
cortexpy Documentation

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CHAPTER 1

Overview of Cortexpy

tests	
package	
docs	

Cortexpy is a Python package for sequence analysis using linked and colored De Bruijn graphs such as the ones created by [Cortex](#) and [Mccortex](#). This project aims to mirror many of the features contained in [CortexJDK](#).

Cortexpy also comes with a command-line tool for basic inspection and manipulation of Cortex graphs with and without links.

1.1 Audience

The audience of cortexpy is researchers working with colored De Bruijn graphs and link information in [Cortex](#) and [Mccortex](#) format.

1.2 Free software

Cortexpy is free software; you can redistribute it and/or modify it under the terms of the Apache License version 2.0. Contributions are welcome. Please join us on [GitHub](#).

1.3 Installation

```
pip install cortexpy
```

1.4 Documentation

For more information, please see cortexpy [documentation](#).

1.5 Bugs

Please raise a github issue for any bugs.

1.6 Development

1. Install [conda](#).
2. Download development and testing tools:

```
conda env create -f environment.yml -n my-dev-environment
```

3. Activate development environment:

```
conda activate my-dev-environment
```

All remaining commands in the development section need to be run in an activated conda dev environment.

1.6.1 Tests

```
make test
```

1.6.2 Deploy new cortexpy version to pypi

Requires access credentials for pypi.

```
make deploy
```

1.6.3 Building the docs

The documentation is automatically built by read-the-docs on push to master. To build the documentation manually:

```
# install sphinx dependencies
pip install docs/requirements.txt

make docs
```

1.6.4 Update the dev environment

This section is experimental because it does not work on travis-CI yet.

```
# Create a new env from the high-level requirements file
conda env create -f environment.yml -n another-dev-env

# activate the new environment
conda activate another-dev-env

# save new env to environment.lock.yml
make lock
```


2.1 Python API

2.1.1 Check if a cortex graph contains a kmer

We can use the After you have installed cortexpy, you can start using it to access cortex files from python:

```
from cortexpy.graph.parser.random_access import RandomAccess

# make sure to open the cortex graph in binary mode
with open('my_graph.ctx', 'rb') as fh:
    ra = RandomAccess(fh)

    # let's see if our favorite kmer is in the graph
    if 'AAA' in ra:
        print('AAA exists in my_graph.ctx!')
```


3.1 Random access of cortexpy graphs

This module contains classes for inspecting cortex graphs with random access to their kmers.

```
class cortexpy.graph.parser.random_access.RandomAccess (graph_handle,  
                                                    kmer_cache_size=None)  
    Provide fast k-mer access to Cortex graph in log(n) time (n = number of kmers in graph)  
  
    __getitem__ (lexlo_string)  
        Return kmer associated with kmer string  
  
        No check is performed to make sure that the input string is a lexicographically-lowest kmer string. Use  
        get_kmer_for_string() in order to convert a kmer string to its lexlo form before retrieving it from  
        the cortex object.  
  
    __iter__ ()  
        Iterate over kmer strings in graph in order stored in graph  
  
    get_kmer_for_string (string)  
        Will compute the revcomp of kmer string before getting a kmer  
  
    items ()  
        Iterate over kmer strings and kmers in graph in order stored in graph  
  
    values ()  
        Iterate over kmers in cortex graph
```

3.2 Utility functions

This module contains utility functions that are used inside cortexpy. These functions may also be useful outside of cortexpy.

```
cortexpy.utils.kmerize_contig (contig, kmer_size)  
    Return generator of kmers in contig
```

The returned kmers are not lexicographically lowest.

```
>>> list(kmerize_contig('ATTT', 3))
['ATT', 'TTT']
```

`cortexpy.utils.kmerize_fasta` (*fasta*, *kmer_size*)

Return generator to all kmers in fasta

`cortexpy.utils.lexlo`

Return lexicographically lowest version of a kmer string and its reverse complement

The reverse complement of a kmer string is generated and the lexicographically-lowest kmer string is returned.

```
>>> lexlo('AAA')
'AAA'
```

```
>>> lexlo('TTT')
'AAA'
```

CHAPTER 4

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