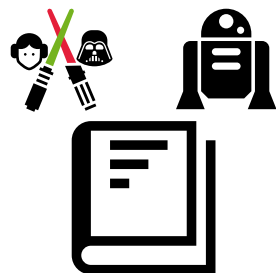

galactic developer guide

The Galactic Organization <contact@thegalactic.org>



0.0.9

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1 Introduction



py-galactic is a python package for studying formal concept analysis.

This guide has been designed to allow developers to extend the *py-galactic-core* engine using 4 kinds of extensions:

- [data reader plugins](#)
- [characteristic plugins](#)
- [description plugins](#)
- [strategy plugins](#)
- [measure plugins](#)

2 Data readers

Data readers are plugins of the *py-galactic-core* engine that allow to read new data file formats.

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A data reader plugin must declare a class inheriting from the `galactic.concepts.DataReader` class and implementing the `read` method and defining the `extensions` property.

The `read` method is responsible for reading an already opened file and must return the data read either as a dictionary (if the individuals are named) or as a list.

The `extensions` property must return an iterator over all the file extensions supported by the plugin.

```
import io
from typing import Union, Iterable, Mapping

from galactic.concepts import DataReader

class MyDataReader(DataReader):
    @classmethod
    def read(cls, data_file: io.TextIOBase) -> Union[Iterable, Mapping]:
        # must return the data read from data_file

    @property
    def extensions(self):
        # must return an iterator over the supported file extensions
        # here: .my
        return iter([".my"])

def get_reader():
    return MyDataReader()
```

Finally, using the `setuptools` system, the package must declare an entry point in the `setup.py` file.

```
entry_points={
    "py_galactic_data_reader": [
        "my_reader = my_data_reader:get_reader"
    ]
},
```

3 Characteristics

Characteristic plugins are plugins of the `py-galactic-core` engine that allow to define new characteristics on individuals.

An characteristic plugin should declare a class inheriting from the `galactic.characteristics.Characteristic` class or preferably from one of its subclass and implementing the `__call__` method.

```
from galactic.characteristic import Characteristic

class MyCharacteristic(Characteristic):
    def __call__(self, individual=None):
        # Return something
```

4 Descriptions

Description plugins are plugins of the *py-galactic-core* engine that allow to define new predicates and new description spaces on individuals.

A description plugin should declare a class inheriting from the `galactic.descriptions.Predicate`

class or preferably from one of its subclass and implementing the `__call__` method. This method must return `True` or `False`.

```
from galactic.descriptions import Predicate

class MyPredicate(Predicate):
    def __call__(self, individual=None):
        # Return True or False
```

Usually, a description plugin declares a class inheriting from the `galactic.descriptions.Description`

class and implementing the `__call__` method. This method must yield a set of minimal predicates describing a set of individuals.

```
class MyDescription(Description):
    def __call__(
        self,
        individuals: Iterable = None
    ) -> Iterator[Predicate]:
        # yield instances of MyPredicate
```

5 Strategies

Strategies are plugins of the *py-galactic-core* engine that allow to create new predicates applicable to individuals.

There are two kinds of strategies:

- basic strategy
- meta strategy

5.1 Basic strategies

A basic strategy plugin must declare a class inheriting from the

`galactic.strategies.BasicStrategy`

class and implementing the `selectors` method. This method must produce an iterator over predicates defined by a **description plugin**.

The `__init__` method must set a value for the `_description` field.

```
from typing import Iterable

from my_characteristic_plugin import MyCharacteristic
from my_description_plugin import MyDescription, MyPredicate
from galactic.strategies import BasicStrategy
from galactic.concepts import Concept

class MyStrategy(BasicStrategy):

    def __init__(self, characteristic: MyCharacteristic):
        self._description = MyDescription(characteristic)

    def selectors(self, concept: Concept):
        # yield instances of MyPredicate

def get_classes():
    return {"strategy.mypugin.MyStrategy": MyStrategy}
```

Finally, using the *setuptools* system, the package must declare an entry point in the `setup.py` file.

```
entry_points={
    "py_galactic_extension": [
        "my_plugin = my_plugin:get_classes"
    ]
},
```

5.2 Meta strategies

A meta strategy plugin must declare a class inheriting from the `galactic.strategies.MetaStrategy`

class and implementing the `selectors` method. This method must produce an iterator over predicates defined by the inner strategies. There are two predefined meta-strategies in the core library:

- `galactic.strategies.LimitFilter`
- `galactic.strategies.SelectionFilter`

which use a measure to choose which predicates to keep. This is the best way to use meta-strategies.

6 Measures

Measures are plugins of the *py-galactic-core* engine that allow to use the predefined meta-strategies

- `galactic.strategies.LimitFilter`
- `galactic.strategies.SelectionFilter`

A measure plugin must declare a class inheriting from the `galactic.strategies.Measure`

class and implementing the `__call__` method. This method must return a float value evaluating a predicate applied to a set of individuals.

```
from typing import Iterable

from galactic.characteristics import Predicate
from galactic.concept import Concept
from galactic.strategies import Measure

class MyMeasure(Measure):
```

```
def __call__(
    self,
    concept: Concept,
    predicate: Predicate = None
):
    # must return a float value evaluating the predicate
    # applied on the individuals

def get_classes():
    return {"measure.myplugin.MyMeasure": MyMeasure}
```

Finally, using the *setuptools* system, the package must declare an entry point in the `setup.py` file.

```
entry_points={
    "py_galactic_extension": [
        "my_plugin = my_plugin:get_classes"
    ]
},
```