nested_dict Documentation

Release 1.61

Leo Goodstadt

October 07, 2016

Contents

1 Specifying the contained type **3**
- 1.1 *dict* of `lists` . . . 3
- 1.2 *dict* of `sets` . . . 3
- 1.3 *dict* of `ints` . . . 3
- 1.4 *dict* of `strs` . . . 4

2 Iterating through `nested_dict` **5**

3 Converting to / from `dict` **7**

4 Updating with another dictionary **9**

5 `defaultdict` **11**
- 5.1 nested_dict . . . 11

Python Module Index **15**

Note:

- Source code at https://github.com/bunbun/nested-dict
- Documentation at http://nested-dict.readthedocs.org

`nested_dict` is a drop-in replacement extending python dict and defaultdict with multiple levels of nesting.

You can created a deeply nested data structure without laboriously creating all the sub-levels along the way:

```
>>> nd= nested_dict()
>>> # magic
>>> nd["one"][2]["three"] = 4
```

Each nested level is created magically when accessed, a process known as "auto-vivification" in perl.

CHAPTER 1

Specifying the contained type

You can specify that a particular level of nesting holds a specified value type, for example:

- a collection (like a set or list) or
- a scalar with useful default values such as `int` or `str`.

Examples:

1.1 *dict* of `lists`

```
#   nested dict of lists
nd = nested_dict(2, list)
nd["mouse"]["2"].append(12)
nd["human"]["1"].append(12)
```

1.2 *dict* of `sets`

```
#   nested dict of sets
nd = nested_dict(2, set)
nd["mouse"]["2"].add("a")
nd["human"]["1"].add("b")
```

1.3 *dict* of `ints`

```
#   nested dict of ints
nd = nested_dict(2, int)
nd["mouse"]["2"] += 4
nd["human"]["1"] += 5
nd["human"]["1"] += 6

nd.to_dict()
#{'human': {'1': 11}, 'mouse': {'2': 4}}
```

1.4 *dict* of `str`s

```
    #   nested dict of strings
    nd = nested_dict(2, str)
    nd["mouse"]["2"] += "a" * 4
    nd["human"]["1"] += "b" * 5
    nd["human"]["1"] += "c" * 6

    nd.to_dict()
    #{'human': {'1': 'bbbbbccccc'}, 'mouse': {'2': 'aaaa'}}
```

CHAPTER 2

Iterating through `nested_dict`

Iterating through deep or unevenly nested dictionaries is a bit of a pain without recursion. `nested dict` allows you to **flatten** the nested levels into tuples before iteration.

You do not need to know beforehand how many levels of nesting you have:

```
    from nested_dict import nested_dict
    nd= nested_dict()
    nd["one"] = "1"
    nd[1]["two"] = "1 / 2"
    nd["uno"][2]["three"] = "1 / 2 / 3"

    for keys_as_tuple, value in nd.items_flat():
        print ("%-20s == %r" % (keys_as_tuple, value))

    #   (1, 'two')           == '1 / 2'
    #   ('one',)             == '1'
    #   ('uno', 2, 'three')  == '1 / 2 / 3'
```

nested_dict provides

- *items_flat()*
- *keys_flat()*
- *values_flat()*

(*iteritems_flat()*, *iterkeys_flat()*, and *itervalues_flat()* are python 2.7-style synonyms.)

CHAPTER 3

Converting to / from `dict`

The magic of `nested_dict` sometimes gets in the way (of pickleing for example).

We can convert to and from a vanilla python `dict` using

- *nested_dict.to_dict()*
- *the nested_dict constructor*

```
>>> from nested_dict import nested_dict
>>> nd= nested_dict()
>>> nd["one"] = 1
>>> nd[1]["two"] = "1 / 2"

#
#   convert nested_dict -> dict and pickle
#
>>> nd.to_dict()
{1: {'two': '1 / 2'}, 'one': 1}
>>> import pickle
>>> binary_representation = pickle.dumps(nd.to_dict())

#
#   convert dict -> nested_dict
#
>>> normal_dict = pickle.loads(binary_representation)
>>> new_nd = nested_dict(normal_dict)
>>> nd == new_nd
True
```

CHAPTER 4

Updating with another dictionary

You can use the `nested_dict.update(other)` method to merge in the contents of another dictionary.

If the `nested_dict` has a fixed nesting and a **value type**, then key / value pairs will be overridden from the other dict like in Python's standard library `dict`. Otherwise they will be preserved as far as possible.

For example, given a three-level nested `nested_dict` of `int`:

```
>>> d1 = nested_dict.nested_dict(3, int)
>>> d1[1][2][3] = 4
>>> d1[1][2][4] = 5

>>> # integers have a default value of zero
>>> default_value = d1[1][2][5]
>>> print (default_value)
0
>>> print (d1.to_dict())
{1: {2: {3: 4, 4: 5, 5:0}}}
```

We can update this with any dictionary, not necessarily a three level `nested_dict` of `int`.

```
>>> # some other nested_dict
>>> d2 = nested_dict.nested_dict()
>>> d2[2][3][4][5] = 6
>>> d1.update(d2)
>>> print (d1.to_dict())
{1: {2: {3: 4, 4: 5, 5: 0}}, 2: {3: {4: {5: 6}}}}
```

However, the rest of the dictionary maintains has the same default **value type** at the specified level of nesting

```
>>> print (d1[2][3][4][5])
6
>>> # d1[2][3][???] == int() even though d1[2][3][4][5] = 6
>>> print (d1[2][3][5])
0
```

CHAPTER 5

defaultdict

`nested_dict` extends collections.defaultdict

You can get arbitrarily-nested "auto-vivifying" dictionaries using defaultdict.

```
from collections import defaultdict
nested_dict = lambda: defaultdict(nested_dict)
nd = nested_dict()
nd[1][2]["three"][4] = 5
nd["one"]["two"]["three"][4] = 5
```

However, only `nested_dict` supports a `dict` of `dict` of `sets` etc.

5.1 nested_dict

nested_dict provides dictionaries with multiple levels of nested-ness.

5.1.1 Class documentation

class `nested_dict.`**`nested_dict`**

`nested_dict.`**`__init__`**(*[existing_dict | nested_level, value_type]*)

Parameters

- **`existing_dict`** – an existing `dict` to be converted into a `nested_dict`
- **`nested_level`** – the level of nestedness in the dictionary
- **`value_type`** – the type of the values held in the dictionary

For example,

```
a = nested_dict(3, list)
a['level 1']['level 2']['level 3'].append(1)

b = nested_dict(2, int)
b['level 1']['level 2']+=3
```

If nested_level and value_type are not defined, the degree of nested-ness is not fixed. For example,

```
a = nested_dict()
a['1']['2']['3'] = 3
a['A']['B'] = 15
```

nested_dict.**update**(*other*)
Updates the dictionary recursively with the key/value pairs from other, overwriting existing keys. Return None.

If the nested_dict has a fixed level of nestedness and a value_type, then this is ignored for the key/value pairs from other but otherwise preserved as far as possible.

nested_dict.**iteritems_flat**()
python 2.7 style synonym for `items_flat()`

nested_dict.**items_flat**()
iterate through values with nested keys flattened into a tuple

For example,

```
from nested_dict import nested_dict
a = nested_dict()
a['1']['2']['3'] = 3
a['A']['B'] = 15
```

print list(a.items_flat())

Produces:

```
[       (('1', '2', '3'),   3),
        (('A', 'B'),        15)
]
```

nested_dict.**iterkeys_flat**()
python 2.7 style synonym for `keys_flat()`

nested_dict.**keys_flat**()
iterate through values with nested keys flattened into a tuple

For example,

```
from nested_dict import nested_dict
a = nested_dict()
a['1']['2']['3'] = 3
a['A']['B'] = 15

print list(a.keys_flat())
```

Produces:

```
[('1', '2', '3'), ('A', 'B')]
```

nested_dict.**itervalues_flat**()
python 2.7 style synonym for `values_flat()`

nested_dict.**values_flat**()
iterate through values as a single list, without considering the degree of nesting

For example,

```
from nested_dict import nested_dict
a = nested_dict()
a['1']['2']['3'] = 3
a['A']['B'] = 15

print list(a.values_flat())
```

Produces:

```
[3, 15]
```

nested_dict.**to_dict**()

Converts the nested dictionary to a nested series of standard `dict` objects

For example,

```
from nested_dict import nested_dict
a = nested_dict()
a['1']['2']['3'] = 3
a['A']['B'] = 15

print a.to_dict()
```

Produces:

```
{'1': {'2': {'3': 3}}, 'A': {'B': 15}}
```

nested_dict.**__str__**([*indent*])

The dictionary formatted as a string

Parameters **indent** – The level of indentation for each nested level

For example,

```
from nested_dict import nested_dict
a = nested_dict()
a['1']['2']['3'] = 3
a['A']['B'] = 15

print a
print a.__str__(4)
```

Produces:

```
{"1": {"2": {"3": 3}}, "A": {"B": 15}}
{
    "1": {
        "2": {
            "3": 3
        }
    },
    "A": {
        "B": 15
    }
}
```

5.1.2 Acknowledgements

Inspired in part from ideas in: http://stackoverflow.com/questions/635483/what-is-the-best-way-to-implement-nested-dictionaries-in-python contributed by nosklo

Many thanks

5.1.3 Copyright

n

nested_dict, 11

Symbols

__init__() (nested_dict.nested_dict method), 11
__str__() (in module nested_dict), 13

I

items_flat() (in module nested_dict), 12
iteritems_flat() (in module nested_dict), 12
iterkeys_flat() (in module nested_dict), 12
itervalues_flat() (in module nested_dict), 12

K

keys_flat() (in module nested_dict), 12

N

nested_dict (class in nested_dict), 11
nested_dict (module), 11

T

to_dict() (in module nested_dict), 13

U

update() (in module nested_dict), 12

V

values_flat() (in module nested_dict), 12