ome_demo

June 8, 2021

1 ezomero Demo

2 OME Community Meeting 2021

2.1 Before we begin…

For this demo, I am connecting to a JAX OMERO server via our VPN, so you will not be able to follow along exactly.

I am using a MacBook Pro running macOS Catalina, working in a simple conda environment in which I installed:

- python 3.7
- ezomero (via pip)
- jupyterlab (via conda-forge)
- matplotlib

All other dependencies (including OMERO.py) were automatically installed.

2.2 Create a connection

2.2.1 Create a connection from parameters

[1]:
```python
# All functions in ezomero have useful docstrings
import ezomero

%pdoc ezomero.connect
```

```
Class docstring:
    Create an OMERO connection

    This function will create an OMERO connection by populating certain
    parameters for ``omero.gateway.BlitzGateway`` initialization by the
    procedure described in the notes below. Note that this function may
    ask for user input, so be cautious if using in the context of a script.

    Finally, don't forget to close the connection ``conn.close()`` when it
    is no longer needed!

    Parameters
```

```
----------
user : str, optional
    OMERO username.

password : str, optional
    OMERO password.

group : str, optional
    OMERO group.

host : str, optional
    OMERO.server host.

port : int, optional
    OMERO port.

secure : boolean, optional
    Whether to create a secure session.

config_path : str, optional
    Path to directory containing '.ezomero' file that stores connection
    information. If left as ``None``, defaults to the home directory as
    determined by Python's ``pathlib``.

Returns
-------
conn : ``omero.gateway.BlitzGateway`` object or None
    OMERO connection, if successful. Otherwise an error is logged and
    returns None.

Notes
-----
The procedure for choosing parameters for ``omero.gateway.BlitzGateway``
initialization is as follows:

1) Any parameters given to `ezconnect` will be used to initialize
   ``omero.gateway.BlitzGateway``

2) If a parameter is not given to `ezconnect`, populate from variables
   in ``os.environ``:
    * OMERO_USER
    * OMERO_PASS
    * OMERO_GROUP
    * OMERO_HOST
    * OMERO_PORT
    * OMERO_SECURE

3) If environment variables are not set, try to load from a config file.
```

```
        This file should be called '.ezomero'. By default, this function will
        look in the home directory, but ``config_path`` can be used to specify
        a directory in which to look for '.ezomero'.

        The function ``ezomero.store_connection_params`` can be used to create
        the '.ezomero' file.

        Note that passwords can not be loaded from the '.ezomero' file. This is
        to discourage storing credentials in a file as cleartext.

     4) If any remaining parameters have not been set by the above steps, the
        user is prompted to enter a value for each unset parameter.
Call docstring:
    Call self as a function.
```

[2]:
```python
conn = ezomero.connect(user='djme',
                       group='Research IT',
                       host='bhomero01lp',
                       port=4064,
                       secure=True)
```

```
Enter password:  ·············
```

[3]:
```python
ezomero.print_groups(conn)
```

```
Groups:
                  default: 3    member
                   Public: 53
       Microscopy_Service: 103
               Canine_PDX: 104
               Murray Lab: 105
             Korstanjelab: 106
                      MTB: 107
                 KOMP_eye: 153  member
               Hinson Lab: 203
              Nishina Lab: 204
                JAX_Hacks: 253  owner
         Bolcun-Filas Lab: 303
              Research IT: 304  owner
              Verhaak Lab: 353  owner
           KOMP_histopath: 403  member
                     Cube: 453
             OConnell Lab: 503
               Robson Lab: 504
                Braun Lab: 505
            Rosenthal Lab: 553
                      GRS: 603
```

[4]:
```
print(conn.group)
```

```
Research IT
```

[5]:
```
conn.close()
```

2.2.2 Create a connection from prompts

[6]:
```
conn = ezomero.connect()
```

```
Enter username:  djme
Enter password:  ·············
Enter group name (or leave blank for default group):
Enter host:  bhomero01lp
Enter port:  4064
Secure session (True or False):  t
```

[7]:
```
conn.close()
```

2.2.3 Create a connection from stored parameters

[8]:
```
ezomero.store_connection_params()
```

```
Enter username:  djme
Enter group name (or leave blank for default group):
Enter host:  bhomero01lp
Enter port:  4064
Secure session (True or False):  t

Connection settings saved to /Users/djme/.ezomero
```

[9]:
```
# Note you still get prompted for password
conn = ezomero.connect()
```

```
Enter password:  ·············
```

[10]:
```
conn.close()
```

2.2.4 Create a connection from evironment variables

[11]:
```
# first remove the stored connection parameters

import os
try:
    os.remove('/Users/djme/.ezomero')
except FileNotFoundError:
    pass
```

```
# Setting these using some jupyter magic.
# You wouldn't necessarily do this in practice
%env OMERO_USER=djme
%env OMERO_GROUP=JAX_Hacks
%env OMERO_HOST=bhomero01lp
```

```
env: OMERO_USER=djme
env: OMERO_GROUP=JAX_Hacks
env: OMERO_HOST=bhomero01lp
```

[12]:
```
# Since we didn't use all environment variables, we get prompts
conn = ezomero.connect()
```

```
Enter password:  ·············
Enter port:  4064
Secure session (True or False):  True
```

[13]:
```
conn.group
```

[13]:
```
'JAX_Hacks'
```

[14]:
```
conn.close()
```

2.3 Browse OMERO data

[15]:
```
conn = ezomero.connect('djme',
                       group='Research IT',
                       host='bhomero01lp',
                       port=4064,
                       secure=True)
```

```
Enter password:  ·············
```

[16]:
```
ezomero.print_projects(conn)
```

```
Projects:
        test_friday:    501
        zarr:   553
        testdata:       559
        test:   652
        test_auto:      902
        test_auto2:     903
        test_auto1:     904
```

[17]:
```
ezomero.print_datasets(conn, 501)
```

```
Datasets in Project "test_friday":
        test_ds_friday: 1456
```

```
[18]: im_ids = ezomero.get_image_ids(conn, dataset=1456)
      print(im_ids)
```

```
[24902, 24901]
```

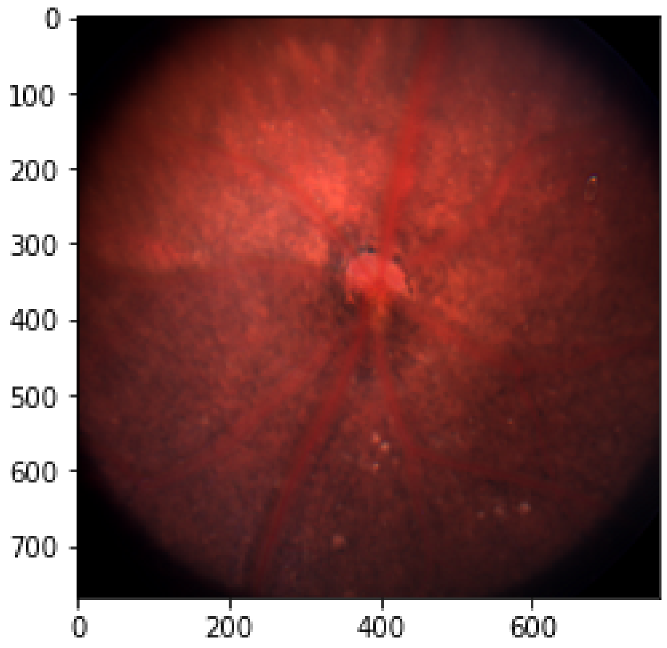
```
[19]: import numpy as np

      # grab an image
      im_obj, pix = ezomero.get_image(conn, 24901)
      pix.shape  # tzyxc (skimage convention)
```

```
[19]: (1, 1, 768, 768, 3)
```

```
[20]: im = np.squeeze(pix)
      im.shape
```

```
[20]: (768, 768, 3)
```

```
[21]: import matplotlib.pyplot as plt
      plt.imshow(im);
```



2.4 Creating Projects, Datasets, and Images

```
[22]: ezomero.print_projects(conn)
```

```
Projects:
        test_friday:    501
        zarr:   553
        testdata:       559
        test:   652
        test_auto:      902
        test_auto2:     903
        test_auto1:     904
```

[23]:
```
pid = ezomero.post_project(conn, "OMEdemo2021", description='This is a demo')
print(pid)
```

```
913
```

[24]:
```
ezomero.print_projects(conn)
```

```
Projects:
        test_friday:    501
        zarr:   553
        testdata:       559
        test:   652
        test_auto:      902
        test_auto2:     903
        test_auto1:     904
        OMEdemo2021:    913
```

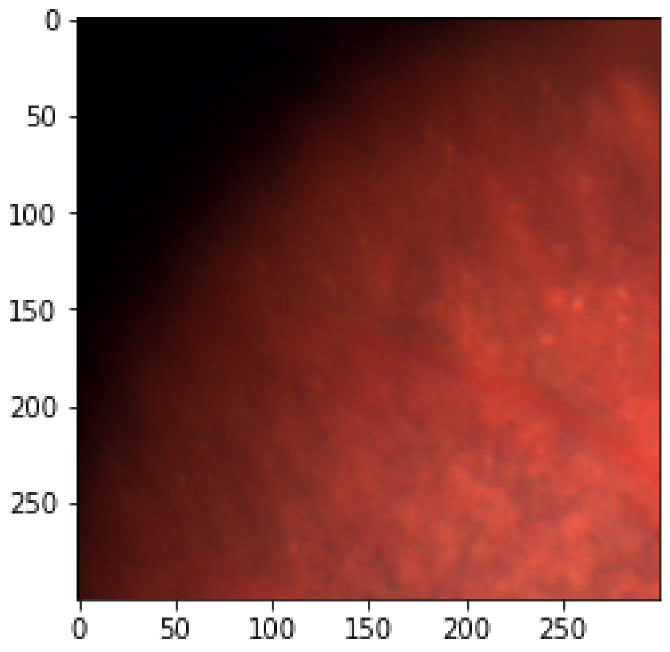
[25]:
```
did = ezomero.post_dataset(conn, "test dataset", description='This is our␣
 ↪dataset', project_id=pid)
print(did)
```

```
2586
```

[26]:
```
ezomero.print_datasets(conn, pid)
```

```
Datasets in Project "OMEdemo2021":
        test dataset:   2586
```

[27]:
```
# Crop image
crop_im = im[:300,:300,:]
plt.imshow(crop_im);
```



```
[28]: crop_im.shape
```

```
[28]: (300, 300, 3)
```

```
[29]: # Need to rearrange axes into OMERO style (XYZCT)

      omero_im = np.moveaxis(crop_im[:, :, None, :, None], 0, 1)
      omero_im.shape
```

```
[29]: (300, 300, 1, 3, 1)
```

```
[30]: im_id = ezomero.post_image(conn, omero_im,
                                 image_name='gradient_image',
                                 dataset_id=did,
                                 source_image_id=24901)
      ezomero.get_image_ids(conn, did)
```

```
WARNING:root:Using this function to save images to OMERO is not recommended when
`transfer=ln_s` is the primary mechanism for data import on your OMERO instance.
Please consult with your OMERO administrator.
```

```
[30]: [128137]
```

2.5 Working with MapAnnotations

[31]:
```
# The key-value pairs of MapAnnotations are basically dicts
d = {'key1': 'value1',
     'antibody': 'my favorite ab',
     'temp (C)': 27}
ns = 'jax.org/example/namespace'

map_ann_id = ezomero.post_map_annotation(conn, 'Image', im_id, kv_dict=d, ns=ns)
print(map_ann_id)
```

```
102287
```

[32]:
```
# Retrieve the MapAnnotation we just posted
map_ann = ezomero.get_map_annotation(conn, map_ann_id)
print(map_ann)
```

```
{'key1': 'value1', 'antibody': 'my favorite ab', 'temp (C)': '27'}
```

[33]:
```
# Change a value and update original MapAnnotation
map_ann['temp (C)'] = 25
ezomero.put_map_annotation(conn, map_ann_id, map_ann)
new_map_ann = ezomero.get_map_annotation(conn, map_ann_id)
print(new_map_ann)
```

```
{'key1': 'value1', 'antibody': 'my favorite ab', 'temp (C)': '25'}
```

[34]:
```
conn.close()
```