ACROBAT Annotation protocol

Phase 2

This document describes the process of creating landmark annotations for the second phase of annotations in the ACROBAT challenge. You should first be familiar with the previous documentation to follow this part.

1. Background

Now the whole dataset has been annotated once. To follow standard practices of the field, we need another set of annotations for all the points in the H&E images. In practice that is half of the points. This is the final part of the annotation process. It is done to be able to average point annotations from multiple (2) annotators to reduce human error in the dataset. The annotation tool has features that make this phase much quicker and easier than the previous one.

To speedup annotations we are using the existing annotations as a starting point with some noise added so that the annotator needs to only adjust the point location, but not search any matching structures in the images.

2. Before starting

3. Open remote connection & tunnel

Please, Do this only once before starting any Phase 2 annotations!
Delete the contents of Downloads directory so that Phase 2 annotations don't mix with Phase 1 annotations. If you are sharing a VDI account with someone else, please coordinate with others so that the Downloads directory is cleared only once for your VDI account.

4. Setup one image pair for annotation

Open the online excel sheet and you should see something like this

	A	B	C	D	E	F	G	H
1	Ihc	PW wsl_he	wsl_Ihc	link	matched_Json	download	annotator_name	done
2	HER2	/mnt/chim	/mnt/chim	http://127.0.0.1:5000/images*76		https://www.dropbox.c		
3	HER2	/mnt/chim	/mnt/chim	http://127.0.0.1:5000/images*58		https://www.dropbox.c		
4	HER2	/mnt/chim	/mnt/chim	http://127.0.0.1:5000/images*59		https://www.dropbox.c		
5	ER	/mnt/chim	/mnt/chim	http://127.0.0.1:5000/images*81		https://www.dropbox.c		
6	PGR	/mnt/chim	/mnt/chim	http://127.0.0.1:5000/images*12		https://www.dropbox.c		
7	KI67	/mnt/chim	/mnt/chim	http://127.0.0.1:5000/images*17		https://www.dropbox.c		

There is one line per image pair. For each image pair, you should do these two steps:

1. Open a link from the excel sheet in **Google Chrome browser.** If you have the tunnel open, you should see the annotation tool now.
2. Copy the link from the **download** column into **Google Chrome browser** and download premade noisy annotations. The downloaded annotation file should have the word '_noisy' in its filename.

5. User interface

The picture below shows the feature used in this final part of the annotations.

ID					
49	(65437, 65283)	(8031, 65437)	Go	👁	☐
48	(88899, 21166)	(35405, 17455)	Go	👁	☐
47	(129114, 61590)	(78196, 57092)	Go	👁	☐
46	(139397, 55377)	(89973, 49969)	Go	👁	☐

On the bottom left there is a list of annotations that is displayed once the annotations have been imported into the tool. At the end of each row, there are [Go] and [👁] buttons.

The button will center both views to the center of each annotation and it is used to go through the list of annotations quickly without the need to manually search for the points. You can easily keep track of your current annotation progress since the previously pressed button stays selected and has darker color.

The button will hide that point from the view completely, which can be optionally used to track progress but also to temporarily disable points in case there are nearby points interfering with the current point being annotated. Alternatively, you can press the button on the right before starting to annotate and display only the current image pair with the button. There is now a clickable checkbox right of each image pair. This box has no effect, but you can use it to remember which landmarks have already been done.

In case images need rotating, you can rotate the right image to match the left one with the controls at the top of the view in the right image.

A VERY IMPORTANT REMINDER: Do not refresh the browser (Ctrl-R or) while annotating as that will erase all points unless you have saved them using the "Download" button. **Make sure to download annotations at regular intervals while annotating.** If you refresh by accident, you can restore annotations from the most recently downloaded annotation file by selecting the file and pressing "import".

6. Example annotation

Now that we have opened a link from the online excel sheet and also downloaded the noisy annotation file, we need to import the noisy annotations to the tool. Click on the 'Choose file' button and select the recently downloaded file. Now press to load annotations from the selected file. Now all the annotations should be visible in the viewers and also as a list of points in the bottom left area of the tool. **Zoom both views at least to 250 microns**. Pick a from the list and click its button to focus both views to that annotation. You can see an example

of this in the figure below, where the left annotation is in its correct place and the right one has some noise added to its location. The left point is used as a reference on how to position the right point. We can now move the right point to match the point locations. **Beware not to move the point in the left view. Only points in the right view are moved - even if you think this will improve the point in the left image!** Once the locations match, this point pair is complete and we can proceed to the next one.

7. Saving annotations

Once you have annotated a couple of points, you can click the button: Download and a file with the combined name of the two images will be saved. If you are using the Google Chrome browser, the file will be automatically downloaded to the 'Downloads' directory. If it for some reason asks you where to save it, tell it to do so in the Downloads directory. You can also tell it to always save it in 'Downloads'.

8. Annotation guidelines

Here are the instructions on how each image pair from the excel file should be annotated. These are step by step instructions of the most important points to keep in mind. These can be glanced every now and then to make sure you are on the right path.

Annotating a pair of H&E and IHC images

1. Download annotation from the 'Download' column in the online excel sheet.
2. Open tool by opening a link from the '**link'** column in Google Chrome browser.
3. Select downloaded file and press import. You should now see all the annotations.
4. Zoom in both views at least to 250mu
5. Select the next annotation form the list and press 'Go' to focus both views to the annotation
6. Move the right annotation point to match the left, **make sure the zoom level is at least 250 microns**. Use the left point as a reference on how the right one should be positioned. **Be careful not to move the left point while annotating.**
7. Remember to press "Download" to download the annotations, just in case.
8. Repeat steps 5, 6 and 7 until all annotations have been corrected.
9. Once you have annotated all the points, insert the number of corrected annotations into the 'Done' column in the online excel. Also, if there was anything peculiar with this image pair, you can add a comment about that into the 'Comment' column.
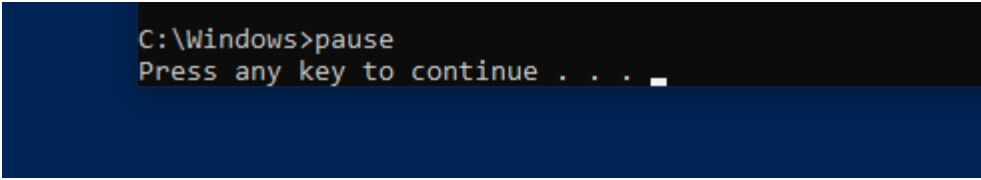
10. After annotations are done

Now that you have annotated all images in the excel sheet, there is one more step to go. You need to send the annotations to us.

Open the Documents folder again and double click the file called backup.

| backup | 2022-04-26 12:36 | Windows Batch File | 1 KB |

A black screen will appear that will ask for **the server password** twice. First type it in once (typed letters won't show on the screen) and press enter, then type in the password for the second time and again press enter. Now a list of annotation files should appear on the screen. At the bottom it should say "Press any key to continue . . .".

Press enter and the window disappears. Everything is done now.

Thank you very much for your contribution!