

Artificial intelligence methods applied to intravital imaging analysis

This program will cover theoretical and practical aspects regarding the application of new A.I. - based methods for the analysis of migration and interaction of immune cells captured by 4D intravital imaging data. Basic knowledge in imaging is recommended.

Program - check for updated versions at <https://www.immunemap.org/index.php/aiivm2021>

DAY 1: June 14th. *Introduction to intravital microscopy (IVM).*

Learning objectives. Understanding the applications and advantages of intravital microscopy / Understanding the importance of Open Data research / Practice with the immunemap platform

9:00-9:30: Introduction of the tutors and the course.

9:30-10:30: Interactive activity to know each student and background.

10:30-11:00: Technical Introduction to IVM

11:00-12:00: Biological application of IVM

12:00-14:00: *Lunch Break*

14:00-15:00: Presentation of immunemap

15:00-17:00: Practical session 1: Use of immunemap

DAY 2: June 15th: *Analysis with tracking.*

Learning objectives. Understanding which type of information can be extracted from IVM data using the classical image analysis pipeline, challenges and new perspectives

9:00-10:30: Classical image analysis pipeline

10:30-10:45 Coffee break

10:45-12:00: The relevance of cell tracking in life sciences

12:00-14:00: *Lunch Break*

14:00-16:00: Practical session 2: Analyzing cell migration with manual and automatic cell tracking

16:00-17:00: Discussion and networking activity

DAY 3: June 16th: *Analysis without tracking.*

Learning objectives. Understanding how image processing techniques working at pixel-level can be applied to analyze IVM data without the usage of cell tracking

9:00-10:30: Advanced analysis - Theory

10:30-10:45 Coffee break

10:45-12:00: Image processing

12:00-14:00: *Lunch Break*

14:00-16:00: Practical session 2: Analyzing cell migration without tracking (Optical Flow, Colocalization, Heatmaps...)

16:00-17:00: Discussion and networking activity

DAY 4: June 17th: *Beyond tracking.*

Learning objectives. Understanding how computer vision methods for action recognition can be applied to analyze IVM data without the usage of cell tracking

9:00-10:30: Trends in computer vision methods – Theory

10:30-10:45 Coffee break

10:45-12:00: Application of computer vision methods to IVM data analysis and immunology

12:00-14:00: *Lunch Break.*

14:00-16:00: Practical session 2: Analyzing IVM data with action recognition

16:00-17:00: Discussion and networking activity

DAY 5: June 18th: Conclusion

09:00 – 12:00: Workshop - Analyze your own data (if you do not have we can provide or form groups)

15:00-16:00: Evaluation - Summer School Quiz

16:00 – 17:00: Concluding remarks