

Opening a session:

A session should automatically open when running the default LIRA pipeline, however if you wish to call it independently, you can do the following:

1. Open a command prompt in this directory. If you are on windows, this can be done with Ctrl+Shift+RightClick -> Open command prompt...

2. Input the command ``python microscopic_prediction_editor_independent.py`` (without the ``s) to open a new interactive session. This session will be opened using the default settings / parameters, however they can be changed by opening the `microscopic_prediction_editor_independent.py` file in an editor. The information for what each parameter does can be found documented in the `microscopic_prediction_editor.py` file, however i've also included the function definition, along with this documentation below if you wish to change the parameters:

```
def edit_microscopic_predictions(sub_h=80,
    sub_w=145,
    img_archive_dir="../../lira/lira1/data/images.h5",
    resized_img_archive_dir="../../lira/lira1/data/resized_images.h5",
    predictions_archive_dir="../../lira/lira1/data/predictions.h5",
    classification_metadata_dir="../../lira_static/classification_metadata.pkl",
    interactive_session_metadata_dir="interactive_session_metadata.pkl",
    live_archive_dir="../../lira/lira2/data/live_samples.h5",
    dual_monitor=False,
    resize_factor=0.1,
    save_new_samples=False,
    rgb=True):
```

"""

Arguments:

sub_h, sub_w: The size of our individual subsections in our images. This will be resized with `resize_factor`.

img_archive_dir: Filepath of our images. Will have predictions overlaid for Interactive GUI.

resized_img_archive_dir: a string filepath of the .h5 file where the resized images will be stored.

predictions_archive_dir: Filepath of our predictions. Will be overlaid on images for Interactive GUI.

classification_metadata_dir: Filepath of our classification metadata. Will be used for handling our predictions / classifications properly.

interactive_session_metadata_dir: Filepath of our interactive session metadata.

Will be used for loading/storing user-modifiable parameters in Interactive GUI.

live_archive_dir: Filepath of our live samples archive. Will be used to store the samples obtained through our interactive session. Updated completely at the end of each session.

dual_monitor: Boolean for if we are using two monitors or not.

Shrinks the width of our display if we are, and leaves normal if not.

resize_factor: The scale to resize our image by, e.g. 0.5 will make a 400x400 image into a 200x200 image.

This should always be $0 < \text{resize_factor} \leq 1.0$

save_new_samples: Boolean for if we should save all our new labeled data in an archive.

While it will automatically keep track of the new predictions as part of the process, and update the original predictions archive, it won't save their associated image subsections / inputs.

While it would be possible to put this in a separate file, by putting it in this file: we would not be able to save the samples if we quit mid-session, we would not be able to save them automatically, and we would not be able to balance the empty slide samples to the number of other samples easily.

rgb: Boolean for if we are handling rgb images (True), or grayscale images (False).

Returns:

This is our main execution for LIRA-Live. Here, we handle all our sub-programs and scripts for LIRA-Live.

After opening our archives,

1. We check to see if we need to resize all our images again, i.e. if we stopped mid-session last time. If we do need to resize:

a. We loop through each image,
b. Resize them using our `resize_factor`, `sub_h`, and `sub_w` to get it resized just the right amount,

c. And save the images to `resized_img_archive_dir`

2. Afterwards, we loop through each image index, with which we can get the entire image and the assorted predictions.

3. We then generate an overlay from our predictions to overlay on top of our image, and open our interactive GUI session.

4. The user uses our interactive GUI to modify our predictions, checking to correct any mistakes they notice.

As they correct these, the predictions are saved after they go to the next image.

5. They can quit mid-session to open the session again later, and we will save their progress along with the metadata such as alpha transparency for the session.

6. Once they have gone through all the images, we save the predictions for the last image.

7.

a. If the option for `save_new_samples=True`, then we save all our predictions along with associated subsection inputs (at full resolution, of course) for training another model later.

b. If not, we skip the above step and we are done.

""""

Commands for using LIRA-Live in an interactive session:

1. Left Mouse Click:

Left clicking will allow you to select subsections for classification, you can also select multiple subsections with the same method as dragging the mouse allows you to do with desktop icons.

2. Right Mouse Click:

Right clicking and moving will allow you to move the viewport / area you are currently viewing around by manipulating the scroll bars.

3. "Alpha Transparency" Slider:

Changing the value of this parameter affects the transparency of the overlaid colored rectangles (predictions).

0 = full transparency, rectangles/predictions not visible.

1 = no transparency, rectangles/predictions completely opaque and lesions not visible.

If you change this, the program will remember it, even if you quit the session. Default is 0.33 .

4. Number keys 1/2/3/.../N

Notated on the right of the window, you can see the numerical keys for classifications.

Pressing one of these will change the classification of the currently selected subsection(s).

5. Refresh Session button / R key

This button will refresh the displayed image, to show changes in classifications or parameters, such as the Alpha transparency.

The changes made to either classifications or parameters do happen regardless of if refresh is pressed, it is merely a tool to show the user updates.

6. Next Image button / N key

This button will go to the next image, saving the new predictions and parameters.

7. Quit Session / Q key

This button will end the session, saving the new predictions and parameters for all images up to, **but not including**, the currently open image.

This is true for every image but the very last one, at which point it will include the currently open image because there are no others after it.

Information on saved parameters:

The position where the last user left off with LIRA-live, as well as the parameter values, can be found in the interactive_session_metadata.pkl file.

Do not modify them.

They will always be saved after the session is closed, as long as the session is not forcibly closed, due to the computer shutting off or the program being forcibly halted.

Information on quitting / ending a session / saving data:

Do not quit by closing the window, this may result in you losing updated parameter(s) or valuable progress.

As long as you exit in a normal way, using the session commands, you will not lose any progress. However, if you do exit by closing the window, you may lose some progress.

If you wish to quit, note that any changes to predictions will be saved, however depending on how you quit will affect where they are saved.

For example, if you quit on the second image:

The predictions for the first image will be updated in the archive they were drawn from.

The predictions for the second image will not be updated.

This will be true for every image, except for if the image which was quit on is the final image in the entire dataset, in which case the predictions for the final image will be updated.

If you wish to save the predictions you have on the current image, the expected way to do this is to finish correcting the predictions on that image, and then go to the next one. If you wish to quit, then just quit once you go to that next image - it will not save the predictions for the next image unless the next image is the final one in the dataset.

Information on resizing images

For our cases, the images shown are around 65,000 x 30,000 pixels at full resolution. In order to show them on screen, we resize them all down into a separate archive as one of the first steps in the program. This archive is the `resized_img_archive_dir` parameter, as shown in the documentation above.

Information on saving corrected classifications as new training data / samples

In our pipeline, we default to not saving any new samples. This means that we present the predictions obtained up to this point in the pipeline to the user, they correct any mistakes, the predictions are updated in their archive, and we move on to the next part of the pipeline.

However, this file can also be used independently (via the instructions in the first part of this README), if you wish to save all corrections as new samples or training data. Simply change the `"save_new_samples=False"` argument to `"save_new_samples=True"` by editing the `microscopic_prediction_editor_independent.py` file with your editor of choice. These new samples will be saved in the directory specified with the `live_archive_dir` argument.

Feel free to email/text/call me if you have any questions, or want anything changed for your ease of use!

Good luck, have fun,

-Blake Edwards / Dark Element