

The background of the slide is a complex fluorescence microscopy image. It features a dense network of fine, thread-like structures in shades of cyan, magenta, and orange against a dark, almost black background. These structures appear to be biological in nature, possibly representing cell fibers or neural pathways. The lighting is uneven, with brighter areas where the structures are more concentrated.

Bioimage Analysis for Quantitative Microscopy course

Sep 30 - Oct 04, 2024

BioCity Turku

♥ WELCOME ♥



Joanna



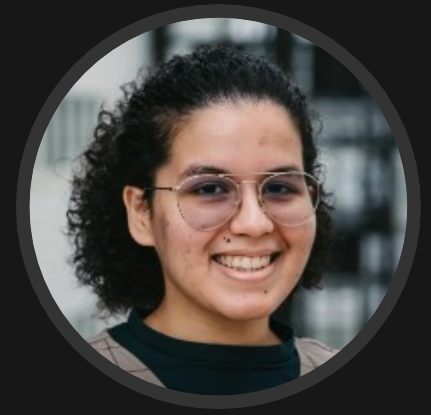
Hanna



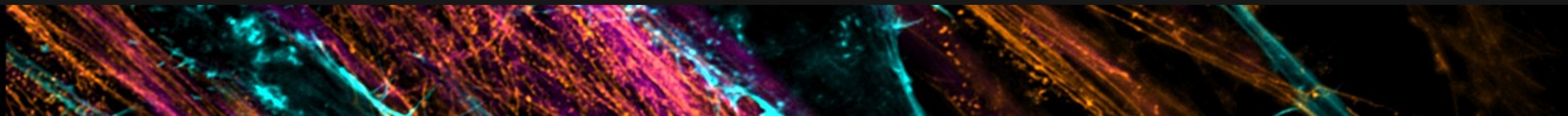
Stéphane



Sujan

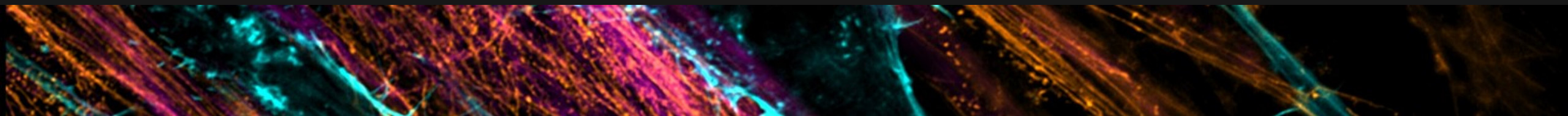


Marcela



A bit of housekeeping

- Everyone has a computer? Everyone has access to an outlet?
- Everyone has a mouse?
- Everyone has all the software installed?
- Everyone is fed and watered and ready to go?



What to expect

Bioimage Analysis for Quantitative Microscopy

Course program
30.9-4.10.2024

Trainers:
Hanna Grobe
Elnaz Fazeli
Joanna Pylvänäinen
Sujan Ghimire
Stéphane Rigaud

*open to all interested

Locations:
Auditorium Biokemi,
Biocity 3rd floor
Auditorium Biologi,
Biocity 2nd floor
Putous Auditorium, Joki
Conference Center

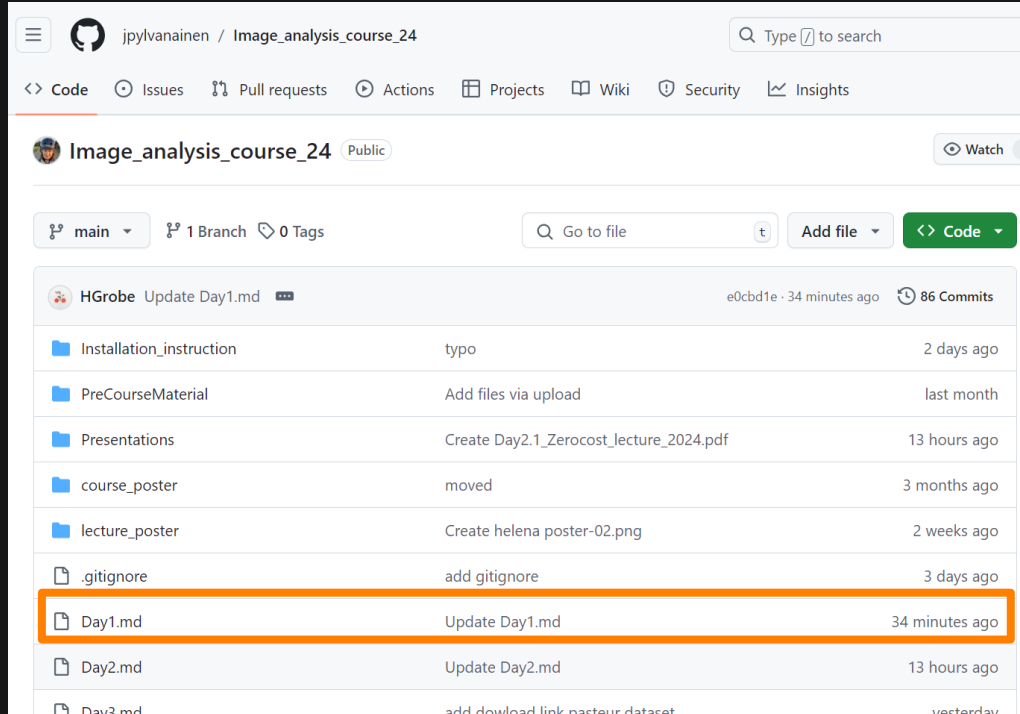
	Mon	Tue	Wed	Thu	Fri
9:00-10:00	Intro + Fiji Basics Hanna Grobe	DL lecture Joanna Pylvänäinen	QuPath Stéphane Rigaud	TrackMate + CellTracks Colab lecture Joanna Pylvänäinen	
10:00-10:15					Presentation: TBI image data team Pasi Kankaanpää
10:15-10:30	<i>break</i>	<i>break</i>	<i>break</i>	<i>break</i>	Project presentations
10:30-11:45	Fiji Basics Hanna Grobe	DL demo annotation and training Sujan Ghimire	QuPath Stéphane Rigaud	Cell tracking with TrackMate Joanna Pylvänäinen	
12-13	Lunch (at own cost)	Lunch (at own cost)	Lunch (at own cost)	Lunch (at own cost)	Lunch (at own cost)
13:00-13:15	Presentation: Euro-Biolmaging Jiri Funda, Susanne Vainio	Science talk *: Deep Learning in Microscopy Guillaume Jacquemet	Science talk *: Deep Learning in Histopathology Pekka Ruusuvuori	Keynote talk *: How to not lie with charts - better data visualisations for life sciences Helena Jambor	Science talk *: Next-generation file formats, version control, and publishing your data Junel Solis
13:15-14:00	Fiji Macros Elnaz Fazeli				
14:00-15:15		DL demo quality control Joanna Pylvänäinen	QuPath Stéphane Rigaud	Track Analysis using CellTracksColab Hanna Grobe	Work with your own data
15:15-15:30	<i>break</i>	<i>break</i>	<i>break</i>	<i>break</i>	<i>break</i>
15:30-16:45	Fiji Macros Elnaz Fazeli	DL demo apply to own data Joanna Pylvänäinen	QuPath Stéphane Rigaud	GPU accelerated Fiji image processing Stéphane Rigaud	Work with your own data Goodbye and farewell
17:00-21:00				Course dinner in Mauno	

The info for each day can be found on the GitHub page for this course:

[.../Image analysis course 24](#)

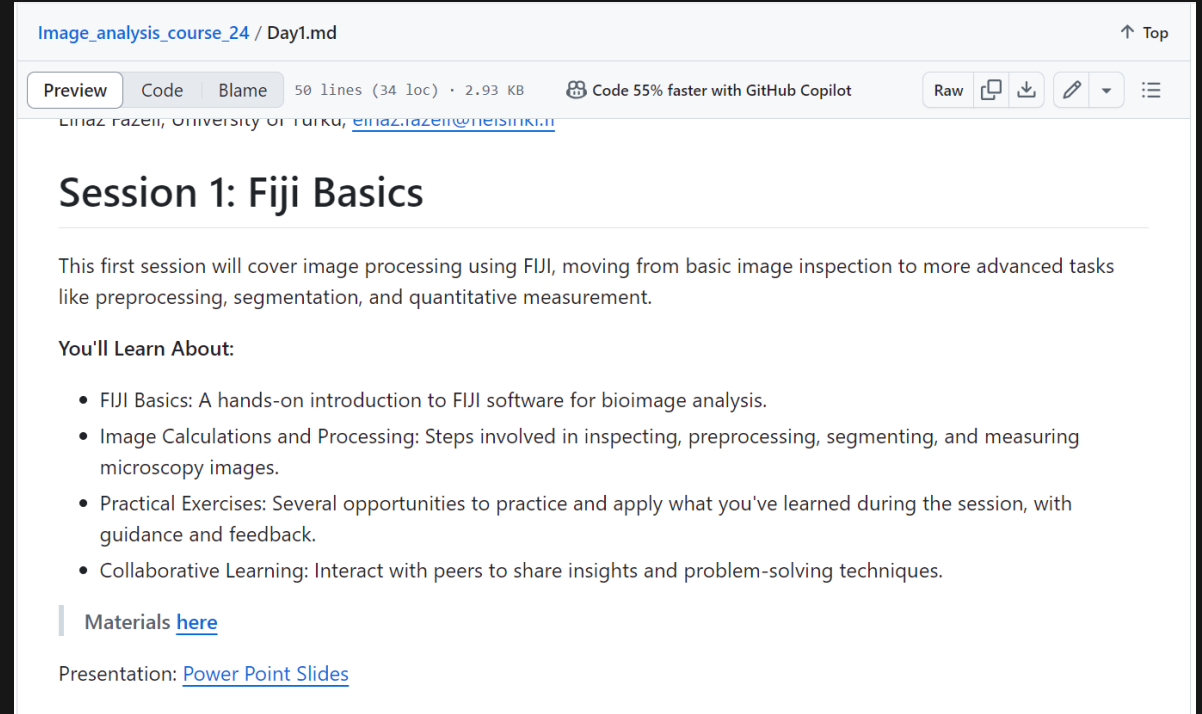
(You should also have an email with the link in your inbox.)

How the GitHub works



The screenshot shows the GitHub repository page for 'Image_analysis_course_24' by user 'jpylvanainen'. The repository is public and has 1 branch and 0 tags. The file list shows several folders and files, with 'Day1.md' highlighted by an orange box. The commit history shows a recent update to 'Day1.md' by 'HGrobe' 34 minutes ago.

File/Folder	Commit Message	Time Ago
Installation_instruction	typo	2 days ago
PreCourseMaterial	Add files via upload	last month
Presentations	Create Day2.1_Zerocost_lecture_2024.pdf	13 hours ago
course_poster	moved	3 months ago
lecture_poster	Create helena poster-02.png	2 weeks ago
.gitignore	add gitignore	3 days ago
Day1.md	Update Day1.md	34 minutes ago
Day2.md	Update Day2.md	13 hours ago
Day3.md	add download link pasteur dataset	yesterday



The screenshot shows the content of the 'Day1.md' file. It is a markdown file with 50 lines (34 loc) and 2.93 KB. The file is titled 'Session 1: Fiji Basics' and describes the first session of the course, which covers image processing using Fiji. It lists the topics to be learned and provides a link to the presentation slides.

Session 1: Fiji Basics

This first session will cover image processing using Fiji, moving from basic image inspection to more advanced tasks like preprocessing, segmentation, and quantitative measurement.

You'll Learn About:

- **Fiji Basics:** A hands-on introduction to Fiji software for bioimage analysis.
- **Image Calculations and Processing:** Steps involved in inspecting, preprocessing, segmenting, and measuring microscopy images.
- **Practical Exercises:** Several opportunities to practice and apply what you've learned during the session, with guidance and feedback.
- **Collaborative Learning:** Interact with peers to share insights and problem-solving techniques.

Materials [here](#)

Presentation: [Power Point Slides](#)

Before we get started for real...



Set a goal for the week



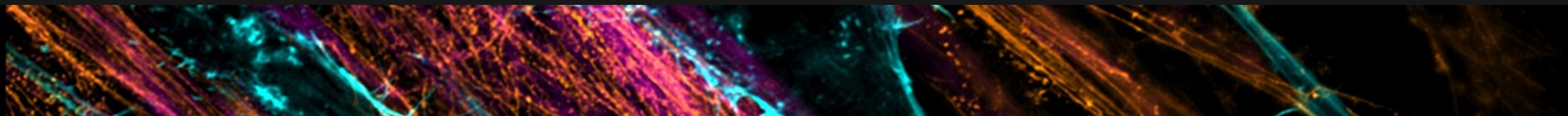
Get to know your neighbor



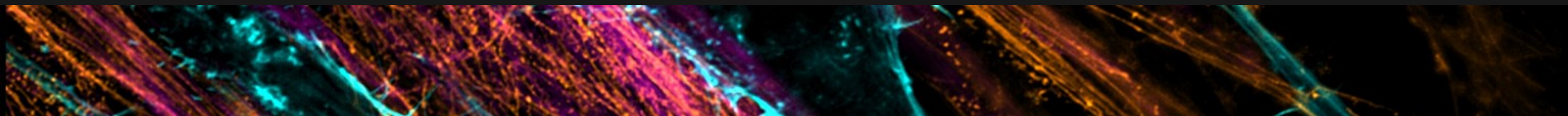
Get to know your neighbor



Be a Wally! What if you could see all the things you're doing right now?



... now to the real stuff



FIJI Basics

Bioimage Analysis for Quantitative Microscopy 30.9-4.10.2024 Trainers: Hanna Grobe Elnaz Fazeli Joanna Pylvänäinen Sujan Ghimire Stéphane Rigaud *open to all interested Locations: Auditorium Biokemi, Biocity 2 nd floor Auditorium Biologi, Biocity 3 rd floor Putous Auditorium, Joki conference center		Mon
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	14.14-15.15	
	15.15-15.30	<i>break</i>
	15.30-16.45	Fiji Macros Elnaz Fazeli
	17.00-21.00	

Part 1

Take homes from the precourse material
A walk through the image analysis pipeline

Part 2

The struggle is real - get your FIJI warmed up

Take home from the pre course

? Image conversion is affected by the image display

YES ([here's why](#))

? What Image to Image calculations are valid in Fiji? (check all that apply)

[1/3; 128x128pix; 8bit] / [128x128pix; 8-bit]






[c:1/3; z:1/7; 128x128pix; 8bit] + [128x128pix; 8-bit]

? What is the normalization factor for a 3 x 3 filter kernel, where all elements are 1?

1/9 ([here's why](#))

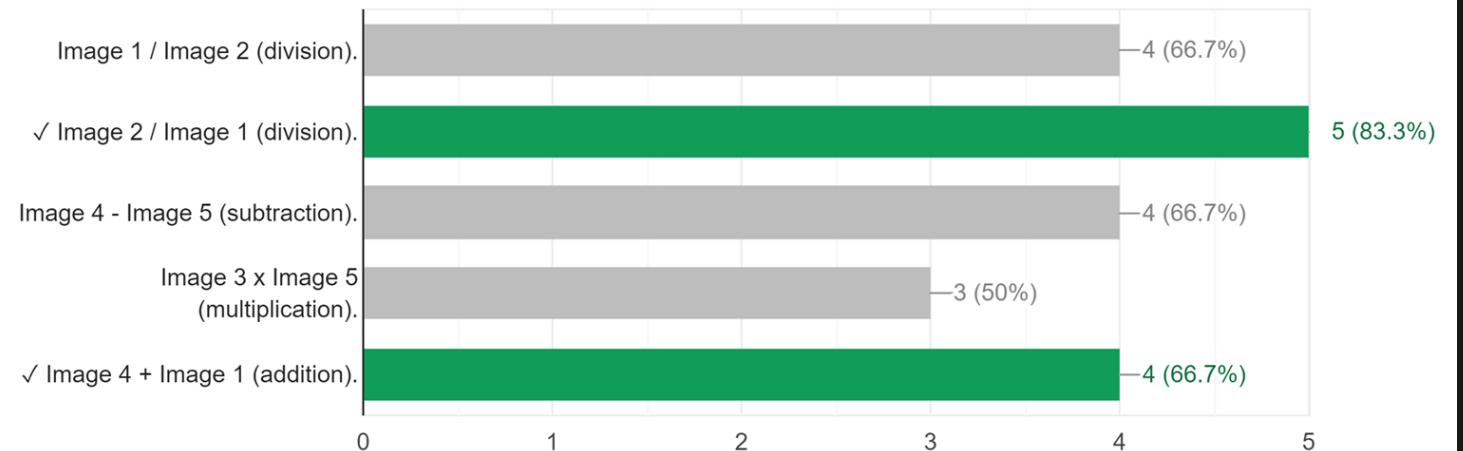
! Saving an image with an ROI in TIFF format from Fiji also saves the ROI.

Image calculations

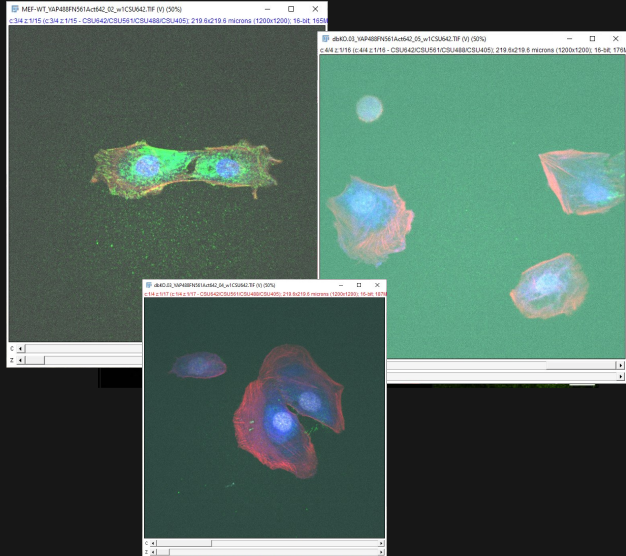
 Image 1 (200%) 128x128 pixels; 8-bit; 16K	—	<input type="checkbox"/>	✗
 Image 2 (200%) 1/3; 128x128 pixels; 8-bit; 48K	—	<input type="checkbox"/>	✗
 Image 3 256x256 pixels; 8-bit; 64K	—	<input type="checkbox"/>	✗
 Image 4 (200%) c:1/3 z:1/7; 128x128 pixels; 8-bit; 336K	—	<input type="checkbox"/>	✗
 Image 5 (200%) 1/3; 128x128 pixels; 8-bit; 48K	—	<input type="checkbox"/>	✗

What Image to Image calculations are valid in Fiji? (check all that apply)

0 / 6 correct responses

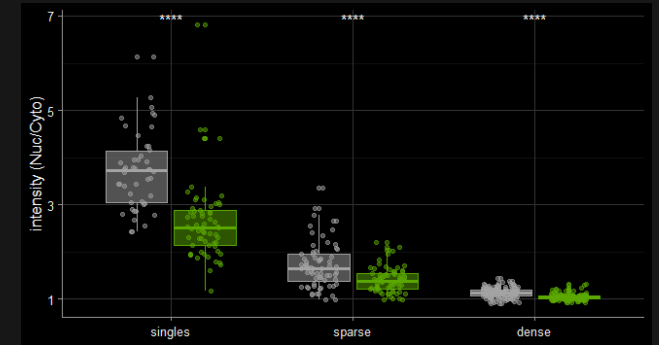


Let's get going



AIM: Analyze YAP localization

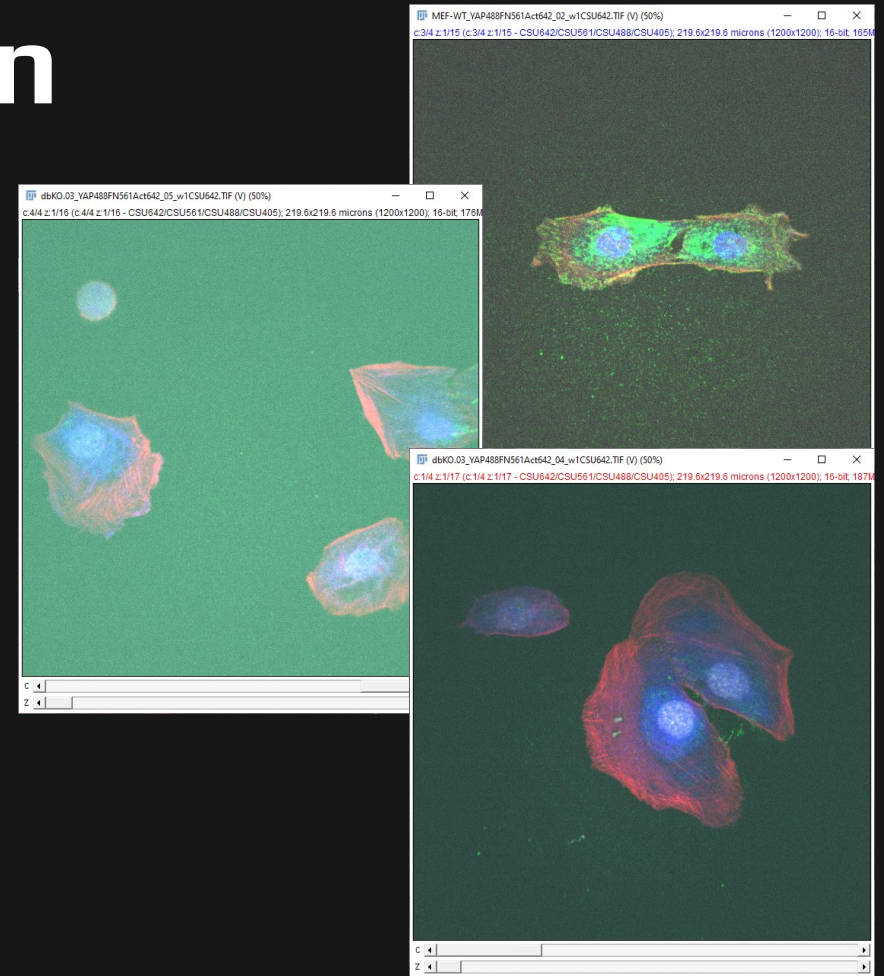
What are the steps?



FIJI Basics

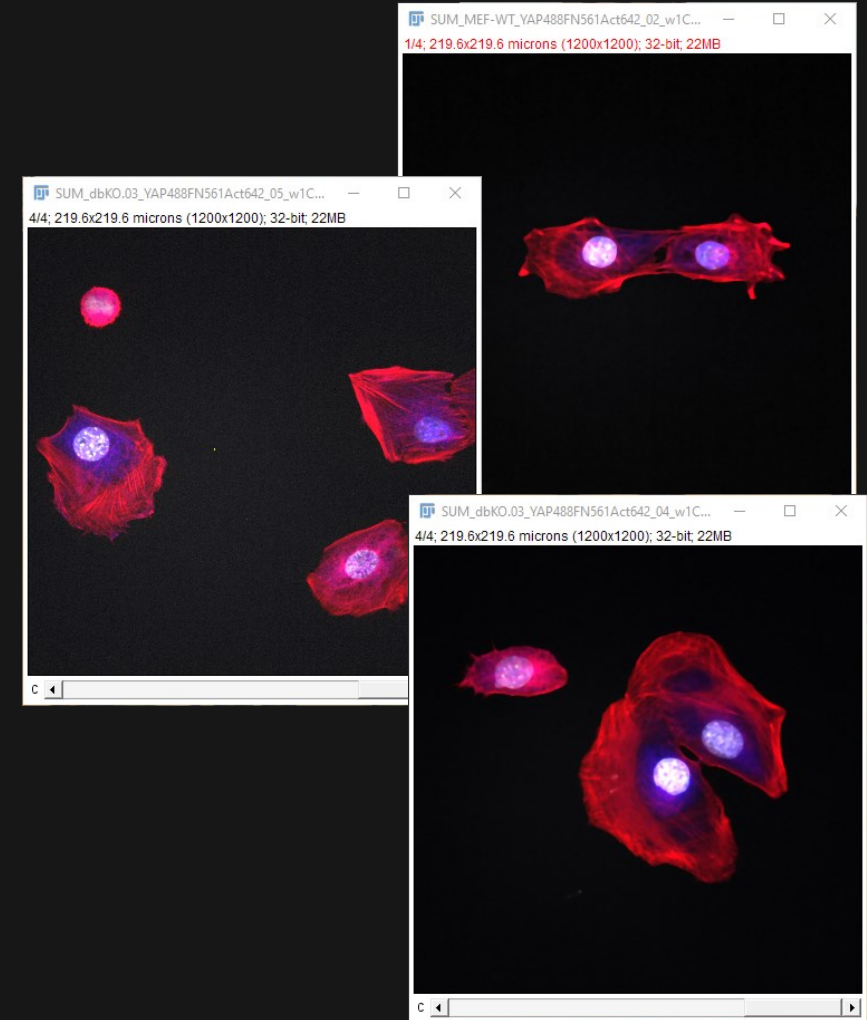
Step 1 - Image inspection

- Channels - what was stained
- Stack - do we have z stacks (and do we need them)
- Are there artefacts
- Are the images calibrated
- Did our target stay in focus
- ...



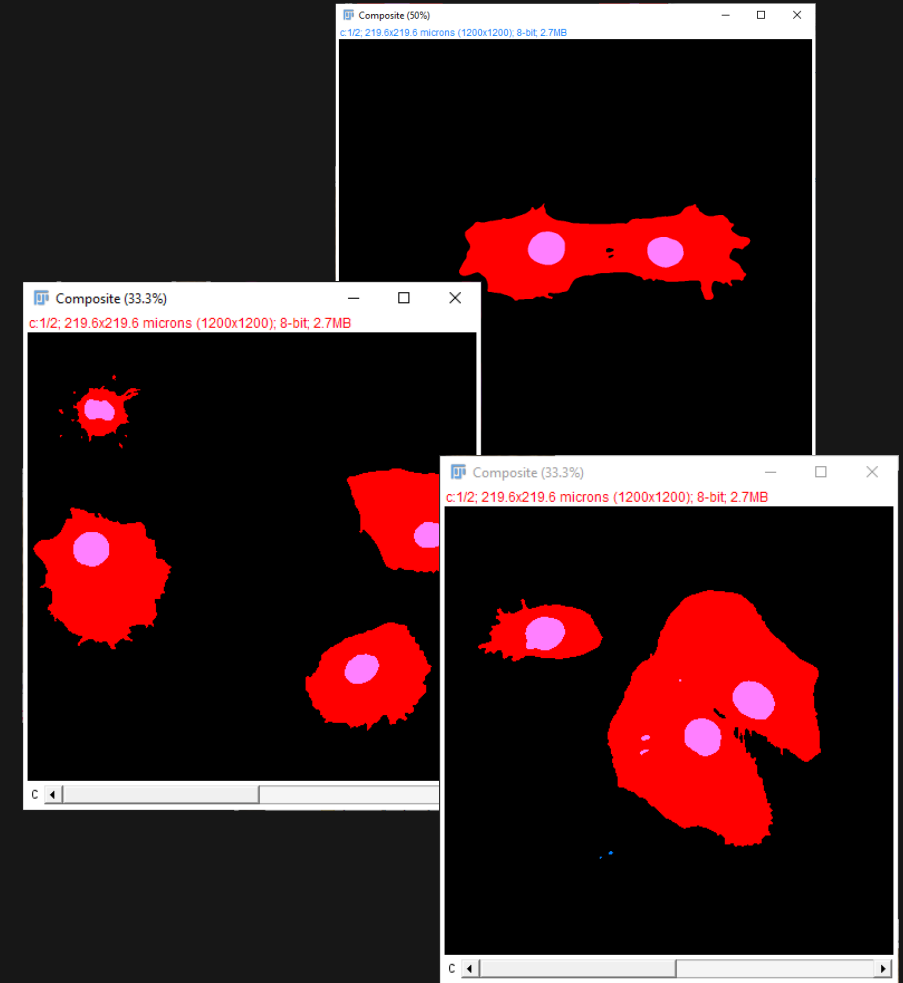
Step 2 - Preprocessing

- Filter
- Remove background
- Make projections
- Change bit depth
- Crop
- ...



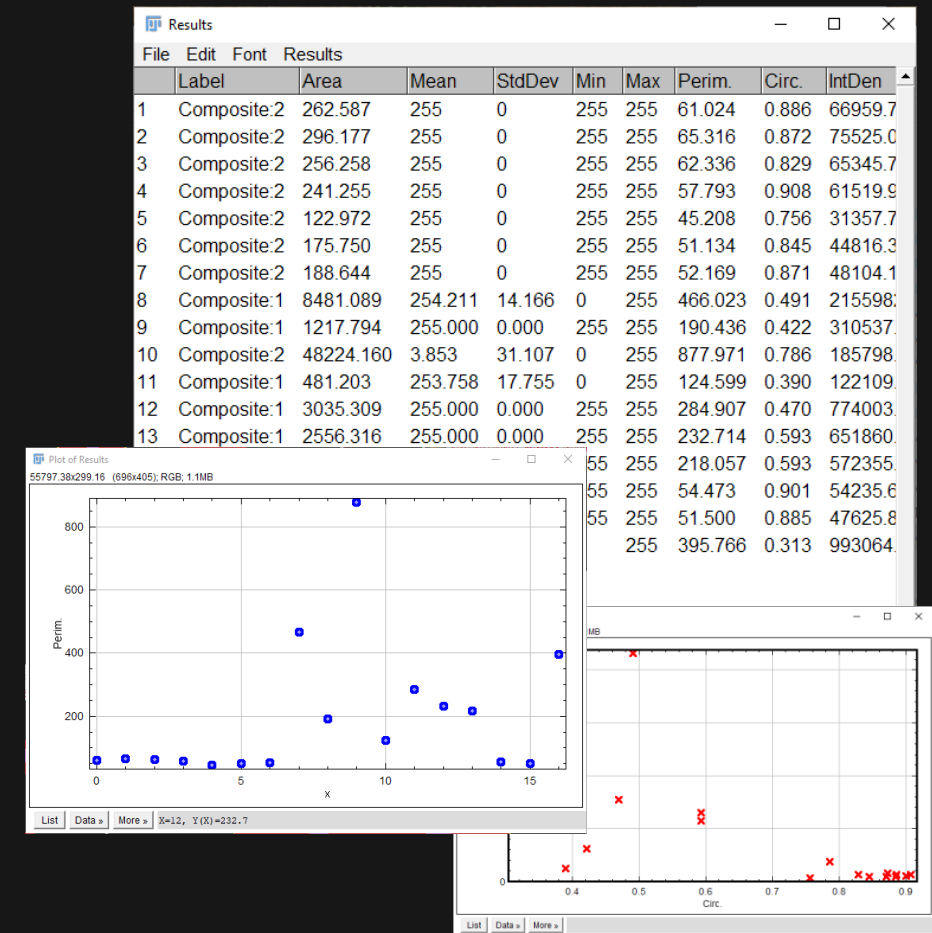
Step 3 - Segmentation

- What needs to be segmented?
- What kind of thresholding
- Binary operations



Step 4 - Image measurement

- Set measurements
- Analyse particles
- Inspect results table



Break time



BREAK

Now you go!



Sample data - Raw



<https://tinyurl.com/BAQM-D1raw>



Data inspection

Preprocessing



15 min (10:45)

5 min

work time

check in

Now that you went:

TASK	MY SOLUTION	YOUR SOLUTION
Reduce z dimensions	Sum slices (Z-Project > SUM slices)	...
Duplicate channels for manipulations	Duplicate nuclei and actin	...
Filter	Median filter for both nucleus and actin (radius = 5px)	...

See “Script_1.ijm”

Now you go!



Sample data - Filtered /
Your own processed data



<https://tinyurl.com/BAQM-D1filtered>



Segmentation
Binary operations



15 min (11:00) work time
5 min check in

Now that you went:

TASK	MY SOLUTION	YOUR SOLUTION
Duplicate channels for manipulations	Duplicate nuclei and actin	...
Thresholding nuclei	Adaptive threshold	...
Thresholding actin	MinError	...

See “Script_2.ijm”

Now you go!



Sample data - Segmented /
Your own segmented data



<https://tinyurl.com/BAQM-D1labelled>



Image measurements



15 min (11:15) work time

Now that you went:

TASK	MY SOLUTION	YOUR SOLUTION
Duplicate channels for manipulations	Duplicate nuclei and actin	...
Measure nuclear YAP intensity	Analyse particles on thres. DAPI (size = 50 - Infinity) Measure on YAP signal	...
Measure cytoplasmatic YAP intensity	Create selection on thres. actin Add to ROI manager ROI manager XOR Measure on YAP signal	...

See “Script_3.ijm”

Lunch time



BREAK