cawdrey

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A collection of useful custom dictionaries for Python.

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CHAPTER

ONE

CONTENTS

- frozendict: An immutable dictionary that cannot be changed after creation.
- FrozenOrderedDict: An immutable OrderedDict where the order of keys is preserved, but that cannot be changed after creation.
- AlphaDict: A FrozenOrderedDict where the keys are stored in alphabetical order.
- bdict: A dictionary where key, value pairs are stored both ways round.

This package also provides two base classes for creating your own custom dictionaries:

- FrozenBase: An Abstract Base Class for Frozen dictionaries.
- MutableBase: An Abstract Base Class for mutable dictionaries.

1.1 Other Dictionary Packages

If you're looking to unflatten a dictionary, such as to go from this:

```
{'foo.bar': 'val'}
```

to this:

```
{'foo': {'bar': 'val'}}
```

check out unflatten, flattery or morph to accomplish that.

indexed provides an OrederedDict where the values can be accessed by their index as well as by their keys.

There's also python-benedict, which provides a custom dictionary with **keylist/keypath** support, **I/O** shortcuts (Base64, CSV, JSON, TOML, XML, YAML, pickle, query-string) and many **utilities**.

1.2 And Finally:

```
Why Cawdrey?

cawdrey can be installed with pip:

$ pip install cawdrey

Browse the Source Code.

Browse the GitHub Repository
```

1.2.1 AlphaDict

About

Usage

API Reference

Provides AlphaDict, a frozen OrderedDict where the keys are stored alphabetically

```
class cawdrey.alphadict.AlphaDict(seq=None, **kwargs)
```

```
 \begin{array}{l} \textbf{copy} \ (*args, **kwargs) \\ \textbf{dict\_cls} \\ & \text{alias of collections.OrderedDict} \\ \textbf{classmethod fromkeys} \ (*args, **kwargs) \\ & \text{Returns a new dict with keys from iterable and values equal to value.} \\ \textbf{get} \ (k \big[, d \big]) \ \rightarrow D[k] \ \text{if k in D, else d. d defaults to None.} \\ \textbf{items} \ () \ \rightarrow \text{a set-like object providing a view on D's items} \\ \textbf{keys} \ () \ \rightarrow \text{a set-like object providing a view on D's keys} \\ \textbf{values} \ () \ \rightarrow \text{an object providing a view on D's values} \\ \texttt{cawdrey.alphadict.alphabetical\_dict} \ (**kwargs) \\ \end{array}
```

1.2.2 bdict

About

Usage

API Reference

```
class cawdrey.bdict.bdict(seq=None, **kwargs)
```

Returns a new dictionary initialized from an optional positional argument and a possibly empty set of keyword arguments.

Each key:value pair is entered into the dictionary in both directions, so you can perform lookups with either the key or the value.

If no positional argument is given, an empty dictionary is created. If a positional argument is given and it is a mapping object, a dictionary is created with the same key-value pairs as the mapping object. Otherwise, the positional argument must be an iterable object. Each item in the iterable must itself be an iterable with exactly two objects. The first object of each item becomes a key in the new dictionary, and the second object the corresponding value.

If keyword arguments are given, the keyword arguments and their values are added to the dictionary created from the positional argument.

If an attempt is made to add a key or value that already exists in the dictionary a ValueError will be raised

Keys or values of "None", "True" and "False" will be stored internally as "_None" "_True" and "_False" respectively

Based on https://stackoverflow.com/a/1063393 by https://stackoverflow.com/users/9493/brian

```
 \begin{aligned} &\textbf{clear}\,() \to \text{None. Remove all items from D.} \\ &\textbf{copy}\,() \\ &\textbf{classmethod fromkeys}\,(\textit{iterable}, \textit{value=None}) \\ &\textbf{get}\,(k\big[,d\big]) \to D[k] \text{ if k in D, else d. d defaults to None.} \\ &\textbf{items}\,() \to \text{a set-like object providing a view on D's items} \\ &\textbf{keys}\,() \to \text{a set-like object providing a view on D's keys} \\ &\textbf{pop}\,(k\big[,d\big]) \to \text{v, remove specified key and return the corresponding value.} \\ &\textbf{If key is not found, d is returned if given, otherwise KeyError is raised.} \\ &\textbf{popitem}\,() \to (k, \, \text{v}), \text{remove and return some (key, value) pair} \\ &\text{as a 2-tuple; but raise KeyError if D is empty.} \\ &\textbf{setdefault}\,(k\big[,d\big]) \to \text{D.get}(k,d), \text{ also set D[k]=d if k not in D} \\ &\textbf{update}\,(\big[E\big], **F) \to \text{None. Update D from mapping/iterable E and F.} \\ &\textbf{If E present and has a .keys}() \text{ method, does: for k in E: D[k]} = E[k] \text{ If E present and lacks .keys}() \text{ method, does: for (k, v) in E: D[k]} = v \text{ In either case, this is followed by: for k, v in Fitems}(): D[k] = v \\ &\textbf{values}\,() \to \text{an object providing a view on D's values} \end{aligned}
```

1.2.3 frozendict

About

frozendict is an immutable wrapper around dictionaries that implements the complete mapping interface. It can be used as a drop-in replacement for dictionaries where immutability is desired.

Of course, this is python, and you can still poke around the object's internals if you want.

The frozendict constructor mimics dict, and all of the expected interfaces (iter, len, repr, hash, getitem) are provided. Note that a frozendict does not guarantee the immutability of its values, so the utility of hash method is restricted by usage.

The only difference is that the copy () method of frozendict takes variable keyword arguments, which will be present as key/value pairs in the new, immutable copy.

Usage

```
>>> from frozendict import frozendict
>>>
>>> fd = frozendict({ 'hello': 'World' })
>>>
>>> print fd
<frozendict {'hello': 'World'}>
>>>
>>> print fd['hello']
'World'
>>>
>>> print fd.copy(another='key/value')
<frozendict {'hello': 'World', 'another': 'key/value'}>
>>>
```

In addition, frozendict supports the + and - operands. If you add a dict-like object, a new frozendict will be returned, equal to the old frozendict updated with the other object. Example:

```
>>> frozendict({"Sulla": "Marco", 2: 3}) + {"Sulla": "Marò", 4: 7} <frozendict {'Sulla': 'Marò', 2: 3, 4: 7}> >>>
```

You can also subtract an iterable from a *frozendict*. A new *frozendict* will be returned, without the keys that are in the iterable. Examples:

```
>>> frozendict({"Sulla": "Marco", 2: 3}) - {"Sulla": "Marò", 4: 7}
<frozendict {'Sulla': 'Marco', 2: 3}>
>>> frozendict({"Sulla": "Marco", 2: 3}) - [2, 4]
<frozendict {'Sulla': 'Marco'}>
>>>
```

Some other examples:

```
>>> from frozendict import frozendict
>>> fd = frozendict({"Sulla": "Marco", "Hicks": "Bill"})
>>> print(fd)
<frozendict {'Sulla': 'Marco', 'Hicks': 'Bill'}>
>>> print(fd["Sulla"])
Marco
>>> fd["Bim"]
KeyError: 'Bim'
>>> len(fd)
>>> "Sulla" in fd
True
>>> "Sulla" not in fd
False
>>> "Bim" in fd
False
>>> hash(fd)
835910019049608535
>>> fd_unhashable = frozendict({1: []})
>>> hash(fd_unhashable)
TypeError: unhashable type: 'list'
>>> fd2 = frozendict({"Hicks": "Bill", "Sulla": "Marco"})
>>> print (fd2)
```

(continues on next page)

(continued from previous page)

```
<frozendict {'Hicks': 'Bill', 'Sulla': 'Marco'}>
>>> fd2 is fd
False
>>> fd2 == fd
True
>>> frozendict()
<freedict {}>
>>> frozendict(Sulla="Marco", Hicks="Bill")
<frozendict {'Sulla': 'Marco', 'Hicks': 'Bill'}>
>>> frozendict((("Sulla", "Marco"), ("Hicks", "Bill")))
<frozendict {'Sulla': 'Marco', 'Hicks': 'Bill'}>
>>> fd.get("Sulla")
'Marco'
>>> print(fd.get("God"))
None
>>> tuple(fd.keys())
('Sulla', 'Hicks')
>>> tuple(fd.values())
('Marco', 'Bill')
>>> tuple(fd.items())
(('Sulla', 'Marco'), ('Hicks', 'Bill'))
>>> iter(fd)
<dict_keyiterator object at 0x7feb75c49188>
>>> frozendict.fromkeys(["Marco", "Giulia"], "Sulla")
<frozendict {'Marco': 'Sulla', 'Giulia': 'Sulla'}>
>>> fd["Sulla"] = "Silla"
TypeError: 'frozendict' object does not support item assignment
>>> del fd["Sulla"]
TypeError: 'frozendict' object does not support item deletion
>>> fd.clear()
AttributeError: 'frozendict' object has no attribute 'clear'
>>> fd.pop("Sulla")
AttributeError: 'frozendict' object has no attribute 'pop'
>>> fd.popitem()
AttributeError: 'frozendict' object has no attribute 'popitem'
>>> fd.setdefault("Sulla")
AttributeError: 'frozendict' object has no attribute 'setdefault'
>>> fd.update({"Bim": "James May"})
AttributeError: 'frozendict' object has no attribute 'update'
```

API Reference

```
class cawdrey.frozendict.frozendict(*args, **kwargs)
```

An immutable wrapper around dictionaries that implements the complete collections. Mapping interface. It can be used as a drop-in replacement for dictionaries where immutability is desired.

```
 \begin{split} \mathbf{copy} \ (**add\_or\_replace) \\ \mathbf{dict\_cls} \\ & \text{alias of builtins.dict} \\ \mathbf{classmethod fromkeys} \ (*args, **kwargs) \\ & \text{Returns a new dict with keys from iterable and values equal to value.} \\ \mathbf{get} \ (k \big[, d \big]) \ \rightarrow \mathrm{D[k]} \ \text{if k in D, else d. d defaults to None.} \\ \mathbf{items} \ () \ \rightarrow \text{a set-like object providing a view on D's items} \\ \end{split}
```

keys () \rightarrow a set-like object providing a view on D's keys

```
sorted (*args, by='keys', **kwargs)
```

Return a new *frozendict*, with the element insertion sorted. The signature is the same of builtin *sorted()* function, except for the additional parameter *by*, that is "keys" by default and can also be "values" and "items". So the resulting *frozendict* can be sorted by keys, values or items.

If you want more complicated sorts, see the documentation of sorted(). Take into mind that the parameters passed to the *key* function are the keys of the *frozendict* if by == "keys", and are the items otherwise.

PS: Note that sort by keys and items are identical. The only difference is when you want to customize the sorting passing a custom *key* function. You *could* achive the same result using *by="values"*, since also sorting by values passes the items to the key function. But this is an implementation detail and you should not rely on it.

values () \rightarrow an object providing a view on D's values

Copyright

Based on https://github.com/slezica/python-frozendict and https://github.com/mredolatti/python-frozendict .

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Also based on https://github.com/Marco-Sulla/python-frozendict

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1.2.4 FrozenOrderedDict

About

FrozenOrderedDict is a immutable wrapper around an OrderedDict.

FrozenOrderedDict is similar to frozendict, and with regards to immutability it solves the same problems:

- Because dictionaries are mutable, they are not hashable and cannot be used in sets or as dictionary keys.
- Nasty bugs can and do occur when mutable data structures are passed around.

It can be initialized just like a dict or OrderedDict. Once instantiated, an instance of FrozenOrderedDict cannot be altered, since it does not implement the MutableMapping interface.

It does implement the Mapping interface, so can be used just like a normal dictionary in most cases.

In order to modify the contents of a FrozenOrderedDict, a new instance must be created. The easiest way to do that is by calling the .copy() method. It will return a new instance of FrozenOrderedDict initialized using the following steps:

- 1. A copy of the wrapped OrderedDict instance will be created.
- 2. If any arguments or keyword arguments are passed to the .*copy()* method, they will be used to create another OrderedDict instance, which will then be used to update the copy made in step #1.
- 3. Finally, self.__class__() will be called, passing the copy as the only argument.

API Reference

```
 \textbf{class} \  \, \texttt{cawdrey.frozenordereddict.FrozenOrderedDict} \, (*args, **kwargs) \\ \text{An immutable OrderedDict. It can be used as a drop-in replacement for dictionaries where immutability is}
```

An immutable OrderedDict. It can be used as a drop-in replacement for dictionaries where immutability is desired.

```
copy (*args, **kwargs)

dict_cls
    alias of collections.OrderedDict

classmethod fromkeys (*args, **kwargs)
    Returns a new dict with keys from iterable and values equal to value.

get (k[,d]) \rightarrow D[k] if k in D, else d. d defaults to None.

items () \rightarrow a set-like object providing a view on D's items

keys () \rightarrow a set-like object providing a view on D's keys

values () \rightarrow an object providing a view on D's values
```

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Also based on https://github.com/wsmith323/frozenordereddict

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1.2.5 NonelessDict

About

NonelessDict is a wrapper around dict that will check if a value is None/empty/False, and not add the key in that case.

The class has a method <code>set_with_strict_none_check()</code> that can be used to set a value and check only for <code>None values</code>.

NonelessOrderedDict is based NonelessDict and OrderedDict, so the order of key insertion is preserved.

Usage

API Reference

```
Provides frozendict, a simple immutable dictionary.
```

```
class cawdrey.nonelessdict.NonelessDict(*args, **kwargs)
      A wrapper around dict that will check if a value is None/empty/False, and not add the key in that case. Use the
      set_with_strict_none_check function to check only for None
      clear() \rightarrow None. Remove all items from D.
      copy (**add_or_replace)
      dict cls
           alias of builtins.dict
      classmethod fromkeys(*args, **kwargs)
           Returns a new dict with keys from iterable and values equal to value.
      \operatorname{qet}(k[,d]) \to \operatorname{D}[k] if k in D, else d. d defaults to None.
      items () \rightarrow a set-like object providing a view on D's items
      keys () \rightarrow a set-like object providing a view on D's keys
      pop (k[,d]) \rightarrow v, remove specified key and return the corresponding value.
           If key is not found, d is returned if given, otherwise KeyError is raised.
      popitem () \rightarrow (k, v), remove and return some (key, value) pair
           as a 2-tuple; but raise KeyError if D is empty.
      set_with_strict_none_check(key, value)
      setdefault (k[,d]) \rightarrow D.get(k,d), also set D[k]=d if k not in D
      update ([E], **F) \rightarrow None. Update D from mapping/iterable E and F.
           If E present and has a .keys() method, does: for k in E: D[k] = E[k] If E present and lacks .keys() method,
           does: for (k, v) in E: D[k] = v In either case, this is followed by: for k, v in F.items(): D[k] = v
      values () \rightarrow an object providing a view on D's values
class cawdrey.nonelessdict.NonelessOrderedDict(*args, **kwargs)
      A wrapper around OrderedDict that will check if a value is None/empty/False, and not add the key in that case.
      Use the set_with_strict_none_check function to check only for None
      clear() \rightarrow None. Remove all items from D.
      copy (*args, **kwargs)
      dict cls
           alias of collections. OrderedDict
      classmethod fromkeys(*args, **kwargs)
           Returns a new dict with keys from iterable and values equal to value.
      get(k|,d|) \rightarrow D[k] if k in D, else d. d defaults to None.
      items () \rightarrow a set-like object providing a view on D's items
      keys () \rightarrow a set-like object providing a view on D's keys
```

```
pop (k[, d]) → v, remove specified key and return the corresponding value.
    If key is not found, d is returned if given, otherwise KeyError is raised.

popitem() → (k, v), remove and return some (key, value) pair
    as a 2-tuple; but raise KeyError if D is empty.

set_with_strict_none_check (key, value)

setdefault (k[, d]) → D.get(k,d), also set D[k]=d if k not in D

update([E], **F) → None. Update D from mapping/iterable E and F.

If E present and has a .keys() method, does: for k in E: D[k] = E[k] If E present and lacks .keys() method, does: for (k, v) in E: D[k] = v In either case, this is followed by: for k, v in F.items(): D[k] = v

values() → an object providing a view on D's values
```

Copyright

Based on https://github.com/slezica/python-frozendict and https://github.com/jerr0328/python-helpfuldicts .

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1.2.6 Base Class

About

FrozenBase is the base class for frozendict and FrozenOrderedDict. If you wish to construct your own frozen dictionary classes, you may wish to inherit from this class.

Usage

API Reference

```
class cawdrey.base.FrozenBase(*args, **kwargs)
    Abstract Base Class for Frozen dictionaries
    Used by frozendict and FrozenOrderedDict.
    Custom subclasses must implement at a minimum __init__, copy, fromkeys.
    abstractmethods = frozenset({' init ', 'copy'})
```

```
__contains__(key)
__copy__(*args, **kwargs)
__dict__ = mappingproxy({'__module__': 'cawdrey.base', '__doc__': '\n\tAbstract Base
___eq__(other)
    Return self==value.
__getitem__(key)
__hash__ = None
abstract __init__(*args, **kwargs)
    Initialize self. See help(type(self)) for accurate signature.
___iter__()
__len__()
__module__ = 'cawdrey.base'
__repr__()
    Return repr(self).
__reversed__ = None
__slots__ = ()
classmethod subclasshook (C)
    Abstract classes can override this to customize issubclass().
    This is invoked early on by abc.ABCMeta.__subclasscheck__(). It should return True, False or NotImple-
    mented. If it returns NotImplemented, the normal algorithm is used. Otherwise, it overrides the normal
    algorithm (and the outcome is cached).
 weakref
    list of weak references to the object (if defined)
_abc_cache = <_weakrefset.WeakSet object>
_abc_negative_cache = <_weakrefset.WeakSet object>
_abc_negative_cache_version = 42
_abc_registry = <_weakrefset.WeakSet object>
abstract copy (*args, **kwargs)
dict_cls = None
classmethod fromkeys(*args, **kwargs)
    Returns a new dict with keys from iterable and values equal to value.
get (k \mid d \mid) \rightarrow D[k] if k in D, else d. d defaults to None.
items () \rightarrow a set-like object providing a view on D's items
keys () \rightarrow a set-like object providing a view on D's keys
values () \rightarrow an object providing a view on D's values
```

1.2.7 Downloading source code

cawdrey source code resides on publicly accessible GitHub servers, and can be accessed from the following URL: https://github.com/domdfcoding/cawdrey

If you have git installed, you can clone the repository with the following command:

```
$ git clone https://github.com/domdfcoding/cawdrey
> Cloning into 'cawdrey'...
> remote: Enumerating objects: 47, done.
> remote: Counting objects: 100% (47/47), done.
> remote: Compressing objects: 100% (41/41), done.
> remote: Total 173 (delta 16), reused 17 (delta 6), pack-reused 126
> Receiving objects: 100% (173/173), 126.56 KiB | 678.00 KiB/s, done.
> Resolving deltas: 100% (66/66), done.
```

Alternatively, the code can be downloaded in a 'zip' file by clicking: *Clone or download -> Download Zip*

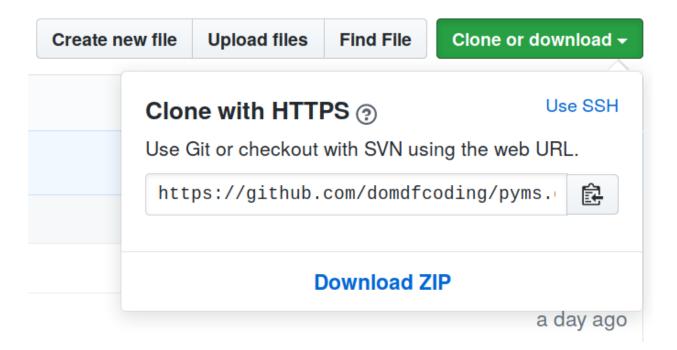


Fig. 1: Downloading a 'zip' file of the source code

1.2.8 Building from source

To build the cawdrey package from source using setuptools, run the following command:

```
$ python3 setup.py sdist bdist_wheel
```

setuptools is configured using the file setup.py.

Different formats are available for built distributions

Format	Description	Notes
gztar	gzipped tar file (.tar.gz)	default on Unix
bztar	<pre>bzipped tar file (.tar.bz2)</pre>	
xztar	bzipped tar file (.tar.bz2)	
tar	tar file (.tar)	
zip	zip file (.zip)	default on Windows
wininst	self-extracting ZIP file for Windows	
msi	Microsoft Installer	

setup.py

```
#!/usr/bin/env python
   # This file is managed by `git_helper`. Don't edit it directly
2
   """Setup script"""
3
   from __pkginfo__ import *
   from setuptools import setup, find_packages
   setup(
                    author=author,
10
                    author_email=author_email,
                    classifiers=classifiers,
12
                    description=short_desc,
13
                    entry_points=entry_points,
14
                    extras_require=extras_require,
15
                    include_package_data=True,
16
                    install_requires=install_requires,
17
                    license=__license__,
                    long_description=long_description,
                    name=pypi_name,
20
                    packages=find_packages(exclude=("tests", "doc-source")),
21
                    project_urls=project_urls,
22
                    py_modules=py_modules,
23
                    python_requires=">=3.6",
24
                    url=web,
25
                    version=__version__,
26
                    keywords=keywords,
27
28
                    )
```

__pkginfo__.py

```
# This file is managed by `qit_helper`. Don't edit it directly
   # Copyright (C) 2019-2020 Dominic Davis-Foster <dominic@davis-foster.co.uk>
2
3
     This program is free software: you can redistribute it and/or modify
   # it under the terms of the GNU General Public License as published by
   # the Free Software Foundation, either version 3 of the License, or
   # (at your option) any later version.
   # This program is distributed in the hope that it will be useful,
9
   # but WITHOUT ANY WARRANTY; without even the implied warranty of
10
   # MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
11
      GNU General Public License for more details.
12
13
      You should have received a copy of the GNU General Public License
14
      along with this program. If not, see <a href="http://www.gnu.org/licenses/">http://www.gnu.org/licenses/>.
15
16
   # This script based on https://github.com/rocky/python-uncompyle6/blob/master/__
17
    →pkginfo__.py
   import pathlib
19
20
     _all__ = [
21
                     "__copyright__",
22
                     "__version__",
23
                     "modname",
24
                     "pypi_name",
25
                     "py_modules",
26
                     "entry_points",
27
                     "__license__",
28
                     "short_desc",
29
                     "author",
30
                     "author_email",
31
                     "github_username",
32
                     "web",
33
                     "github_url",
34
                     "project_urls",
35
                     "repo_root",
36
                     "long_description",
37
                     "install_requires",
38
                     "extras_require",
39
                     "classifiers",
40
                     "keywords",
41
                     "import_name",
42
43
                     1
44
   __copyright__ = """
45
   2019-2020 Dominic Davis-Foster <dominic@davis-foster.co.uk>
46
47
48
   __version__ = "0.1.4"
49
50
   modname = "cawdrey"
51
   pypi_name = "cawdrey"
52
   import_name = "cawdrey"
53
   py_modules = []
54
   entry_points = {
55
                     "console_scripts": []
```

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```
}
57
58
     _license__ = "GNU Lesser General Public License v3 or later (LGPLv3+)"
59
60
   short_desc = "Several useful custom dictionaries"
61
62
     _author___ = author = "Dominic Davis-Foster"
63
   author_email = "dominic@davis-foster.co.uk"
64
   github_username = "domdfcoding"
65
   web = github_url = f"https://github.com/domdfcoding/cawdrey"
   project_urls = {
                    "Documentation": f"https://cawdrey.readthedocs.io", # TODO: Make,
    →this link match the package version
                    "Issue Tracker": f"{qithub_url}/issues",
69
                    "Source Code": github_url,
70
                    }
71
72
   repo_root = pathlib.Path(__file__).parent
73
74
    # Get info from files; set: long_description
75
   long_description = (repo_root / "README.rst").read_text().replace("0.1.4", __version__
76
    \hookrightarrow) + '\n'
   conda_description = """Several useful custom dictionaries
77
78
   Before installing please ensure you have added the following channels: domdfcoding,...
    ⇔conda-forge"""
    _all__.append("conda_description")
81
82
   install_requires = (repo_root / "requirements.txt").read_text().split('\n')
83
   extras_require = {'all': []}
84
85
   classifiers = [
86
                     'Development Status :: 3 - Alpha',
87
                     'Intended Audience :: Developers',
88
                    'License :: OSI Approved :: GNU Lesser General Public License v3 or_
89
    →later (LGPLv3+)',
                    'Operating System :: OS Independent',
                    'Programming Language :: Python',
                    'Programming Language :: Python :: 3.6',
92
                    'Programming Language :: Python :: 3.7',
93
                    'Programming Language :: Python :: 3.8',
94
                    'Programming Language :: Python :: 3 :: Only',
95
                    'Programming Language :: Python :: Implementation :: CPython',
                    'Programming Language :: Python :: Implementation :: PyPy',
97
                     'Topic :: Software Development :: Libraries :: Python Modules',
98
                     'Topic :: Utilities',
99
100
                    1
101
102
   keywords = "ordereddict frozenordereddict orderedfrozendict ordered frozen immutable,
    →frozendict dict dictionary map Mapping MappingProxyType developers"
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