

---

# **Trafaret Documentation**

***Release 1.0.0***

**Mikhail Krivushin**

**November 26, 2017**



---

## Table of Contents

---

<b>1</b>	<b>Introducing trafaret</b>	<b>3</b>
1.1	Features . . . . .	3
1.2	DataError . . . . .	4
1.3	Trafaret . . . . .	4
1.4	Subclassing . . . . .	4
1.5	Type . . . . .	4
1.6	Any . . . . .	5
1.7	Or . . . . .	5
1.8	Null . . . . .	5
1.9	Bool . . . . .	5
1.10	Float . . . . .	5
1.11	Int . . . . .	5
1.12	Atom . . . . .	6
1.13	String, Email, URL . . . . .	6
1.14	List . . . . .	6
1.15	Dict . . . . .	6
1.16	Mapping . . . . .	8
1.17	Enum . . . . .	8
1.18	Callable . . . . .	8
1.19	Call . . . . .	8
1.20	Forward . . . . .	8
1.21	guard . . . . .	8
<b>2</b>	<b>Changelog</b>	<b>11</b>
2.1	2017-08-04 . . . . .	11
2.2	2017-05-12 . . . . .	11
2.3	2017-03-25 0.9.0 . . . . .	11
2.4	0.8.1 . . . . .	12
2.5	2016-09-25 . . . . .	12
2.6	2016-08-03 . . . . .	12
2.7	2016-03-31 . . . . .	12
2.8	2016-03-18 . . . . .	12
2.9	2014-09-17 . . . . .	12
2.10	2012-05-30 . . . . .	12
2.11	2012-05-28 . . . . .	12
2.12	2012-05-21 . . . . .	12

2.13	2012-05-16 . . . . .	13
2.14	2012-05-11 . . . . .	13
2.15	2012-05-10 . . . . .	13
2.16	2012-04-12 . . . . .	13
<b>3</b>	<b>API docs . . . . .</b>	<b>15</b>
3.1	trafaret — Validation atoms definition . . . . .	15
3.2	trafaret.extras — structs for trafaret structures extended definition . . . . .	22
3.3	trafaret.utils — utils for unfolding netsted dict syntax . . . . .	23
3.4	trafaret.visitor — methods to access object's attribute/netsted key by path . . . . .	23
3.5	trafaret.constructor — methods to access object's attribute/netsted key by path . . . . .	24
<b>4</b>	<b>Indices and tables . . . . .</b>	<b>25</b>
	<b>Python Module Index . . . . .</b>	<b>27</b>

Contents:



# CHAPTER 1

---

## Introducing trafaret

---

Trafaret is validation library with support to convert data structures. Sample usage:

```
import datetime
import trafaret as t

date = t.Dict(year=t.Int, month=t.Int, day=t.Int) >> (lambda d: datetime.
↳ datetime(**d))
assert date.check({'year': 2012, 'month': 1, 'day': 12}) == datetime.datetime(2012, 1,
↳ 12)
```

`t.Dict` creates new dict structure validator with three `t.Int` elements. `>>` operation adds lambda function to the converters of given checker. Some checkers have default converter, but when you use `>>` or `.append`, you disable default converter with your own.

This does not mean that `Int` will not convert numbers to integers, this mean that some checkers, like `String` with regular expression, have special converters applied them and can be overridden.

Converters can be chained. You can raise `DataError` in converters.

## 1.1 Features

Trafaret has very handy features, read below some samples.

### 1.1.1 Regexp

`RegexpRow` can work with regular expressions:

```
>>> c = t.RegexpRow(r'^name=(\w+)$') >> (lambda m: m.groups()[0])
>>> c.check('name=Jeff')
'Jeff'
```

You can use all `re.match` power to extract from strings dicts and other higher level datastructures.

### 1.1.2 Dict and Key

`Dict` take as argument dictionaries with string keys and checkers as value, like `{ 'a': t.Int }`. But instead of a string key you can use the `Key` class. A `Key` instance can rename the given key name to something else:

```
>>> c = t.Dict({t.Key('uNJ') >> 'user_name': t.String})
>>> c.check({'uNJ': 'Adam'})
{'user_name': 'Adam'}
```

And we can do more with the right converter:

```
>>> from trafaret.utils import fold
>>> c = t.Dict({t.Key('uNJ') >> 'user__name': t.String}) >> fold
>>> c.check({'uNJ': 'Adam'})
{'user': {'name': 'Adam'}}
```

We have some example of enhanced `Key` in extras:

```
>>> from trafaret.extras import KeysSubset
>>> cmp_pwd = lambda x: {'pwd': x['pwd']} if x.get('pwd') == x.get('pwd1') else_
↳ DataError('Not equal')
>>> d = Dict({KeysSubset('pwd', 'pwd1'): cmp_pwd, 'key1': String})
>>> d.check({'pwd': 'a', 'pwd1': 'a', 'key1': 'b'}).keys()
{'pwd': 'a', 'key1': 'b'}
```

## 1.2 DataError

Exception class that is used in the library. Exception hold errors in `error` attribute. For simple checkers it will be just a string. For nested structures it will be *dict* instance.

## 1.3 Trafaret

Base class for checkers. Use it to create new checkers. In derived classes you need to implement `_check` or `_check_val` methods. `_check_val` must return a value, `_check` must return *None* on success.

You can implement *converter* method if you want to convert value somehow, that said you proly want to make it possible for the developer to apply their own converters to raw data. This used to return strings instead of *re.Match* object in *String* trafaret.

## 1.4 Subclassing

For your own trafaret creation you need to subclass `Trafaret` class and implement `check_value` or `check_and_return` methods. `check_value` can return nothing on success, `check_and_return` must return value. In case of failure you need to raise `DataError`. You can use `self._failure` shortcut function to do this. Check library code for samples.

## 1.5 Type

Checks that data is instance of given class. Just instantiate it with any class, like *int*, *float*, *str*. For instance:



```
>>> t.Type(int).check(4)
4
```

## 1.6 Any

Will match any element.

## 1.7 Or

*Or* takes other converters as arguments. The input is considered valid if one of the converters succeed:

```
>>> Or(t.Int, t.Null).check(None)
None
>>> (t.Int | t.Null).check(5)
5
```

## 1.8 Null

Value must be *None*.

## 1.9 Bool

Check if value is a boolean:

```
>>> t.Bool().check(True)
True
```

## 1.10 Float

Check if value is a float or can be converted to a float. Supports *lte*, *gte*, *lt*, *gt* parameters:

```
>>> t.Float(gt=3.5).check(4)
4
```

## 1.11 Int

Similar to *Float*, but checking for int:

```
>>> t.Int(gt=3).check(4)
4
```

## 1.12 Atom

Value must be exactly equal to Atom first arg:

```
>>> t.Atom('this_key_must_be_this').check('this_key_must_be_this')
'this_key_must_be_this'
```

This may be useful in Dict with Or statements to create enumerations.

## 1.13 String, Email, URL

Basically just check that argument is a string.

Argument allow\_blank indicates if string can be blank or not.

If you provide a regex parameter - it will return re match object. Default converter will return match.group() result.

Email and URL just provide regular expressions and a bit of logic for IDNA domains. Default converters return email and domain, but you will get re match object in converter.

Here is some examples to make things clear:

```
>>> t.String().check('werwerwer')
'werwerwer'
>>> t.String(regex='^\s+$').check(' ')
' '
>>> t.String(regex='^name=(\w+)$').check('name=Jeff')
'Jeff'
```

And one wild sample:

```
>>> todt = lambda m: datetime(*[int(i) for i in m.groups()])
>>> (t.String(regex='^year=(\d+),month=(\d+),day=(\d+)$') >> todt).check('year=2011,
↳ month=07,day=23')
datetime.datetime(2011, 7, 23, 0, 0)
```

## 1.14 List

Just List of elements of one type. In converter you will get list of converted elements.

Sample:

```
>>> t.List(t.Int).check(range(100))
[0, 1, 2, ... 99]
>>> t.extract_error(t.List(t.Int).check(['a']))
{0: 'value cant be converted to int'}
```

## 1.15 Dict

Dict include named parameters. You can use for keys plain strings and Key instances. In case you provide just string keys, they will converted to Key instances. Actual checking proceeded with Key instance.

Methods:

- `allow_extra(*names)`: where `names` can be key names or `*` to allow any additional keys.
- `make_optional(*names)`: where `names` can be key names or `*` to make all options optional.
- `ignore_extra(*names)`: where `names` are the names of the keys or `*` to exclude listed key names or all unspecified ones from the validation process and final result
- `merge(Dict|dict|[t.Key...])`: where argument can be other Dict, dict like provided to Dict, or list of Key`s. Also provided as `__add__`, so you can add Dict`s, like `dict1 + dict2`.

### 1.15.1 Key

Special class to create dict keys. Parameters are:

- *name* - key name
- *default* - default if key is not present
- *optional* - if *True* the key is optional
- *to\_name* - allows to rename the key

You can provide `to_name` with `>>` operation:

```
Key('javaStyleData') >> 'plain_cool_data'
```

It provides method `__call__(self, data)` that extract key value from data through mapping `get` method.

Key `__call__` method yields (key name, Maybe(DataError), [touched keys]) triples.

You can redefine `get_data(self, data, default)` method in subclassed Key if you want to use something other then `.get(...)` method. Like this for the [aiohttp](#)'s *MultiDict* class:

```
class MDKey(t.Key):
    def get_data(data, default):
        return data.get_all(self.name, default)

t.Dict({MDKey('users'): t.List(t.String)})
```

Moreover, instead of Key you can use any callable, say a function:

```
def simple_key(value):
    yield 'simple', 'simple data', []

check_args = t.Dict(simple_key)
```

### 1.15.2 KeysSubset

Experimental feature, not stable API. Sometimes you need to make something with part of dict keys. So you can:

```
>>> join = (lambda d: {'name': ' '.join(d.values())})
>>> Dict({KeysSubset('name', 'last'): join}).check({'name': 'Adam', 'last': 'Smith'})
{'name': 'Smith Adam'}
```

As you can see you need to return a *dict* from checker.

### 1.15.3 Error raise

In `Dict` you can just return error from checkers or converters, there is need not to raise them.

## 1.16 Mapping

Check both keys and values:

```
>>> trafaret = Mapping(String, Int)
>>> trafaret
<Mapping(<String> => <Int>)>
>>> trafaret.check({"foo": 1, "bar": 2})
{'foo': 1, 'bar': 2}
```

## 1.17 Enum

Example:

```
>>> Enum(1, 2, 'error').check(2)
2
```

## 1.18 Callable

Check if data is callable.

## 1.19 Call

Take a function that will be called in `check`. Function must return value or `DataError`.

## 1.20 Forward

This checker is container for any checker, that you can provide later. To provide container use `provide` method or `<< operation`:

```
>> node = Forward()
>> node << Dict(name=String, children=List[node])
```

## 1.21 guard

Decorator for function:

```
>>> @guard(a=String, b=Int, c=String)
... def fn(a, b, c="default"):
...     '''docstring'''
...     return (a, b, c)
```

### 1.21.1 GuardError

Derived from `DataError`.



### 2.1 2017-08-04

- converters and `convert=False` are deleted in favor of `And` and `&`
- `String` parameter `regex` deleted in favor of `Regexp` and `RegexpRaw` usage
- new `OnError` to customize error message
- `context=something` argument for `__call__` and `check` `Trafaret` methods. Supported by `Or`, `And`, `Forward` etc.
- new customizable method `transform` like `change_and_return` but takes `context=arg`
- new `trafaret_instance.async_check` method that works with `await`

### 2.2 2017-05-12

- removed entrypoint magic
- 0.10.0

### 2.3 2017-03-25 0.9.0

- added `And` trafaret and `&` shortcut operation.
- change `>>` behaviour. From now on `Trafaret` does not use `self.converters` and use `And` trafaret instead
- added `RegexpRaw` and `Regexp` trafarets. `RegexpRaw` returns `re.Match` object and `Regexp` returns match string.
- deprecate `String regex` argument in favor to `Regexp` and `RegexpRaw` usage
- `Dict` now takes `allow_extra`, `allow_extra_trafaret` and `ignore_extra` keyword arguments as preferred alternative to methods

## 2.4 0.8.1

- added `trafaret.constructor`. Now you can use *construct* and *C* from this package.

## 2.5 2016-09-25

Added *trafaret* argument to *DataError* constructor and made *\_failure* a method (rather than static method)

## 2.6 2016-08-03

Added *Subclass* *trafaret*.

## 2.7 2016-03-31

Fixed loading contrib modules, so now original contrib module loading exception will be raised on contrib Trafaret access. Added *value* option to internal *\_failure* interface, and option *value* to *DataError.as\_dict* method.

## 2.8 2016-03-18

Fixed Key default behaviour for Dict with allowed extra when names are the same in Key and in data source

## 2.9 2014-09-17

Fixed Email validator

## 2.10 2012-05-30

Renamed methods to *check\_value* and *check\_and\_return*. Added *Tuple* *trafaret*.

## 2.11 2012-05-28

Fixed *Dict(...).make\_optional(...)* method for a chaining support

## 2.12 2012-05-21

Updated *KeysSubSet* errors propagation - now you can return error either *{'a': DataError('message')}*, or *DataError({'a': 'message'})*



## 2.13 2012-05-16

Added `__call__` alias to *check*.

## 2.14 2012-05-11

Added *visitor* module.

## 2.15 2012-05-10

Fixed *Dict.allow\_extra* behaviour.

## 2.16 2012-04-12

*Int* will not convert not-rounded floats like 2.2

*Dict* have *.ignore\_extra* method, similar to *.allow\_extra*, but given keys will not included to result dict. If you will provide \*, any extra will be ignored.



### 3.1 trafaret — Validation atoms definition

**exception** `trafaret.DataError` (*error=None, name=None, value=<object object>, trafaret=None*)  
Error with data preserve error can be a message or None if error raised in childs data can be anything

**class** `trafaret.Trafaret`  
Base class for trafarets, provides only one method for trafaret validation failure reporting

**append** (*other*)  
Appends new converter to list.

**check** (*value, context=None*)  
Common logic. In subclasses you need to implement `check_value` or `check_and_return`.

**class** `trafaret.Call` (*fn*)

```
>>> def validator(value):
...     if value != "foo":
...         return DataError("I want only foo!")
...     return 'foo'
...
>>> trafaret = Call(validator)
>>> trafaret
<Call(validator)>
>>> trafaret.check("foo")
'foo'
>>> extract_error(trafaret, "bar")
'I want only foo!'
```

**class** `trafaret.Or` (*\*trafarets*)

```
>>> nullString = Or(String, Null)
>>> nullString
```

```
<Or(<String>, <Null>)>
>>> nullString.check(None)
>>> nullString.check("test")
'test'
>>> extract_error(nullString, 1)
{0: 'value is not a string', 1: 'value should be None'}
```

**class** trafaret.**And** (*trafaret, other*)  
Will work over trafarets sequentially

**class** trafaret.**Forward**

```
>>> node = Forward()
>>> node << Dict(name=String, children=List[node])
>>> node
<Forward(<Dict(children=<List(<recur>)>, name=<String>)>>>
>>> node.check({"name": "foo", "children": []}) == {'children': [], 'name': 'foo'}
True
>>> extract_error(node, {"name": "foo", "children": [1]})
{'children': {0: 'value is not a dict'}}
>>> node.check({"name": "foo", "children": [
    ↳, "children": []
    ↳ 'name': 'bar'}], 'name': 'foo'}) == {'children': [{'children': [],
    ↳ 'name': 'bar'}], 'name': 'foo'}
True
>>> empty_node = Forward()
>>> empty_node
<Forward(None)>
>>> extract_error(empty_node, 'something')
'trafaret not set yet'
```

**class** trafaret.**Any**

```
>>> Any()
<Any>
>>> (Any() >> ignore).check(object())
```

**class** trafaret.**Null**

```
>>> Null()
<Null>
>>> Null().check(None)
>>> extract_error(Null(), 1)
'value should be None'
```

**class** trafaret.**List** (*trafaret, min\_length=0, max\_length=None*)

```
>>> List(Int)
<List(<Int>)>
>>> List(Int, min_length=1)
<List(min_length=1 | <Int>)>
>>> List(Int, min_length=1, max_length=10)
<List(min_length=1, max_length=10 | <Int>)>
>>> extract_error(List(Int), 1)
'value is not a list'
```

```

>>> List(Int).check([1, 2, 3])
[1, 2, 3]
>>> List(String).check(["foo", "bar", "spam"])
['foo', 'bar', 'spam']
>>> extract_error(List(Int), [1, 2, 1 + 3j])
{2: 'value is not int'}
>>> List(Int, min_length=1).check([1, 2, 3])
[1, 2, 3]
>>> extract_error(List(Int, min_length=1), [])
'list length is less than 1'
>>> List(Int, max_length=2).check([1, 2])
[1, 2]
>>> extract_error(List(Int, max_length=2), [1, 2, 3])
'list length is greater than 2'
>>> extract_error(List(Int), ["a"])
{0: "value can't be converted to int"}

```

**class** trafaret.**Key** (*name*, *default*=<object object>, *optional*=False, *to\_name*=None, *trafaret*=None)  
 Helper class for Dict.

It gets name, and provides method `extract(data)` that extract key value from data through mapping get method. Key `__call__` method yields (key name, Maybe(DataError), [touched keys]) triples.

You can redefine `get_data(data, default)` method in subclassed Key if you want to use something other then `.get(...)` method.

Like this for the aiohttp MultiDict:

```

class MDKey(t.Key):
    def get_data(data, default):
        return data.get_all(self.name, default)

```

**class** trafaret.**Dict** (\*args, \*\*trafarets)

```

>>> trafaret = Dict(foo=Int, bar=String) >> ignore
>>> trafaret.check({"foo": 1, "bar": "spam"})
>>> extract_error(trafaret, {"foo": 1, "bar": 2})
{'bar': 'value is not a string'}
>>> extract_error(trafaret, {"foo": 1})
{'bar': 'is required'}
>>> extract_error(trafaret, {"foo": 1, "bar": "spam", "eggs": None})
{'eggs': 'eggs is not allowed key'}
>>> trafaret.allow_extra("eggs")
<Dict(extras=(eggs) | bar=<String>, foo=<Int>)>
>>> trafaret.check({"foo": 1, "bar": "spam", "eggs": None})
>>> trafaret.check({"foo": 1, "bar": "spam"})
>>> extract_error(trafaret, {"foo": 1, "bar": "spam", "ham": 100})
{'ham': 'ham is not allowed key'}
>>> trafaret.allow_extra("*")
<Dict(any, extras=(eggs) | bar=<String>, foo=<Int>)>
>>> trafaret.check({"foo": 1, "bar": "spam", "ham": 100})
>>> trafaret.check({"foo": 1, "bar": "spam", "ham": 100, "baz": None})
>>> extract_error(trafaret, {"foo": 1, "ham": 100, "baz": None})
{'bar': 'is required'}
>>> trafaret = Dict({Key('bar', optional=True): String}, foo=Int)
>>> trafaret.allow_extra("*")
<Dict(any | bar=<String>, foo=<Int>)>
>>> _dd(trafaret.check({"foo": 1, "ham": 100, "baz": None}))

```

```

"&quot;{'baz': None, 'foo': 1, 'ham': 100}&quot;
>>> _dd(extract_error(trafaret, {"bar": 1, "ham": 100, "baz": None}))
"&quot;{'bar': 'value is not a string', 'foo': 'is required'}&quot;
>>> extract_error(trafaret, {"foo": 1, "bar": 1, "ham": 100, "baz": None})
{'bar': 'value is not a string'}
>>> trafaret = Dict({Key('bar', default='nyanya') >> 'baz': String}, foo=Int)
>>> _dd(trafaret.check({'foo': 4}))
"&quot;{'baz': 'nyanya', 'foo': 4}&quot;
>>> _ = trafaret.ignore_extra('fooz')
>>> _dd(trafaret.check({'foo': 4, 'fooz': 5}))
"&quot;{'baz': 'nyanya', 'foo': 4}&quot;
>>> _ = trafaret.ignore_extra('*')
>>> _dd(trafaret.check({'foo': 4, 'foor': 5}))
"&quot;{'baz': 'nyanya', 'foo': 4}&quot;

```

#### **merge** (*other*)

Extends one Dict with other Dict Key's or Key's list, or dict instance supposed for Dict

**class** trafaret.**Enum** (\**variants*)

```

>>> trafaret = Enum("foo", "bar", 1) >> ignore
>>> trafaret
<Enum('foo', 'bar', 1)>
>>> trafaret.check("foo")
>>> trafaret.check(1)
>>> extract_error(trafaret, 2)
"value doesn't match any variant"

```

**class** trafaret.**Tuple** (\**args*)

Tuple checker can be used to check fixed tuples, like (Int, Int, String).

```

>>> t = Tuple(Int, Int, String)
>>> t.check([3, 4, '5'])
(3, 4, '5')
>>> extract_error(t, [3, 4, 5])
{2: 'value is not a string'}
>>> t
<Tuple(<Int>, <Int>, <String>)>

```

**class** trafaret.**Atom** (*value*)

```

>>> Atom('atom').check('atom')
'atom'
>>> extract_error(Atom('atom'), 'molecule')
"value is not exactly 'atom'"

```

**class** trafaret.**String** (*allow\_blank=False, min\_length=None, max\_length=None*)

```

>>> String()
<String>
>>> String(allow_blank=True)
<String(blank)>
>>> String().check("foo")
'foo'
>>> extract_error(String(), "")

```

```
'blank value is not allowed'
>>> String(allow_blank=True).check("")
''
>>> extract_error(String(), 1)
'value is not a string'
>>> String(min_length=2, max_length=3).check('123')
'123'
>>> extract_error(String(min_length=2, max_length=6), '1')
'String is shorter than 2 characters'
>>> extract_error(String(min_length=2, max_length=6), '1234567')
'String is longer than 6 characters'
>>> String(min_length=2, max_length=6, allow_blank=True)
Traceback (most recent call last):
...
AssertionError: Either allow_blank or min_length should be specified, not both
>>> String(min_length=0, max_length=6, allow_blank=True).check('123')
'123'
```

**class** trafaret.**Float** (*gte=None, lte=None, gt=None, lt=None*)  
Checks that value is a float. Or if value is a string converts this string to float

**class** trafaret.**FloatRaw** (*gte=None, lte=None, gt=None, lt=None*)  
Tests that value is a float or a string that is convertible to float.

```
>>> Float()
<Float>
>>> Float(gte=1)
<Float(gte=1)>
>>> Float(lte=10)
<Float(lte=10)>
>>> Float(gte=1, lte=10)
<Float(gte=1, lte=10)>
>>> Float().check(1.0)
1.0
>>> extract_error(Float(), 1 + 3j)
'value is not float'
>>> extract_error(Float(), 1)
1.0
>>> Float(gte=2).check(3.0)
3.0
>>> extract_error(Float(gte=2), 1.0)
'value is less than 2'
>>> Float(lte=10).check(5.0)
5.0
>>> extract_error(Float(lte=3), 5.0)
'value is greater than 3'
>>> Float().check("5.0")
5.0
```

**value\_type**  
alias of float

**class** trafaret.**IntRaw** (*gte=None, lte=None, gt=None, lt=None*)

```
>>> Int()
<Int>
>>> Int().check(5)
```

```
5
>>> extract_error(Int(), 1.1)
'value is not int'
>>> extract_error(Int(), 1 + 1j)
'value is not int'
```

**value\_type**  
alias of int

**class** trafaret.**Callable**

```
>>> (Callable() >> ignore).check(lambda: 1)
>>> extract_error(Callable(), 1)
'value is not callable'
```

**class** trafaret.**Bool**

```
>>> Bool()
<Bool>
>>> Bool().check(True)
True
>>> Bool().check(False)
False
>>> extract_error(Bool(), 1)
'value should be True or False'
```

**class** trafaret.**Type**(type\_)

```
>>> Type(int)
<Type(int)>
>>> Type[int]
<Type(int)>
>>> c = Type[int]
>>> c.check(1)
1
>>> extract_error(c, "foo")
'value is not int'
```

**typing\_checker()**  
isinstance(object, class-or-type-or-tuple) -> bool

Return whether an object is an instance of a class or of a subclass thereof. With a type as second argument, return whether that is the object's type. The form using a tuple, isinstance(x, (A, B, ...)), is a shortcut for isinstance(x, A) or isinstance(x, B) or ... (etc.).

**class** trafaret.**Subclass**(type\_)

```
>>> Subclass(type)
<Subclass(type)>
>>> Subclass[type]
<Subclass(type)>
>>> s = Subclass[type]
>>> s.check(type)
<type 'type'>
```



```
>>> extract_error(s, object)
'value is not subclass of type'
```

```
typing_checker()
issubclass(C, B) -> bool
```

Return whether class C is a subclass (i.e., a derived class) of class B. When using a tuple as the second argument `issubclass(X, (A, B, ...))`, is a shortcut for `issubclass(X, A)` or `issubclass(X, B)` or ... (etc.).

**class** trafaret.**Mapping**(key, value)

Mapping gets two trafarets as arguments, one for key and one for value, like *Mapping(t.Int, t.List(t.Str))*.

**class** trafaret.**StrBool**

```
>>> extract_error(StrBool(), 'aloha')
'value can't be converted to Bool'
>>> StrBool().check(1)
True
>>> StrBool().check(0)
False
>>> StrBool().check('y')
True
>>> StrBool().check('n')
False
>>> StrBool().check(None)
False
>>> StrBool().check('1')
True
>>> StrBool().check('0')
False
>>> StrBool().check('Yes')
True
>>> StrBool().check('No')
False
>>> StrBool().check(True)
True
>>> StrBool().check(False)
False
```

trafaret.**DictKeys**(keys)

Checks if dict has all given keys

**Parameters** keys –

```
>>> _dd(DictKeys(['a', 'b']).check({'a':1, 'b':2,}))
"{'a': 1, 'b': 2}"
>>> extract_error(DictKeys(['a', 'b']), {'a':1, 'b':2, 'c':3,})
{'c': 'c is not allowed key'}
>>> extract_error(DictKeys(['key', 'key2']), {'key':'val'})
{'key2': 'is required'}
```

trafaret.**guard**(trafaret=None, \*\*kwargs)

Decorator for protecting function with trafarets

```
>>> @guard(a=String, b=Int, c=String)
... def fn(a, b, c="default"):
...     '''docstring'''
...     return (a, b, c)
```

```

...
>>> fn.__module__ = None
>>> help(fn)
Help on function fn:

fn(*args, **kwargs)
    guarded with <Dict(a=<String>, b=<Int>, c=<String>)>

    docstring

>>> fn("foo", 1)
('foo', 1, 'default')
>>> extract_error(fn, "foo", 1, 2)
{'c': 'value is not a string'}
>>> extract_error(fn, "foo")
{'b': 'is required'}
>>> g = guard(Dict())
>>> c = Forward()
>>> c << Dict(name=str, children=List[c])
>>> g = guard(c)
>>> g = guard(Int())
Traceback (most recent call last):
...
RuntimeError: trafaret should be instance of Dict or Forward

```

**class** trafaret.**RegexRaw** (*regexp, re\_flags=0*)

Check if given string match given regexp

trafaret.**ensure\_trafaret** (*trafaret*)

Helper for complex trafarets, takes trafaret instance or class and returns trafaret instance

trafaret.**extract\_error** (*checker, \*a, \*\*kw*)

Helper for tests - catch error and return it as dict

trafaret.**ignore** (*val*)

Stub to ignore value from trafaret Use it like:

```

>>> a = Int >> ignore
>>> a.check(7)

```

trafaret.**catch** (*checker, \*a, \*\*kw*)

Helper for tests - catch error and return it as dict

trafaret.**catch\_error** (*checker, \*a, \*\*kw*)

Helper for tests - catch error and return it as dict

## 3.2 trafaret.extras — structs for trafaret structures extended definition

**class** trafaret.extras.**KeysSubset** (*\*keys*)

From checkers and converters dict must be returned. Some for errors.

```

>>> from . import extract_error, Mapping, String
>>> cmp_pwds = lambda x: {'pwd': x['pwd']} if x.get('pwd') == x.get('pwd1') else_
↳DataError('Not equal')
>>> d = Dict({KeysSubset('pwd', 'pwd1'): cmp_pwds, 'key1': String})

```

```
>>> sorted(d.check({'pwd': 'a', 'pwd1': 'a', 'key1': 'b'}).keys())
['key1', 'pwd']
>>> extract_error(d.check, {'pwd': 'a', 'pwd1': 'c', 'key1': 'b'})
{'pwd': 'Not equal'}
>>> extract_error(d.check, {'pwd': 'a', 'pwd1': None, 'key1': 'b'})
{'pwd': 'Not equal'}
>>> get_values = (lambda d, keys: [d[k] for k in keys if k in d])
>>> join = (lambda d: {'name': ' '.join(get_values(d, ['name', 'last']))})
>>> Dict({KeysSubset('name', 'last'): join}).check({'name': 'Adam', 'last': 'Smith'
↪})
{'name': 'Adam Smith'}
>>> Dict({KeysSubset(): Dict({'a': Any})}).check({'a': 3})
{'a': 3}
```

### 3.3 trafaret.utils — utils for unfolding netsted dict syntax

There will be small helpers to render forms with exist trafarets for DRY.

`trafaret.utils.fold(data, prefix=' ', delimiter='__')`

```
>>> _dd(fold({'a__a': 4}))
"{'a': {'a': 4}}"
>>> _dd(fold({'a__a': 4, 'a__b': 5}))
"{'a': {'a': 4, 'b': 5}}"
>>> _dd(fold({'a__1': 2, 'a__0': 1, 'a__2': 3}))
"{'a': [1, 2, 3]}"
>>> _dd(fold({'form__a__b': 5, 'form__a__a': 4}, 'form'))
"{'a': {'a': 4, 'b': 5}}"
>>> _dd(fold({'form__a__b': 5, 'form__a__a__0': 4, 'form__a__a__1': 7}, 'form'))
"{'a': {'a': [4, 7], 'b': 5}}"
>>> repr(fold({'form__1__b': 5, 'form__0__a__0': 4, 'form__0__a__1': 7}, 'form'))
"[{'a': [4, 7]}, {'b': 5}]"
```

`trafaret.utils.unfold(data, prefix=' ', delimiter='__')`

```
>>> _dd(unfold({'a': 4, 'b': 5}))
"{'a': 4, 'b': 5}"
>>> _dd(unfold({'a': [1, 2, 3]}))
"{'a__0': 1, 'a__1': 2, 'a__2': 3}"
>>> _dd(unfold({'a': {'a': 4, 'b': 5}}))
"{'a__a': 4, 'a__b': 5}"
>>> _dd(unfold({'a': {'a': 4, 'b': 5}}, 'form'))
"{'form__a__a': 4, 'form__a__b': 5}"
```

### 3.4 trafaret.visitor — methods to access object's attribute/netsted key by path

This module is expirement. API and implementation are unstable. Supposed to use with Request object or something like that.

**class** `trafaret.visitor.DeepKey` (*name*, *default=<object object>*, *optional=False*, *to\_name=None*, *trafaret=None*)  
 Lookup for attributes and items Path in name must be delimited by ..

```
>>> from trafaret import Int
>>> class A(object):
...     class B(object):
...         d = {'a': 'word'}
>>> dict((DeepKey('B.d.a') >> 'B_a').pop(A))
{'B_a': 'word'}
>>> dict((DeepKey('c.B.d.a') >> 'B_a').pop({'c': A}))
{'B_a': 'word'}
>>> dict((DeepKey('B.a') >> 'B_a').pop(A))
{'B.a': ValueError('Unexistent key')}
>>> dict(DeepKey('c.B.d.a', to_name='B_a', trafaret=Int()).pop({'c': A}))
{'B_a': ValueError('value can't be converted to int')}
```

**class** `trafaret.visitor.Visitor` (*keys*)  
 Check any object or mapping with DeepKey instances. This means that counts only existence and correctness of given paths. Visitor will not check for additional attributes etc.

`trafaret.visitor.get_deep_attr` (*obj*, *keys*)  
 Helper for DeepKey

### 3.5 trafaret.constructor — methods to access object's attribute/netsted key by path

**class** `trafaret.constructor.C`  
 Start object. It has | and & operations defined that will use construct to it args  
 Use it like *C & int & check\_less\_500*

`trafaret.constructor.construct` (*arg*)  
 Shortcut syntax to define trafarets.

- int, str, float and bool will return `t.Int`, `t.String`, `t.Float` and `t.Bool`
- one element list will return `t.List`
- tuple or list with several args will return `t.Tuple`
- dict will return `t.Dict`. If key has '?' at the and it will be optional and '?' will be removed
- any callable will be `t.Call`
- otherwise it will be returned as is

`construct` is recursive and will try construct all lists, tuples and dicts args

## CHAPTER 4

---

### Indices and tables

---

- `genindex`
- `modindex` \* *Introducing traforet* \* *API docs*
- `search`



### t

- `trafaret`, [15](#)
- `trafaret.constructor`, [24](#)
- `trafaret.extras`, [22](#)
- `trafaret.utils`, [23](#)
- `trafaret.visitor`, [23](#)





## A

And (class in trafaret), 16  
Any (class in trafaret), 16  
append() (trafaret.Trafaret method), 15  
Atom (class in trafaret), 18

## B

Bool (class in trafaret), 20

## C

C (class in trafaret.constructor), 24  
Call (class in trafaret), 15  
Callable (class in trafaret), 20  
catch() (in module trafaret), 22  
catch\_error() (in module trafaret), 22  
check() (trafaret.Trafaret method), 15  
construct() (in module trafaret.constructor), 24

## D

DataError, 15  
DeepKey (class in trafaret.visitor), 23  
Dict (class in trafaret), 17  
DictKeys() (in module trafaret), 21

## E

ensure\_trafaret() (in module trafaret), 22  
Enum (class in trafaret), 18  
extract\_error() (in module trafaret), 22

## F

Float (class in trafaret), 19  
FloatRaw (class in trafaret), 19  
fold() (in module trafaret.utils), 23  
Forward (class in trafaret), 16

## G

get\_deep\_attr() (in module trafaret.visitor), 24  
guard() (in module trafaret), 21

## I

ignore() (in module trafaret), 22  
IntRaw (class in trafaret), 19

## K

Key (class in trafaret), 17  
KeysSubset (class in trafaret.extras), 22

## L

List (class in trafaret), 16

## M

Mapping (class in trafaret), 21  
merge() (trafaret.Dict method), 18

## N

Null (class in trafaret), 16

## O

Or (class in trafaret), 15

## R

RegexRaw (class in trafaret), 22

## S

StrBool (class in trafaret), 21  
String (class in trafaret), 18  
Subclass (class in trafaret), 20

## T

Trafaret (class in trafaret), 15  
trafaret (module), 15  
trafaret.constructor (module), 24  
trafaret.extras (module), 22  
trafaret.utils (module), 23  
trafaret.visitor (module), 23  
Tuple (class in trafaret), 18  
Type (class in trafaret), 20

`typing_checker()` (trafaret.Subclass method), [21](#)  
`typing_checker()` (trafaret.Type method), [20](#)

## U

`unfold()` (in module `trafaret.utils`), [23](#)

## V

`value_type` (trafaret.FloatRaw attribute), [19](#)  
`value_type` (trafaret.IntRaw attribute), [20](#)  
`Visitor` (class in `trafaret.visitor`), [24](#)