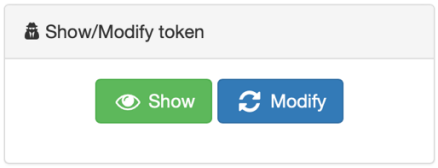
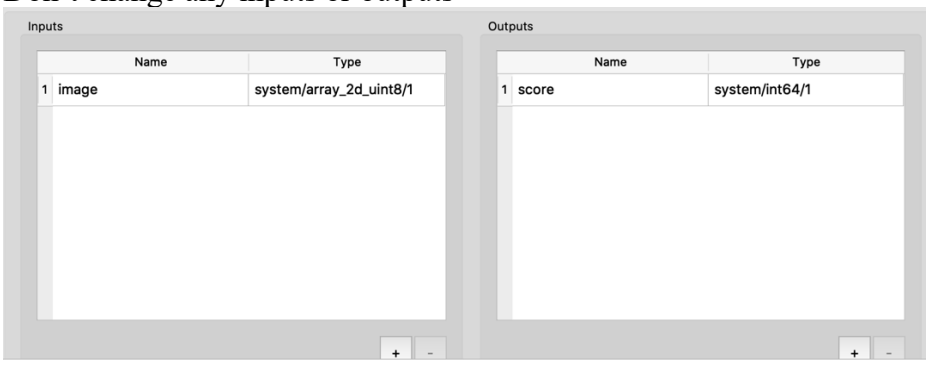
ADDING ALGORITHMS TO BEAT

Setup:

1. Install the BEAT editor by following the instructions here: https://www.idiap.ch/software/beat/docs/beat/docs/stable/beat/install.html
2. Set up the editor
    a. Create a folder to serve as your prefix. Set this folder as the prefix by running "beat config set prefix <your folder path>"
    b. Set your username using "beat config set user <your username>"
    c. Set your token using "beat config set token <token>"
3. If you need to find your token
    a. Log into the BEAT platform (https://www.beat-eu.org/platform/)
    b. Go to User Settings
    c. Click Show token



4. Download the base algorithm by running "beat algorithms pull jmcgrat3/LivDet-Iris-2020-Base/1"
5. Verify that the algorithm appears if you run "beat algorithms list"
6. Fork the algorithm by running "beat algorithms fork jmcgrat3/LivDet-Iris-2020-Base/1 <user>/<new name>/1"
7. Go to User Resources > Algorithms (see https://www.idiap.ch/software/beat/docs/beat/docs/master/beat/beat.web/doc/user/algorithms/guide.html for more information)
8. View your algorithm by running "beat editor start"
    a. Don't change any inputs or outputs



    b. You can add any parameters your algorithm will need

9. Check your algorithm using "beat algorithm check <algorithm>"
10. Save your algorithm to the web platform by running "beat algorithms push <user>/<algorithm name>/<version>"

Development:

Python

1. The editor window should already be set up with the necessary code. Access the file

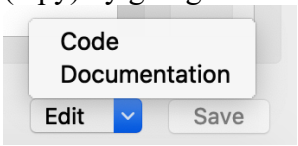
Source code:

```
class Algorithm:
    def setup(self, parameters):
        # perform some setup using the parameters
        # here, we set the score to output
        self.score_to_output = parameters['score_to_output']
        return True

    def process(self, inputs, data_loaders, outputs):
        # read the image from the input (will be np array)
        image = inputs['image'].data.value
        # perform some processing
        output = self.score_to_output
        # write to outputs
        outputs['score'].write({'value':output})
        return True

```

(1.py) by going to the algorithm in the beat editor and clicking edit in the bottom right.



2. Import any additional modules your algorithm will need (make sure they are included in the environment - http://www.iris2020.livdet.org/wp-content/uploads/2020/06/environment_beat.txt)
3. Any parameters your algorithm needs (that you added in setup step 4 above) can be loaded in the *setup* portion of the algorithm. See the examples (https://www.idiap.ch/software/beat/docs/beat/docs/master/beat/beat.web/doc/user/algorithms/guide.html) for more details
4. The inputs and outputs of the *process* portion of the algorithm should remain the same.
5. If your algorithm relies on external models, they will need to be converted to a text format and added to the *Algorithm* class

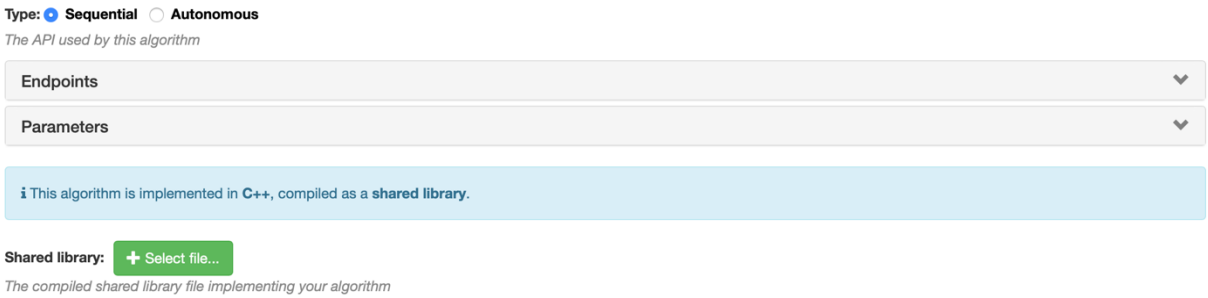
```
model = b'\x80\x03csklearn.discriminant_analysis\nLinearDiscriminantAnalysis\nq\x00)\x81q\x01}q\x02(X\

lda = pickle.loads(model)
lda
```

C++

1. Follow the instructions for setting up the environment to develop in C++ (https://www.idiap.ch/software/beat/docs/beat/docs/master/beat/beat.web/doc/user/algorithms/guide.html#implementing-an-algorithm-in-c)
    a. The docker image can be found at https://hub.docker.com/r/beatenv/beat.env.cxxdev
2. Change the algorithm you created in setup to be a C++ algorithm and save it.
3. Continue following the instructions from step 1 (pull your algorithm into the docker environment and run generate_cxx.py to create the necessary files)
4. Follow the examples to retrieve your parameters and inputs and to set your outputs
    a. https://www.idiap.ch/software/beat/docs/beat/docs/master/algorithms.html#preparation-of-an-algorithm
    b. Boost data types are used in C++
5. Make your .so file

    a. Make sure to update the cmake file to correctly link any dependencies you may need
6. Upload the file to your algorithm on the BEAT website



If you have issues when implementing your algorithm for BEAT, please ask us at jmcgrat3@alumni.nd.edu