going astronomical survey data in an attempt to identify the sources of transient/variable events, and predict their classifications based on crossmatched data.

Documentation for sherlock is hosted by Read the Docs (development version and master version). The code lives on github. Please report any issues you find here.

CHAPTER

ONE

FEATURES

-

1.1 Installation

The easiest way to install sherlock is to use `pip` (here we show the install inside of a conda environment):

```
conda create -n sherlock python=3.7 pip
conda activate sherlock
pip install sherlock
```

Or you can clone the github repo and install from a local version of the code:

```
git clone git@github.com:thespacedoctor/sherlock.git
cd sherlock
python setup.py install
```

To upgrade to the latest version of sherlock use the command:

```
pip install sherlock --upgrade
```

To check installation was successful run `sherlock -v`. This should return the version number of the install.

1.1.1 Development

If you want to tinker with the code, then install in development mode. This means you can modify the code from your cloned repo:

```
git clone git@github.com:thespacedoctor/sherlock.git
cd sherlock
python setup.py develop
```

Pull requests are welcomed!

1.2 Initialisation

Before using sherlock you need to use the `init` command to generate a user settings file. Running the following creates a yaml settings file in your home folder under `~/.config/sherlock/sherlock.yaml`:

```
sherlock init
```

The file is initially populated with sherlock's default settings which can be adjusted to your preference.

If at any point the user settings file becomes corrupted or you just want to start afresh, simply trash the `sherlock.yaml` file and rerun `sherlock init`.

1.2.1 Modifying the Settings

Once created, open the settings file in any text editor and make any modifications needed.

1.2.2 Basic Python Setup

If you plan to use `sherlock` in your own scripts you will first need to parse your settings file and set up logging etc. One quick way to do this is to use the `fundamentals` package to give you a logger, a settings dictionary and a database connection (if connection details given in settings file):

```
## SOME BASIC SETUP FOR LOGGING, SETTINGS ETC
from fundamentals import tools
from os.path import expanduser
home = expanduser("~")
settingsFile  = home + "/.config/sherlock/sherlock.yaml"
su = tools(
    arguments={"settingsFile": settingsFile},
    docString=__doc__,
)
arguments, settings, log, dbConn = su.setup()
```

1.3 Todo List

Todo:

- update the package tutorial if needed

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/catalogue_conesearch.py:docstring of sherlock.catalogue_conesearch.catalogue_conesearch, line 25.)

Todo:

- write a checklist for adding a new catalogue to the sherlock database and reference it from here (use the image below of the tcs_helper_catalogue_views_info table)

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/commonutils/get_crossmatch_catalogues_co

of sherlock.commonutils.get_crossmatch_catalogues_column_map.get_crossmatch_catalogues_column_map, line 7.)

Todo:

- update the package tutorial if needed

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/transient_classifier.py:docstring of sherlock.transient_classifier.transient_classifier, line 26.)

Todo:

- add usage info
- create a sublime snippet for usage
- update package tutorial if needed

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/transient_classifier.py:docstring of sherlock.transient_classifier.transient_classifier._consolidate_coordinateList, line 16.)

Todo:

- add usage info
- create a sublime snippet for usage
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- update package tutorial with command-line tool info if needed

---

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Todo:

- add an entry in the tutorial to clean database tables

```python from sherlock.database_cleaner import database_cleaner db = database_cleaner(

    log=log, settings=settings

) db.clean() ```

(The original entry is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/database_cleaner.py:docstring of sherlock.database_cleaner.database_cleaner, line 15.)

**Todo:**

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Todo:

- docuument cl_utils module
- tidy usage text

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/cl_utils.py:docstring of sherlock.cl_utils, line 7.)

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- add an entry in the tutorial to clean database tables

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) db.clean() ```

---

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- create a sublime snippet for usage
- write a command-line tool for this method
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---
```

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/envs/develop/lib/python3.7/site-packages/qub_sherlock-2.2.0-py3.7.egg/sherlock/database_cleaner.py:docstring of sherlock.database_cleaner.database_cleaner._create_tcs_help_tables, line 25.)

Todo:

- nice!

(The *original entry* is located in /home/docs/checkouts/readthedocs.org/user_builds/qub-sherlock/checkouts/develop/docs/source/_template_.md, line 1.)

1.4 Release Notes

v2.2.0 - August 2, 2021

- **FEATURE**: Default search algorithm now version-controlled and ship alongside code. Users can override the default algorithm if they need to.
- **FEATURE**: Hidden `database-batch-size` and `cpu-pool-size` settings added - power users can access and change in settings files.
- **ENHANCEMENT**: Speed improvements (5-10 times processing speed increase).
- **REFACTOR/FIX**: synonym match break now removed by default so a location now gets matched against all catalogues regardless of whether or not a synonym match is initially found (e.g. right on top of a catalogued star). Resolves edge cases where true SNe are mis-classified as VS as they are located just too close to a stellar source, or galaxy source mis-identified as stellar in one catalogue but correctly as galaxy in another.
- **FIX**: some URLs to NED objects, found in the human readable Sherlock annotations, that were not resolving now do.

v2.1.8 - April 16, 2021`#bugFixFriday`

- **REFACTOR**: catalogue quality weights now used *within* the merged source sets to sort the data. This fixed *some* mis-matched annotation issues.
- **REFACTOR**: updating db connection settings to use QUB jumpbox.
- **REFACTOR/FIX** Reduced associated source merging radius from 3 arcsec to 1 arcsec (1/9th of the original matching area). This seems to correct many of the cases in which 2 or more distinct catalogued sources were getting merged/blended into one association. This resulted in in-correct classification prediction and wrongly associated distances.
- **FIXED**: annotation mismatches. If transient is classified as a SN then the underlying sources is identified as a galaxy in the annotation.

v2.1.7 - September 29, 2020

- **FIXED**: lite version introduced a couple of small bugs. Fixed.

v2.1.6 - September 7, 2020

- **ENHANCEMENT**: transient human-readable annotations added to the `classifications` dictionary return of the `transient_classifier.classify()` method.
- **ENHANCEMENT**: a `lite` parameter has been added to the Sherlock `transient_classifier` object. When set to `True` only top-ranked crossmatches are returned with a limited column set.

- **ENHANCEMENT**: snapshot annotation is now added into the classification dictionary return. The classification dictionary is now `{'MyTransientId01': ['Type', 'Annotation'], 'MyTransientId02': ['Type', 'Annotation'],}`
- **REFACTOR**: small change to query that writes NED source magnitudes that vastly improves speed
- **FIXED**: small issue where a missing error in photoz was causing annotations to not complete

v2.1.5 - June 22, 2020

- **refactor**: tunnel changes due to new jump box installation at QUB
- **fixed:** some NED galaxies not reported if redshift does not exist but a semi-major axis is given

v2.1.4 - June 18, 2020

- **fixed**: an empty crossmatch set could cause a transient database update when not required

v2.1.3 - June 5, 2020

- **refactor**: stop sherlock checking for transient database triggers if running in non-update mode
- **fixed**: another sdss photoz issue where photoz ranking about specz

v2.1.2 - May 24, 2020

- **fixed:** merged result parameters are now merged correctly

v2.1.1 - May 21, 2020

- **fixed:** fixes to cl utils

v2.1.0 - May 20, 2020

- Now compatible with Python 3.*

CHAPTER

TWO

API REFERENCE

2.1 Modules

sherlock.commonutils	*common tools used throughout package*
sherlock.imports	
sherlock.utKit	*Unit testing tools*

2.1.1 commonutils *(module)*

common tools used throughout package

Classes

update_wiki_pages(log[, settings])	*Update sherlock's github wiki pages with some useful info regarding the crossmatch database catalogue tables*

Functions

get_crossmatch_catalogues_column_map(dbConn, log)	*Query the sherlock-catalogues helper tables to generate a map of the important columns of each catalogue*
getpackagepath()	*Get the root path for this python package - used in unit testing code*

Sub-modules

get_crossmatch_catalogues_column_map(dbConn, log)	*Query the sherlock-catalogues helper tables to generate a map of the important columns of each catalogue*
getpackagepath()	*Get the root path for this python package - used in unit testing code*

continues on next page

Table 4 – continued from previous page

update_wiki_pages(log[, settings])	*Update sherlock's github wiki pages with some useful info regarding the crossmatch database catalogue tables*

2.1.2 imports *(module)*

Classes

ifs(log[, settings, pathToDataFile, ...])	*Importer for the Multi Unit Spectroscopic Explorer (MUSE) IFS galaxy catalogue stream*
ned(log[, settings, pathToDataFile, ...])	*Using a list of coordinates, query the online NED database and import sources found within a given search radius of each of the loctions into the sherlock-catalogues database*
ned_d(log[, settings, pathToDataFile, ...])	*Import the * `NED-D <https://ned.ipac.caltech.edu/Library/Distances/>`_ *galaxy catalogue in to the sherlock-catalogues database*
veron(log[, settings, pathToDataFile, ...])	*importer object for the VERON AGN catalogue*

Sub-modules

ifs(log[, settings, pathToDataFile, ...])	*Importer for the Multi Unit Spectroscopic Explorer (MUSE) IFS galaxy catalogue stream*
ned(log[, settings, pathToDataFile, ...])	*Using a list of coordinates, query the online NED database and import sources found within a given search radius of each of the loctions into the sherlock-catalogues database*
ned_d(log[, settings, pathToDataFile, ...])	*Import the * `NED-D <https://ned.ipac.caltech.edu/Library/Distances/>`_ *galaxy catalogue in to the sherlock-catalogues database*
veron(log[, settings, pathToDataFile, ...])	*importer object for the VERON AGN catalogue*

2.1.3 utKit *(module)*

Unit testing tools

Classes

utKit(moduleDirectory[, dbConn])	*Override dryx utKit*

Sub-modules

utKit(moduleDirectory[, dbConn])	*Override dryx utKit*

class utKit(*moduleDirectory*, *dbConn=False*)

Bases: fundamentals.utKit.utKit

Override dryx utKit

get_project_root()

Get the root of the ``python`` package - useful for getting files in the root directory of a project

Return

- rootPath – the root path of a project

refresh_database()

Refresh the unit test database

setupModule()

The setupModule method

Return

- log – a logger
- dbConn – a database connection to a test database (details from yaml settings file)
- pathToInputDir – path to modules own test input directory
- pathToOutputDir – path to modules own test output directory

tearDownModule()

The tearDownModule method

2.2 Classes

sherlock.catalogue_conesearch	*The worker class for the conesearch module*
sherlock.commonutils.update_wiki_pages	*Update sherlock's github wiki pages with some useful info regarding the crossmatch database catalogue tables*
sherlock.database	*the database object for sherlock, setting up ssh tunnels and various database connections*
sherlock.database_cleaner	*Clean and maintain the database helper tables used by sherlock*

continues on next page

Table 9 – continued from previous page

sherlock.imports.ifs	*Importer for the Multi Unit Spectroscopic Explorer (MUSE) IFS galaxy catalogue stream*
sherlock.imports.ned	*Using a list of coordinates, query the online NED database and import sources found within a given search radius of each of the loctions into the sherlock-catalogues database*
sherlock.imports.ned_d	*Import the * `NED-D <https://ned.ipac.caltech.edu/Library/Distances/>`_ *galaxy catalogue in to the sherlock-catalogues database*
sherlock.imports.veron	*importer object for the VERON AGN catalogue*
sherlock.transient_catalogue_crossmatch	*crossmatch a list of transients against a suite of catalogues according to given search algorithm*
sherlock.transient_classifier	*The Sherlock Transient Classifier*

2.2.1 catalogue_conesearch *(class)*

class catalogue_conesearch(*log*, *ra*, *dec*, *tableName*, *radiusArcsec*, *colMaps*, *dbConn=False*, *nearestOnly=False*, *physicalSearch=False*, *upperMagnitudeLimit=False*, *lowerMagnitudeLimit=False*, *magnitudeLimitFilter=False*)

Bases: object

The worker class for the conesearch module

Key Arguments

- dbConn – mysql database connection to the catalogues database
- log – logger
- ra – ra of transient location (sexegesimal or decimal degrees, J2000, single location or list of locations)
- dec – dec of transient location (sexegesimal or decimal degrees, J2000, single location or list of locations)
- tableName – the name of the database table to perform the conesearch on
- radius – radius of the conesearch to perform (arcsec)
- colMaps – maps of the important column names for each table/view in the crossmatch-catalogues database
- nearestOnly – return only the nearest object. Default *False*
- physicalSearch – is this a physical search, so only return matches with distance information. Default *False*
- upperMagnitudeLimit – the upper magnitude limit if a magnitude cut is requird with the conesearch. Default *False*
  - lowerMagnitudeLimit – the lower magnitude limit if a magnitude cut is requird with the conesearch. Default *False*
  - magnitudeLimitFilter – the filter to use for the magnitude limit if requird. Default *False*, ("_u"|"_g"|"_r"|"_i"|"_z"|"_y"|"U"|"B"|"V"|"R"|"I"|"Z"|"J"|"H"|"K"|"G")

Usage

To setup your logger, settings and database connections, please use the fundamentals package (see tutorial here).

Todo:

- update the package tutorial if needed

The following examples assume you've connected to the various databases and generated the catalogue column maps in the following menner:

```
# SETUP ALL DATABASE CONNECTIONS
from sherlock import database
db = database(
    log=log,
    settings=settings
)
dbConns, dbVersions = db.connect()
transientsDbConn = dbConns["transients"]
cataloguesDbConn = dbConns["catalogues"]

# GET THE COLUMN MAPS FROM THE CATALOGUE DATABASE
from sherlock.commonutils import get_crossmatch_catalogues_column_map
colMaps = get_crossmatch_catalogues_column_map(
    log=log,
    dbConn=cataloguesDbConn
)
```

To perform a single location conesearch on a catalogue in the database, for example the milliquas AGN catalogue:

```
from sherlock import catalogue_conesearch
cs = catalogue_conesearch(
    log=log,
    ra="23:01:07.99",
    dec="-01:58:04.5",
    radiusArcsec=60.,
    colMaps=colMaps,
    tableName="tcs_view_agn_milliquas_v4_5",
    dbConn=cataloguesDbConn,
    nearestOnly=False,
    physicalSearch=False
)
# catalogueMatches ARE ORDERED BY ANGULAR SEPARATION
indices, catalogueMatches = cs.search()

print(catalogueMatches)
```

The output of this search is:

```
[{'R': 20.1, 'cmSepArcsec': 0.28015184686564643, 'ra': 345.2832267, 'catalogue_
↪object_subtype': u'QR', 'z': 0.777, 'dec': -1.9679629, 'catalogue_object_id': u
↪'PKS 2258-022'}]
```

Note `catalogue_conesearch` can accept coordinates in sexegesimal or decimal degrees (J200). It can also accept lists of corrdinates:

```
from sherlock import catalogue_conesearch
cs = catalogue_conesearch(
    log=log,
```

(continues on next page)

(continued from previous page)

```
    ra=["23:01:07.99", 45.36722, 13.875250],
    dec=["-01:58:04.5", 30.45671, -25.26721],
    radiusArcsec=60.,


        colMaps=colMaps,
        tableName="tcs_view_agn_milliquas_v4_5",
        dbConn=cataloguesDbConn,
        nearestOnly=False,
        physicalSearch=False
    )
```

```
When passing a list of transient coordinates the returned ``indices`` value␣
↪becomes important as this list identifies which transient is matched with which␣
↪crossmatch results (and possibly multiple crossmatch results)

```python
indices, catalogueMatches = cs.search()
for i, c in zip(indices, catalogueMatches):
    print(i, c)
```

The output of this search is:

```text
0 {'R': 20.1, 'cmSepArcsec': 0.28015184686564643, 'ra': 345.2832267, 'catalogue_
↪object_subtype': u'QR', 'z': 0.777, 'dec': -1.9679629, 'catalogue_object_id': u
↪'PKS 2258-022'}
2 {'R': 19.2, 'cmSepArcsec': 0.81509715903447644, 'ra': 13.875, 'catalogue_object_
↪subtype': u'Q', 'z': 2.7, 'dec': -25.2672223, 'catalogue_object_id': u'Q 0053-
↪2532'}
```
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

Methods

search()	*trigger the conesearch*

search()
trigger the conesearch

Return

- matchIndies – the indicies of the input transient sources (syncs with uniqueMatchDicts)
- uniqueMatchDicts – the crossmatch results

Usage

See class docstring for usage examples

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
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```

2.2.2 update_wiki_pages *(class)*

class update_wiki_pages(*log*, *settings=False*)

Bases: object

Update sherlock's github wiki pages with some useful info regarding the crossmatch database catalogue tables

Key Arguments

- log – logger
- settings – the settings dictionary

Usage

To trigger an update of sherlock's wiki pages to give an overview of the crossmatch table database tables run the following:

```
from sherlock.commonutils import update_wiki_pages
wiki = update_wiki_pages(
    log=log,
    settings=settings
)
wiki.update()
```

```
- create a new script for updating sherlock wiki with the snippet above, remove␣
↪wiki command from cl-utils and add stand alone scripts to the sherlock repo␣
↪(cleans up the usage and docs for sherlock)
- harvest text from wiki pages and then delete them: https://github.com/
↪thespacedoctor/sherlock/wiki
```

Methods

update()	Update wiki pages

update()

Update wiki pages

See class docstring for usage

2.2.3 database *(class)*

class database(*log*, *settings=False*)

Bases: object

the database object for sherlock, setting up ssh tunnels and various database connections

The returned dictionary of database connections contain the following databases:

- transients – the database hosting the transient source data
- catalogues – connection to the database hosting the contextual catalogues the transients are to be crossmatched against

Key Arguments

- log – logger
- settings – the settings dictionary

Return

- dbConns – a dictionary of the database connections required by sherlock

Usage

To setup the sherlock database connections, run the following:

```
# SETUP ALL DATABASE CONNECTIONS
from sherlock import database
db = database(
    log=log,
    settings=settings
)
dbConns, dbVersions = db.connect()
transientsDbConn = dbConns["transients"]
cataloguesDbConn = dbConns["catalogues"]
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

Methods

connect()	connect to the various databases, the credientals and settings of which are found in the sherlock settings file

connect()

connect to the various databases, the credientals and settings of which are found in the sherlock settings file

Return

- transientsDbConn – the database hosting the transient source data

- `cataloguesDbConn` – connection to the database hosting the contextual catalogues the transients are to be crossmatched against

See the class docstring for usage

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

2.2.4 database_cleaner *(class)*

class database_cleaner(*log*, *settings=False*)

Bases: `object`

Clean and maintain the database helper tables used by sherlock

The helper tables list row counts for tables and views and provide the column maps that help sherlock know which catalogue columns relate to which parameters (e.g. RA, DEC etc)

Key Arguments

- `dbConn` – mysql database connection
- `log` – logger
- `settings` – the settings dictionary

Usage

Todo:

- add an entry in the tutorial to clean database tables

```python from sherlock.database_cleaner import database_cleaner db = database_cleaner(

log=log, settings=settings

) db.clean() ```

---


```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```
```

Methods

clean()	*clean up and run some maintance tasks on the crossmatch catalogue helper tables*

clean()
clean up and run some maintance tasks on the crossmatch catalogue helper tables

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

2.2.5 ifs *(class)*

class ifs(*log*, *settings=False*, *pathToDataFile=False*, *version=False*, *catalogueName=''*, *coordinateList=[]*, *radiusArcsec=False*)
Bases: sherlock.imports._base_importer._base_importer

Importer for the Multi Unit Spectroscopic Explorer (MUSE) IFS galaxy catalogue stream

Key Arguments

- log – logger
- settings – the settings dictionary

Usage

To import the IFS catalogue stream into the sherlock-catalogues database, run the following:

```
from sherlock.imports import IFS
```

```
stream = IFS(
    log=log,
    settings=settings
)
stream.ingest()
```

```
- abstract this module out into its own stand alone script
- check sublime snippet exists
```

Methods

add_data_to_database_table(dictList[, ...])	*Import data in the list of dictionaries in the requested database table*
ingest()	*Import the IFS catalogue into the sherlock-catalogues database*

add_data_to_database_table(*dictList*, *createStatement=False*)

Import data in the list of dictionaries in the requested database table

Also adds HTMIDs and updates the sherlock-catalogue database helper table with the time-stamp of when the imported catlogue was last updated

Key Arguments

- `dictList` - a list of dictionaries containing all the rows in the catalogue to be imported
- `createStatement` - the table's mysql create statement (used to generate table if it does not yet exist in database). Default *False*

Usage

```
self.add_data_to_database_table(
    dictList=dictList,
    createStatement=createStatement
)
```

```
- Write a checklist for creating a new sherlock database importer
```

ingest()

Import the IFS catalogue into the sherlock-catalogues database

The method first generates a list of python dictionaries from the IFS datafile, imports this list of dictionaries into a database table and then generates the HTMIDs for that table.

Usage

See class docstring for usage

2.2.6 ned *(class)*

class ned(*log*, *settings=False*, *pathToDataFile=False*, *version=False*, *catalogueName=''*, *coordinateList=[]*, *radiusArcsec=False*)

Bases: `sherlock.imports._base_importer._base_importer`

Using a list of coordinates, query the online NED *database and import sources found within a given search radius of each of the loctions into the sherlock-catalogues database*

The code:

```
1. Uses the list of transient coordinates and queries NED (conesearch) for the␣
↪results within the given search radius
2. Creates the `tcs_cat_ned_stream` table if it doesn't exist
3. Adds the resulting matched NED IDs/Names to the `tcs_cat_ned_stream` table
4. Updates the NED query history table
5. Queris NED via NED IDs (object search) for the remaining source metadata to be␣
↪added to the `tcs_cat_ned_stream` table
```

Note it's up to the user to filter the input coordinate list by checking whether or not the same area of the sky has been imported into the `tcs_cat_ned_stream` table recently (by checking the `tcs_helper_ned_query_history` table)

Key Arguments

- `dbConn` – mysql database connection
- `log` – logger
- `settings` – the settings dictionary

- `coordinateList` – list of coordinates (a list of strings with RA and DEC space separated)
- `radiusArcsec` - - the radius in arcsec with which to perform the initial NED conesearch. Default * False*

Usage

To import the ned catalogue stream, run the following:

```
from sherlock.imports import ned
```

```
stream = ned(
    log=log,
    settings=settings,
    coordinateList=["23.12323 -12.34343","345.43234 45.26789"],
    radiusArcsec=180
)
stream.ingest()
```

```
- test this code is still working after changes
- add option to filter coordinate list via the `tcs_helper_ned_query_history`␣
↪table
- check sublime snippet exists
- clip any useful text to docs mindmap
```

Methods

`add_data_to_database_table`(dictList[, ...])	*Import data in the list of dictionaries in the requested database table*
`ingest`()	*Perform conesearches of the online NED database and import the results into a the sherlock-database*

`add_data_to_database_table`(*dictList*, *createStatement=False*)
Import data in the list of dictionaries in the requested database table

Also adds HTMIDs and updates the sherlock-catalogue database helper table with the time-stamp of when the imported catlogue was last updated

Key Arguments

- `dictList` - a list of dictionaries containing all the rows in the catalogue to be imported
- `createStatement` - the table's mysql create statement (used to generate table if it does not yet exist in database). Default *False*

Usage

```
self.add_data_to_database_table(
    dictList=dictList,
    createStatement=createStatement
)
```

```
- Write a checklist for creating a new sherlock database importer
```

`ingest`()
Perform conesearches of the online NED database and import the results into a the sherlock-database

The code:

```
1. uses the list of transient coordinates and queries NED for the results␣
↪within the given search radius
2. Creates the `tcs_cat_ned_stream` table if it doesn't exist
3. Adds the resulting NED IDs/Names to the `tcs_cat_ned_stream` table
4. Updates the NED query history table
5. Queris NED via NED IDs for the remaining source metadata to be added to␣
↪the `tcs_cat_ned_stream` table
```

Usage

Having setup the NED object with a coordinate list and cone-search radius, run the `ingest()` method

```
stream.ingest()
```

```
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

2.2.7 ned_d *(class)*

class ned_d(*log*, *settings=False*, *pathToDataFile=False*, *version=False*, *catalogueName=''*, *coordinateList=[]*, *radiusArcsec=False*)

Bases: `sherlock.imports._base_importer._base_importer`

*Import the * `NED-D <https://ned.ipac.caltech.edu/Library/Distances/>`_ *galaxy catalogue in to the sherlock-catalogues database*

Key Arguments

- `log` – logger
- `settings` – the settings dictionary
- `pathToDataFile` – path to the ned_d data file
- `version` – version of the ned_d catalogue
- `catalogueName` – the name of the catalogue

Usage

To import the ned_d catalogue catalogue, run the following:

```
from sherlock.imports import ned_d
catalogue = ned_d(
    log=log,
    settings=settings,
    pathToDataFile="/path/to/ned_d.txt",
    version="1.0",
    catalogueName="ned_d"
)
catalogue.ingest()
```

```
- abstract this module out into its own stand alone script
```

Methods

add_data_to_database_table(dictList[, ...])	*Import data in the list of dictionaries in the requested database table*
ingest()	Import the ned_d catalogue into the catalogues database

add_data_to_database_table(*dictList*, *createStatement=False*)
Import data in the list of dictionaries in the requested database table

Also adds HTMIDs and updates the sherlock-catalogue database helper table with the time-stamp of when the imported catlogue was last updated

Key Arguments

- `dictList` - a list of dictionaries containing all the rows in the catalogue to be imported
- `createStatement` - the table's mysql create statement (used to generate table if it does not yet exist in database). Default *False*

Usage

```
self.add_data_to_database_table(
    dictList=dictList,
    createStatement=createStatement
)
```

```
- Write a checklist for creating a new sherlock database importer
```

ingest()
Import the ned_d catalogue into the catalogues database

The method first generates a list of python dictionaries from the ned_d datafile, imports this list of dictionaries into a database table and then generates the HTMIDs for that table.

Usage

See class docstring for usage

```
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

2.2.8 veron *(class)*

class veron(*log*, *settings=False*, *pathToDataFile=False*, *version=False*, *catalogueName=''*, *coordinateList=[]*, *radiusArcsec=False*)
Bases: `sherlock.imports._base_importer._base_importer`

importer object for the VERON AGN catalogue

Key Arguments

- `dbConn` – mysql database connection
- `log` – logger
- `settings` – the settings dictionary

- `pathToDataFIle` – path to the veron data file
- `version` – version of the veron catalogue

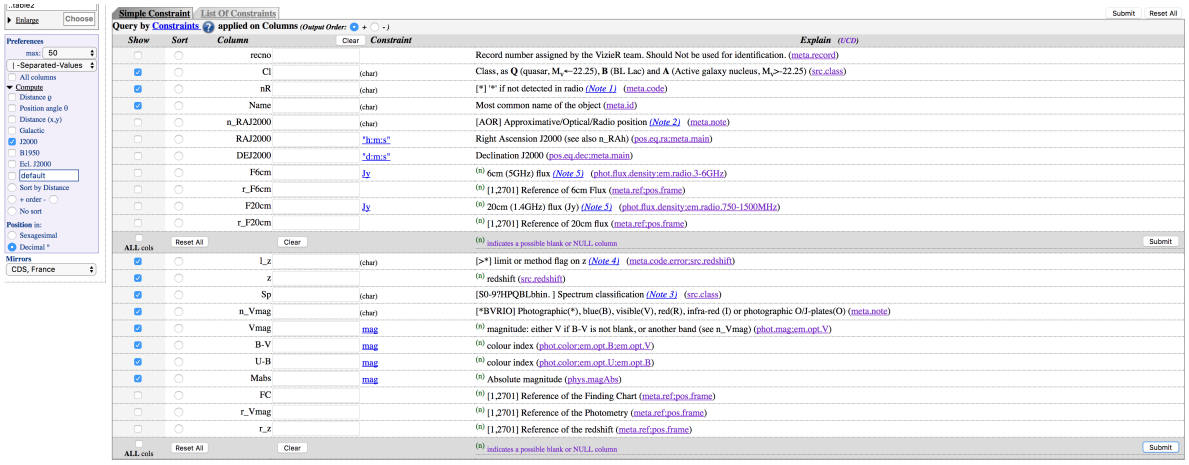
Usage

To import the veron catalogue catalogue, run the following:

```
from sherlock.imports import veron
```

```
catalogue = veron(
    log=log,
    settings=settings,
    pathToDataFile="/path/to/veron.txt",
    version="1.0",
    catalogueName="veron"
)
catalogue.ingest()
```

Whenever downloading a version of the Veron catalogue from Vizier use the following column selection:




```
- abstract this module out into its own stand alone script
- add ppmxl to stand-alone import scripts
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

Methods

`add_data_to_database_table`(dictList[, ...])	*Import data in the list of dictionaries in the requested database table*
`ingest`()	ingest the veron catalogue into the catalogues database

`add_data_to_database_table`(*dictList*, *createStatement=False*)
Import data in the list of dictionaries in the requested database table

Also adds HTMIDs and updates the sherlock-catalogue database helper table with the time-stamp of when the imported catlogue was last updated

Key Arguments

- `dictList` - a list of dictionaries containing all the rows in the catalogue to be imported
- `createStatement` - the table's mysql create statement (used to generate table if it does not yet exist in database). Default *False*

Usage

```
self.add_data_to_database_table(
    dictList=dictList,
    createStatement=createStatement
)
```

```
- Write a checklist for creating a new sherlock database importer
```

`ingest`()
ingest the veron catalogue into the catalogues database

See class docstring for usage.

2.2.9 transient_catalogue_crossmatch *(class)*

`class transient_catalogue_crossmatch`(*log*, *settings=False*, *colMaps=False*, *transients=[]*, *dbSettings=False*, *dbConn=False*)

Bases: `object`

crossmatch a list of transients against a suite of catalogues according to given search algorithm

Key Arguments

- `dbConn` – mysql database connection for the catalogues
- `log` – logger
- `settings` – the settings dictionary
- `colMaps` – maps of the important column names for each table/view in the crossmatch-catalogues database
- `transients` – the list of transients

Usage

To setup your logger, settings and database connections, please use the `fundamentals` package (see tutorial here).

To initiate a transient_catalogue_crossmatch object, use the following:

```
from sherlock import transient_catalogue_crossmatch
xmatcher = transient_catalogue_crossmatch(
    log=log,
    settings=settings,
    colMaps=colMaps,
    transients=transients,
    dbSettings=settings["database settings"]["static catalogues"]
)
```

Then to run the transient through the search algorithm found in the settings file, use the `match` method:

```
classifications = xmatcher.match()
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

Methods

`angular_crossmatch_against_catalogue(objectList)`	*perform an angular separation crossmatch against a given catalogue in the database and annotate the crossmatch with some value added parameters (distances, physical separations, sub-type of transient etc)*
`match()`	*match the transients against the sherlock-catalogues according to the search algorithm and return matches alongside the predicted classification(s)*
`physical_separation_crossmatch_against_catalogue(objectList)`	*perform a physical separation crossmatch against a given catalogue in the database*

angular_crossmatch_against_catalogue(*objectList*, *searchPara={}*, *search_name=''*, *brightnessFilter=False*, *physicalSearch=False*, *classificationType=False*)

perform an angular separation crossmatch against a given catalogue in the database and annotate the crossmatch with some value added parameters (distances, physical separations, sub-type of transient etc)

Key Arguments

- `objectList` – the list of transient locations to match against the crossmatch catalogue
- `searchPara` – the search parameters for this individual search as lifted from the search algorithm in the sherlock settings file
- `search_name` – the name of the search as given in the sherlock settings file
- `brightnessFilter` – is this search to be constrained by magnitude of the catalogue sources? Default *False*. [bright|faint|general]
- `physicalSearch` – is this angular search a sub-part of a physical separation search
- `classificationType` – synonym, association or annotation. Default *False*

Return

```
- matchedObjects -- any sources matched against the object
```

Usage

Take a list of transients from somewhere

```
transients = [
    {'ps1_designation': u'PS1-14aef',
     'name': u'4L3Piiq',
     'detection_list_id': 2,
     'local_comments': u'',
     'ra': 0.02548233704918263,
     'followup_id': 2065412L,
     'dec': -4.284933417540423,
     'id': 100000611004170570OL,
     'object_classification': 0L
     },

    {'ps1_designation': u'PS1-13dcr',
     'name': u'3I3Phzx',
     'detection_list_id': 2,
     'local_comments': u'',
     'ra': 4.754236999477372,
     'followup_id': 1140386L,
     'dec': 28.276703631398625,
     'id': 100190101128163610OL,
     'object_classification': 0L
     },

    {'ps1_designation': u'PS1-13dhc',
     'name': u'3I3Pixd',
     'detection_list_id': 2,
     'local_comments': u'',
     'ra': 1.3324973428505413,
     'followup_id': 1202386L,
     'dec': 32.98869220595689,
     'id': 100051979132591920OL,
     'object_classification': 0L
     }
]
```

Then run the `angular_crossmatch_against_catalogue` method to crossmatch against the catalogues and return results:

```
# ANGULAR CONESEARCH ON CATALOGUE
search_name = "ned_d spec sn"
searchPara = self.settings["search algorithm"][search_name]
matchedObjects = xmatcher.angular_crossmatch_against_catalogue(
    objectList=transients,
    searchPara=searchPara,
    search_name=search_name
)
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
```

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```
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

match()

match the transients against the sherlock-catalogues according to the search algorithm and return matches alongside the predicted classification(s)

Return

- `classification` – the crossmatch results and classifications assigned to the transients

See the class docstring for usage.

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

physical_separation_crossmatch_against_catalogue(*objectList*, *searchPara*, *search_name*, *brightnessFilter=False*, *classificationType=False*)

perform an physical separation crossmatch against a given catalogue in the database

This search is basically the same as the angular separation search except extra filtering is done to exclude sources outside the physical search radius (matched sources require distance info to calulate physical separations)

Key Arguments

- `objectList` – transients to be crossmatched
- `searchPara` – parameters of the search (from settings file)
- `search_name` – the name of the search
- `brightnessFilter` – is this search to be constrained by magnitude of the catalogue sources? Default *False*. [bright|faint|general]
- `classificationType` – synonym, association or annotation. Default *False*

Return

- matchedObjects – any sources matched against the object

To run a physical separation crossmatch, run in a similar way to the angular separation crossmatch:

Usage

```
search_name = "ned spec sn"
searchPara = self.settings["search algorithm"][search_name]
matchedObjects = xmatcher.physical_separation_crossmatch_against_catalogue(
    objectList=transients,
    searchPara=searchPara,
```

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```
    search_name=search_name
)
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

2.2.10 transient_classifier *(class)*

class transient_classifier(*log*, *settings=False*, *update=False*, *ra=False*, *dec=False*, *name=False*, *verbose=0*, *updateNed=True*, *daemonMode=False*, *updatePeakMags=True*, *oneRun=False*, *lite=False*)

Bases: `object`

The Sherlock Transient Classifier

Key Arguments

- `log` – logger
- `settings` – the settings dictionary
- `update` – update the transient database with crossmatch results (boolean)
- `ra` – right ascension of a single transient source. Default *False*
- `dec` – declination of a single transient source. Default *False*
- `name` – the ID of a single transient source. Default *False*
- `verbose` – amount of details to print about crossmatches to stdout. 0|1|2 Default *0*
- `updateNed` – update the local NED database before running the classifier. Classification will not be as accuracte the NED database is not up-to-date. Default *True*.
- `daemonMode` – run sherlock in daemon mode. In daemon mode sherlock remains live and classifies sources as they come into the database. Default *True*
- `updatePeakMags` – update peak magnitudes in human-readable annotation of objects (can take some time - best to run occationally)
- `lite` – return only a lite version of the results with the topped ranked matches only. Default *False*
- `oneRun` – only process one batch of transients, usful for unit testing. Default *False*

Usage

To setup your logger, settings and database connections, please use the `fundamentals` package (see tutorial here).

To initiate a transient_classifier object, use the following:

Todo:

- update the package tutorial if needed

The sherlock classifier can be run in one of two ways. The first is to pass into the coordinates of an object you wish to classify:

```
from sherlock import transient_classifier
classifier = transient_classifier(
    log=log,
    settings=settings,
    ra="08:57:57.19",
    dec="+43:25:44.1",
    name="PS17gx",
    verbose=0
)
classifications, crossmatches = classifier.classify()
```

The crossmatches returned are a list of dictionaries giving details of the crossmatched sources. The classifications returned are a list of classifications resulting from these crossmatches. The lists are ordered from most to least likely classification and the indicies for the crossmatch and the classification lists are synced.

The second way to run the classifier is to not pass in a coordinate set and therefore cause sherlock to run the classifier on the transient database referenced in the sherlock settings file:

```
from sherlock import transient_classifier
classifier = transient_classifier(
    log=log,
    settings=settings,
    update=True
)
classifier.classify()
```

Here the transient list is selected out of the database using the `transient query` value in the settings file:

```
database settings:
    transients:
        user: myusername
        password: mypassword
        db: nice_transients
        host: 127.0.0.1
        transient table: transientBucket
        transient query: "select primaryKeyId as 'id', transientBucketId as 'alt_
↪id', raDeg 'ra', decDeg 'dec', name 'name', sherlockClassification as 'object_
↪classification'
            from transientBucket where object_classification is null
        transient primary id column: primaryKeyId
        transient classification column: sherlockClassification
        tunnel: False
```

By setting `update=True` the classifier will update the `sherlockClassification` column of the `transient table` with new classification and populate the `sherlock_crossmatches` table with key details of the crossmatched sources from the catalogues database. By setting `update=False` results are printed to stdout but the database is not updated (useful for dry runs and testing new algorithms),

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
```

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```
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

Methods

classification_annotations()	*add a detialed classification annotation to each classification in the sherlock_classifications table*
classify()	*classify the transients selected from the transient selection query in the settings file or passed in via the CL or other code*
generate_match_annotation(match[, ...])	*generate a human readale annotation for the transient-catalogue source match*
update_classification_annotations_and_summaries()	*update classification annotations and summaries*
update_peak_magnitudes()	*update peak magnitudes*

classification_annotations()
add a detialed classification annotation to each classification in the sherlock_classifications table

Key Arguments

•

=

Return

- None

Usage

Todo:

- add usage info
- create a sublime snippet for usage
- write a command-line tool for this method
- update package tutorial with command-line tool info if needed

---

```
usage code
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

classify()
classify the transients selected from the transient selection query in the settings file or passed in via the CL or other code

Return

- `crossmatches` – list of dictionaries of crossmatched associated sources
- `classifications` – the classifications assigned to the transients post-crossmatches (dictionary of rank ordered list of classifications)

See class docstring for usage.

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

generate_match_annotation(*match*, *updatePeakMagnitudes=False*)

generate a human readale annotation for the transient-catalogue source match

Key Arguments

- `match` – the source crossmatched against the transient
- `updatePeakMagnitudes` – update the peak magnitudes in the annotations to give absolute magnitudes. Default *False*

Return

- None

Usage

```
usage code
```

Todo:

- add usage info
- create a sublime snippet for usage
- write a command-line tool for this method
- update package tutorial with command-line tool info if needed

---

update_classification_annotations_and_summaries(*updatePeakMagnitudes=True*, *cl=False*, *crossmatches=False*, *classifications=False*)

update classification annotations and summaries

Key Arguments

- `updatePeakMagnitudes` – update the peak magnitudes in the annotations to give absolute magnitudes. Default *True*
- `cl` – reporting only to the command-line, do not update database. Default *False*
- `crossmatches` – crossmatches will be passed for the single classifications to report annotations from command-line
- `classifications` – classifications will be passed for the single classifications to have annotation appended to the dictionary for stand-alone non-database scripts

Return

- None

Usage

Todo:

- add usage info
- create a sublime snippet for usage
- write a command-line tool for this method
- update package tutorial with command-line tool info if needed

---

```
usage code
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

update_peak_magnitudes()
update peak magnitudes

Key Arguments

-

=

Return

- None

Usage

Todo:

- add usage info
- create a sublime snippet for usage
- write a command-line tool for this method
- update package tutorial with command-line tool info if needed

---

```
usage code
```

```
- update key arguments values and definitions with defaults
- update return values and definitions
- update usage examples and text
- update docstring text
- check sublime snippet exists
- clip any useful text to docs mindmap
- regenerate the docs and check redendering of this docstring
```

2.3 Functions

sherlock.commonutils.get_crossmatch_catalogues_column_map	*Query the sherlock-catalogues helper tables to generate a map of the important columns of each catalogue*
sherlock.commonutils.getpackagepath	*Get the root path for this python package - used in unit testing code*

2.3.1 get_crossmatch_catalogues_column_map (*function*)

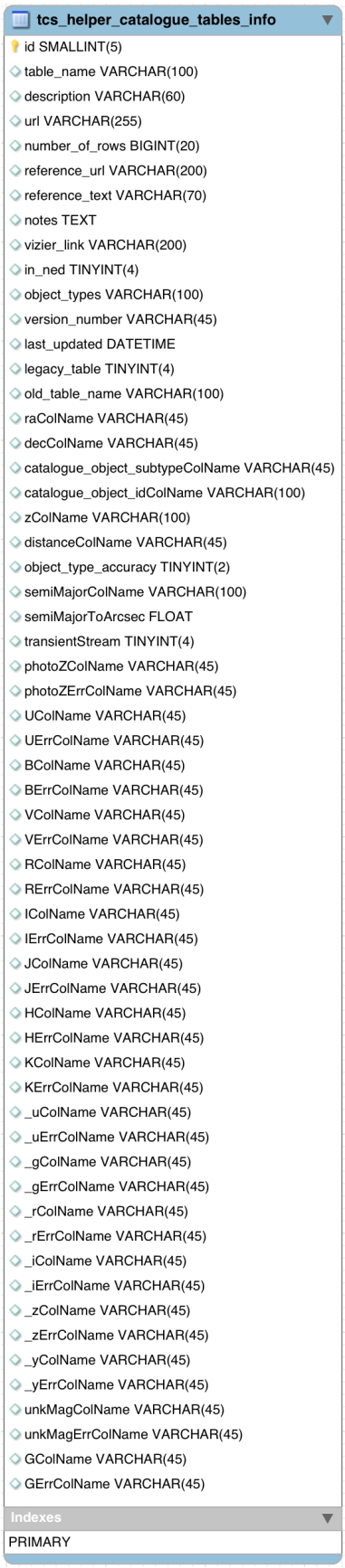
get_crossmatch_catalogues_column_map(*dbConn*, *log*)

Query the sherlock-catalogues helper tables to generate a map of the important columns of each catalogue

Within your sherlock-catalogues database you need to manually map the inhomogeneous column-names from the sherlock-catalogues to an internal homogeneous name-set which includes *ra*, *dec*, *redshift*, *object name*, *magnitude*, *filter* etc. The column-name map is set within the two database helper tables called `tcs_helper_catalogue_views_info` and `tcs_helper_catalogue_views_info`. See the *'Checklist for Adding A New Reference Catalogue to the Sherlock Catalogues Database'* for more information.

Todo:

- write a checklist for adding a new catalogue to the sherlock database and reference it from here (use the image below of the tcs_helper_catalogue_views_info table)


tcs_helper_catalogue_tables_info
id SMALLINT(5)
table_name VARCHAR(100)
description VARCHAR(60)
url VARCHAR(255)
number_of_rows BIGINT(20)
reference_url VARCHAR(200)
reference_text VARCHAR(70)
notes TEXT
vizier_link VARCHAR(200)
in_ned TINYINT(4)
object_types VARCHAR(100)
version_number VARCHAR(45)
last_updated DATETIME
legacy_table TINYINT(4)
old_table_name VARCHAR(100)
raColName VARCHAR(45)
decColName VARCHAR(45)
catalogue_object_subtypeColName VARCHAR(45)
catalogue_object_idColName VARCHAR(100)
zColName VARCHAR(100)
distanceColName VARCHAR(45)
object_type_accuracy TINYINT(2)
semiMajorColName VARCHAR(100)
semiMajorToArcsec FLOAT
transientStream TINYINT(4)
photoZColName VARCHAR(45)
photoZErrColName VARCHAR(45)
UColName VARCHAR(45)
UErrColName VARCHAR(45)
BColName VARCHAR(45)
BErrColName VARCHAR(45)
VColName VARCHAR(45)
VErrColName VARCHAR(45)
RColName VARCHAR(45)
RErrColName VARCHAR(45)
IColName VARCHAR(45)
IErrColName VARCHAR(45)
JColName VARCHAR(45)
JErrColName VARCHAR(45)
HColName VARCHAR(45)
HErrColName VARCHAR(45)
KColName VARCHAR(45)
KErrColName VARCHAR(45)
_uColName VARCHAR(45)
_uErrColName VARCHAR(45)
_gColName VARCHAR(45)
_gErrColName VARCHAR(45)
_rColName VARCHAR(45)
_rErrColName VARCHAR(45)
_iColName VARCHAR(45)
_iErrColName VARCHAR(45)
_zColName VARCHAR(45)
_zErrColName VARCHAR(45)
_yColName VARCHAR(45)
_yErrColName VARCHAR(45)
unkMagColName VARCHAR(45)
unkMagErrColName VARCHAR(45)
GColName VARCHAR(45)
GErrColName VARCHAR(45)
Indexes
PRIMARY

Key Arguments

- `dbConn` – the sherlock-catalogues database connection
- `log` – logger

Return

- `colMaps` – dictionary of dictionaries with the name of the database-view (e.g. `tcs_view_agn_milliquas_v4_5`) as the key and the column-name dictary map as value (`{view_name: {columnMap}}`).

Usage

To collect the column map dictionary of dictionaries from the catalogues database, use the `get_crossmatch_catalogues_column_map` function:

```
from sherlock.commonutils import get_crossmatch_catalogues_column_map
colMaps = get_crossmatch_catalogues_column_map(
    log=log,
    dbConn=cataloguesDbConn
)
```

2.3.2 getpackagepath (*function*)

getpackagepath()
Get the root path for this python package - used in unit testing code

2.4 A-Z Index

Modules

sherlock.commonutils	*common tools used throughout package*
sherlock.imports	
sherlock.utKit	*Unit testing tools*

Classes

sherlock.catalogue_conesearch	*The worker class for the conesearch module*
sherlock.commonutils.update_wiki_pages	*Update sherlock's github wiki pages with some useful info regarding the crossmatch database catalogue tables*
sherlock.database	*the database object for sherlock, setting up ssh tunnels and various database connections*
sherlock.database_cleaner	*Clean and maintain the database helper tables used by sherlock*
sherlock.imports.ifs	*Importer for the Multi Unit Spectroscopic Explorer (MUSE) IFS galaxy catalogue stream*

continues on next page

Table 22 – continued from previous page

sherlock.imports.ned	*Using a list of coordinates, query the online NED database and import sources found within a given search radius of each of the loctions into the sherlock-catalogues database*
sherlock.imports.ned_d	*Import the * `NED-D <https://ned.ipac.caltech.edu/Library/Distances/>`_ *galaxy catalogue in to the sherlock-catalogues database*
sherlock.imports.veron	*importer object for the VERON AGN catalogue*
sherlock.transient_catalogue_crossmatch	*crossmatch a list of transients against a suite of catalogues according to given search algorithm*
sherlock.transient_classifier	*The Sherlock Transient Classifier*

Functions

sherlock.commonutils.get_crossmatch_catalogues_column_map	*Query the sherlock-catalogues helper tables to generate a map of the important columns of each catalogue*
sherlock.commonutils.getpackagepath	*Get the root path for this python package - used in unit testing code*

CHAPTER

THREE

RELEASE NOTES

v2.2.0 - August 2, 2021

- **FEATURE**: Default search algorithm now version-controlled and ship alongside code. Users can override the default algorithm if they need to.
- **FEATURE**: Hidden `database-batch-size` and `cpu-pool-size` settings added - power users can access and change in settings files.
- **ENHANCEMENT**: Speed improvements (5-10 times processing speed increase).
- **REFACTOR/FIX**: synonym match break now removed by default so a location now gets matched against all catalogues regardless of whether or not a synonym match is initially found (e.g. right on top of a catalogued star). Resolves edge cases where true SNe are mis-classified as VS as they are located just too close to a stellar source, or galaxy source mis-identified as stellar in one catalogue but correctly as galaxy in another.
- **FIX**: some URLs to NED objects, found in the human readable Sherlock annotations, that were not resolving now do.

v2.1.8 - April 16, 2021`#bugFixFriday`

- **REFACTOR**: catalogue quality weights now used *within* the merged source sets to sort the data. This fixed *some* mis-matched annotation issues.
- **REFACTOR**: updating db connection settings to use QUB jumpbox.
- **REFACTOR/FIX** Reduced associated source merging radius from 3 arcsec to 1 arcsec (1/9th of the original matching area). This seems to correct many of the cases in which 2 or more distinct catalogued sources were getting merged/blended into one association. This resulted in in-correct classification prediction and wrongly associated distances.
- **FIXED**: annotation mismatches. If transient is classified as a SN then the underlying sources is identified as a galaxy in the annotation.

v2.1.7 - September 29, 2020

- **FIXED**: lite version introduced a couple of small bugs. Fixed.

v2.1.6 - September 7, 2020

- **ENHANCEMENT**: transient human-readable annotations added to the `classifications` dictionary return of the `transient_classifier.classify()` method.
- **ENHANCEMENT**: a `lite` parameter has been added to the Sherlock `transient_classifier` object. When set to `True` only top-ranked crossmatches are returned with a limited column set.
- **ENHANCEMENT**: snapshot annotation is now added into the classification dictionary return. The classification dictionary is now `{'MyTransientId01': ['Type', 'Annotation'], 'MyTransientId02': ['Type', 'Annotation'],}`

- **REFACTOR**: small change to query that writes NED source magnitudes that vastly improves speed
- **FIXED**: small issue where a missing error in photoz was causing annotations to not complete

v2.1.5 - June 22, 2020

- **refactor**: tunnel changes due to new jump box installation at QUB
- **fixed:** some NED galaxies not reported if redshift does not exist but a semi-major axis is given

v2.1.4 - June 18, 2020

- **fixed**: an empty crossmatch set could cause a transient database update when not required

v2.1.3 - June 5, 2020

- **refactor**: stop sherlock checking for transient database triggers if running in non-update mode
- **fixed**: another sdss photoz issue where photoz ranking about specz

v2.1.2 - May 24, 2020

- **fixed:** merged result parameters are now merged correctly

v2.1.1 - May 21, 2020

- **fixed:** fixes to cl utils

v2.1.0 - May 20, 2020

- Now compatible with Python 3.*

PYTHON MODULE INDEX

INDEX

V