datalad$_{crawler}$ Documentation

Release 0.1.0

DataLad team

Oct 31, 2019

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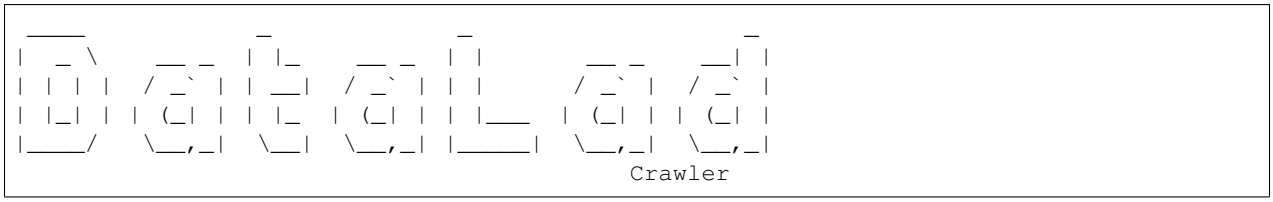
CHAPTER 1

Change log



This is a high level and scarce summary of the changes between releases. We would recommend to consult log of the DataLad git repository for more details.

1.1 0.4.3 (Oct 30, 2019) – . . . and help each other

- MNT: More changes for compatibility with developmental DataLad (#62)

1.2 0.4.2 (Oct 30, 2019) – Friends should stick together . . .

- BF: Prevent sorting error on missing attribute (#45)
- BF: enclose “if else” into () since it has lower precedence than + (#43)
- MNT: Adjust imports for compatibility with developmental DataLad (#53)
- MNT: Update save() call for compatibility with new save (#42)

1.3 0.4.1 (Jun 20, 2019) – Let us all stay friends

- Compatibility layer with 0.12 series of DataLad changing API (no backend option for `create`)

1.4 0.4 (Mar 14, 2019) – There is more to life than a Pi

Primarily a variety of fixes and small enhancements. The only notable change is stripping away testing/support of git-annex direct mode.

- do not depend on a release candidate of the DataLad, since PIP then opens the way to a RCs for any later releases to be installed
- `simple_with_archives`
  - issue warning if incoming_pipeline has Annexificator but no `annex` is given
- `crcns`
  - skip (but warn if relevant) records without xml
- do not crash while saving updated crawler's URL db to the file which is annexed.

1.5 0.3 (Feb 06, 2019) – Happy New Year

Primarily a variety of fixes

- `crcns` crawler now uses new datacite interface
- `openfmri` crawler uses legacy.openfmri.org
- `simple_with_archives`
  - by default now also match pure .gz files to be downloaded
  - `archives_re` option provides regex for archives files (so `.gz` could be added if needed)
  - will now run with `tarballs=False`
  - `add_annex_to_incoming_pipeline` to state either to add `annex` to the incoming pipeline
- new `stanford_lib` pipeline
- aggregation of metadata explicitly invokes incremental mode
- tests
  - variety of tests lost their `@known_failure_v6` and now tollerant to upcoming datalad 0.11.2

1.6 0.2 (May 17, 2018) – The other Release

- All non-master branches in the pipelines now will initiate from master branch, not detached. That should allow to inherit .gitattributes settings of the entire dataset

1.7 0.1 (May 11, 2018) – The Release

- First release as a DataLad extension. Functionality remains identical to DataLad 0.10.0.rc2

CHAPTER 2

Acknowledgments

DataLad development is being performed as part of a US-German collaboration in computational neuroscience (CRCNS) project "DataGit: converging catalogues, warehouses, and deployment logistics into a federated 'data distribution'" (Halchenko/Hanke), co-funded by the US National Science Foundation (NSF 1429999) and the German Federal Ministry of Education and Research (BMBF 01GQ1411). Additional support is provided by the German federal state of Saxony-Anhalt and the European Regional Development Fund (ERDF), Project: Center for Behavioral Brain Sciences, Imaging Platform

DataLad is built atop the git-annex software that is being developed and maintained by Joey Hess.

CHAPTER 3

DataLad Crawler 101

3.1 Nodes

A node in a pipeline is just a callable (function of a method of a class) which takes a dictionary, and yields a dictionary any number of times. The simplest node could look like

```
>>> def add1_node(data, field='input'):
...     data_ = data.copy()
...     data_['input'] += 1
...     yield data_
```

which creates a simple node, intended to increment an arbitrary (specified by *field* keyword argument) field in the input dictionary and yields a modified dictionary as its output once.

```
>>> next(add1_node({'input': 1}))
{'input': 2}
```

Nodes are generators which yield a dictionary zero, one, or multiple times and yield a dictionary. For more on generators, reference the Python documentation on Generators.

Note: Nodes should not have side-effects, i.e. they should not modify input data, but yield a shallow copy if any of the field values need to be added, removed, or modified. To help with creation of a new shallow copy with some fields adjusted, use `updated()`.

3.2 Pipelines

A pipeline is a series of generators ordered into a list. Each generator takes the output of its predecessor as its own input. The first node in the pipeline would need to be provided with specific input. The simplest pipeline could look like

```
>>> from datalad.crawler.nodes.crawl_url import crawl_url
>>> from datalad.crawler.nodes.matches import a_href_match
>>> from datalad.crawler.nodes.annex import Annexificator
>>> annex = Annexificator(allow_dirty=True)  # so we could demo right within
>>> pipeline = \
...     [
...     crawl_url('http://map.org/datasets'),
...     a_href_match(".*\.mat"),
...     annex
...     ]
```

in which the first node (method of a class) is provided with input and crawls a website. *a_href_match* then works to output all files that end in *.mat*, and those files are lastly inputted to *annex*, another node, which simply annexes them.

Note: Since pipelines depend heavily on nodes, these nodes must yield in order for an output to be produced. If a generator fails to yield, then the pipeline can no longer continue and it is stopped at that node.

3.3 Subpipelines

A subpipline is a pipeline that lives within a greater pipeline and is also denoted by *[]*. Two subpipelines that exist on top of one another will take in the same input, but process it with different generators. This functionality allows for the same input to be handled in two or more (depending on the number of subpipelines) different manners.

TODO: 'FinishPipeline' exception here `FinishPipeline`

CHAPTER 4

Demo

4.1 Track data from a webpage

With a few lines DataLad is set up to track data posted on a website, and obtain changes made in the future...

The website http://www.fmri-data-analysis.org/code provides code and data file for examples in a text book.

We will set up a dataset that DataLad uses to track the content linked from this webpage

Let's create the dataset, and configure it to track any text file directly in Git. This will make it very convenient to see how source code changed over time.

```
~ % datalad create --text-no-annex demo
[INFO   ] Creating a new annex repo at /demo/demo
create(ok): /demo/demo (dataset)
~ % cd demo
```

DataLad's crawler functionality is used to monitor the webpage. It's configuration is stored in the dataset itself.

The crawler comes with a bunch of configuration templates. Here we are using one that extract all URLs that match a particular pattern, and obtains the linked data. In case of this webpage, all URLs of interest on that page seems to have 'd=1' suffix

```
~/demo % datalad crawl-init --save --template=simple_with_archives url=http://www.
↪fmri-data-analysis.org/code 'a_href_match_=.*d=1$'
[INFO   ] Creating a pipeline to crawl data files from http://www.fmri-data-analysis.
↪org/code
[INFO   ] Initiating special remote datalad-archives
[INFO   ] Not adding annex.largefiles=exclude=README* and exclude=LICENSE* to git␣
↪annex calls because already defined to be (not(mimetype=text/*))
~/demo % datalad diff --revision @~1
         added(file): .datalad/crawl/crawl.cfg
~/demo % cat .datalad/crawl/crawl.cfg
[crawl:pipeline]
template = simple_with_archives
```

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```
_url = http://www.fmri-data-analysis.org/code
_a_href_match_ = .*d=1$
```

With this configuration in place, we can ask DataLad to crawl the webpage.

```
~/demo % datalad crawl
[INFO   ] Loading pipeline specification from ./.datalad/crawl/crawl.cfg
[INFO   ] Creating a pipeline to crawl data files from http://www.fmri-data-analysis.
↪org/code
[INFO   ] Not adding annex.largefiles=exclude=README* and exclude=LICENSE* to git␣
↪annex calls because already defined to be (not(mimetype=text/*))
[INFO   ] Running pipeline [<function switch_branch at 0x7f9147061488>, [[<datalad.
↪crawler.nodes.crawl_url.crawl_url object at 0x7f9135c6ad50>, a_href_match(query='.
↪*d=1$'), <function fix_url at 0x7f914b7a9cf8>, <datalad.crawler.nodes.annex.
↪Annexificator object at 0x7f9135c4b810>]], <function switch_branch at␣
↪0x7f9135c51de8>, [<function merge_branch at 0x7f9135c51050>, [find_files(dirs=False,
↪ fail_if_none=True, regex='\\.(zip|tgz|tar(\\..+)?)$', topdir='.'), <function _add_
↪archive_content at 0x7f9135c51e60>]], <function switch_branch at 0x7f9135c51ed8>,
↪<function merge_branch at 0x7f9135c51f50>, <function _finalize at 0x7f9135c74050>]
[INFO   ] Found branch non-dirty -- nothing was committed
[INFO   ] Checking out master into a new branch incoming
[INFO   ] Fetching 'http://www.fmri-data-analysis.org/code'
[INFO   ] Need to download 950 Bytes from http://www.fmri-data-analysis.org/code/
↪figure_2_12.R?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 656 Bytes from http://www.fmri-data-analysis.org/code/
↪figure_2_14.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 4.3 kB from http://www.fmri-data-analysis.org/code/figure_
↪2_3.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 453.1 kB from http://www.fmri-data-analysis.org/code/
↪figure_3_14.tgz?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 486 Bytes from http://www.fmri-data-analysis.org/code/
↪figure_3_8.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 255 Bytes from http://www.fmri-data-analysis.org/code/
↪figure_3_9.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 321.6 kB from http://www.fmri-data-analysis.org/code/
↪figure_4_7.tgz?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 2.1 kB from http://www.fmri-data-analysis.org/code/figure_
↪5_10.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 1.1 kB from http://www.fmri-data-analysis.org/code/figure_
↪5_11.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 2.5 kB from http://www.fmri-data-analysis.org/code/figure_
↪5_12.zip?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 1.5 kB from http://www.fmri-data-analysis.org/code/figure_
↪5_3.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 110.4 kB from http://www.fmri-data-analysis.org/code/
↪figure_8_11.tgz?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 1.7 kB from http://www.fmri-data-analysis.org/code/figure_
↪8_2.m?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 3.2 kB from http://www.fmri-data-analysis.org/code/figure_
↪9_1.R?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 9.8 kB from http://www.fmri-data-analysis.org/code/figure_
↪9_2.R?attredirects=0&d=1. No progress indication will be reported
[INFO   ] Need to download 9.8 kB from http://www.fmri-data-analysis.org/code/figure_
↪9_3.R?attredirects=0&d=1. No progress indication will be reported
                                                                                [INFO␣
↪  ] Repository found dirty -- adding and committing
                                                                                [INFO␣
↪  ] Checking out a new detached branch incoming-processed
```

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```
[INFO   ] Initiating 1 merge of incoming using strategy theirs
                                                                                [INFO␣
↪  ] Adding content of the archive ./figure_4_7.tgz into annex <AnnexRepo path=/demo/
↪demo (<class 'datalad.support.annexrepo.AnnexRepo'>)>
[INFO   ] Finished adding ./figure_4_7.tgz: Files processed: 4, +git: 1, +annex: 3
[INFO   ] Adding content of the archive ./figure_8_11.tgz into annex <AnnexRepo path=/
↪demo/demo (<class 'datalad.support.annexrepo.AnnexRepo'>)>
[INFO   ] Finished adding ./figure_8_11.tgz: Files processed: 7, renamed: 7, +git: 4,␣
↪+annex: 3
[INFO   ] Adding content of the archive ./figure_5_12.zip into annex <AnnexRepo path=/
↪demo/demo (<class 'datalad.support.annexrepo.AnnexRepo'>)>
[INFO   ] Finished adding ./figure_5_12.zip: Files processed: 3, skipped: 1, renamed:␣
↪2, +git: 2
[INFO   ] Adding content of the archive ./figure_3_14.tgz into annex <AnnexRepo path=/
↪demo/demo (<class 'datalad.support.annexrepo.AnnexRepo'>)>
[INFO   ] Finished adding ./figure_3_14.tgz: Files processed: 6, renamed: 6, +annex: 6
[INFO   ] Repository found dirty -- adding and committing
                                                                                [INFO␣
↪  ] Checking out an existing branch master
[INFO   ] Initiating 1 merge of incoming-processed using strategy None
[INFO   ] Found branch non-dirty -- nothing was committed
[INFO   ] House keeping: gc, repack and clean
[INFO   ] Finished running pipeline: URLs processed: 16, downloaded: 16, size: 923.4␣
↪kB,  Files processed: 40, skipped: 1, renamed: 15, +git: 19, +annex: 16,  Branches␣
↪merged: incoming->incoming-processed
[INFO   ] Total stats: URLs processed: 16, downloaded: 16, size: 923.4 kB,  Files␣
↪processed: 40, skipped: 1, renamed: 15, +git: 19, +annex: 16,  Branches merged:␣
↪incoming->incoming-processed,  Datasets crawled: 1
```

All files have been obtained and are ready to use. Here is what DataLad recorded for this update

```
~/demo % git show @ -s
commit 3a8033d45cf7a96b523d927e02cf9d6a79f8e30e (HEAD -> master, incoming-processed)
Author: DataLad Demo <demo@datalad.org>
Date:   Fri Mar 16 08:41:22 2018 +0100

    [DATALAD] Added files from extracted archives

    Files processed: 24
     skipped: 1
     renamed: 15
     +git: 7
     +annex: 12
    Branches merged: incoming->incoming-processed
```

Any file from the webpage is available locally.

```
~/demo % ls
all_rois.txt    figure_4_7.sh  figure_9_3.R
dat.txt                 figure_5_10.m  flirt_thresh_zstat1.nii.gz
fair_abbrevs.txt   figure_5_11.m  fnirt_thresh_zstat1.nii.gz
fair_networks.txt  figure_5_12.m  mean_func.nii.gz
figure_2_12.R           figure_5_3.m   zstat1_0mm.nii.gz
figure_2_14.m           figure_8_11.R  zstat1_16mm.nii.gz
figure_2_3.m    figure_8_2.m   zstat1_32mm.nii.gz
figure_3_8.m    figure_9_1.R   zstat1_4mm.nii.gz
figure_3_9.m    figure_9_2.R   zstat1_8mm.nii.gz
```

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```
~/demo % #
```

The webpage can be queried for potential updates at any time by re-running the 'crawl' command.

```
~/demo % datalad crawl
[INFO   ] Loading pipeline specification from ./.datalad/crawl/crawl.cfg
[INFO   ] Creating a pipeline to crawl data files from http://www.fmri-data-analysis.
↪org/code
[INFO   ] Not adding annex.largefiles=exclude=README* and exclude=LICENSE* to git␣
↪annex calls because already defined to be (not(mimetype=text/*))
[INFO   ] Running pipeline [<function switch_branch at 0x7f47abaf3488>, [[<datalad.
↪crawler.nodes.crawl_url.crawl_url object at 0x7f479a6fcd50>, a_href_match(query='.
↪*d=1$'), <function fix_url at 0x7f47b023acf8>, <datalad.crawler.nodes.annex.
↪Annexificator object at 0x7f479a6dd810>]], <function switch_branch at␣
↪0x7f479a6e3de8>, [<function merge_branch at 0x7f479a6e3050>, [find_files(dirs=False,
↪ fail_if_none=True, regex='\\.(zip|tgz|tar(\\..+)?)$', topdir='.'), <function _add_
↪archive_content at 0x7f479a6e3e60>]], <function switch_branch at 0x7f479a6e3ed8>,
↪<function merge_branch at 0x7f479a6e3f50>, <function _finalize at 0x7f479a706050>]
[INFO   ] Found branch non-dirty -- nothing was committed
[INFO   ] Checking out an existing branch incoming
[INFO   ] Fetching 'http://www.fmri-data-analysis.org/code'
                                                                                [INFO␣
↪  ] Found branch non-dirty -- nothing was committed
[INFO   ] Checking out an existing branch incoming-processed
[INFO   ] Found branch non-dirty -- nothing was committed
[INFO   ] Checking out an existing branch master
[INFO   ] Finished running pipeline: URLs processed: 16,  Files processed: 16,␣
↪skipped: 16
[INFO   ] Total stats: URLs processed: 16,  Files processed: 16, skipped: 16, ␣
↪Datasets crawled: 1
```

Files can be added, or removed from this dataset without impairing the ability to get updates from the webpage. DataLad keeps the necessary information in dedicated Git branches.

```
~/demo % git branch
  git-annex
  incoming
  incoming-processed
* master
```

CHAPTER 5

Command line reference

CHAPTER 6

Python API

6.1 Python module reference

This module reference extends the manual with a comprehensive overview of the available functionality. Each module in the package is documented by a general summary of its purpose and the list of classes and functions it provides.

6.1.1 Commands

`crawl`
`crawl_init`

6.1.2 Pipelines

`pipeline`

CHAPTER 7

Indices and tables

- genindex
- modindex
- search