

Global Bioluminescence Project

D4.1 Report on 1st international training course for facility staff on image data tools

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Abstract

The first International Training Course on “Challenges in Image Data Management and Analysis” took place at EMBL Heidelberg, on 13th-15th November 2016.

The goal of this course was to present the capabilities and technologies currently available to imaging facility staff in the field of image data management and analysis. The aim was to raise awareness on the current challenges and capabilities in the field and to provide the course participants with a new set of tools (and references) that can be used to tackle such challenges and improve the use of image data management and image analysis tools in their facilities.

This deliverable contains is a summary of the course content, participants, feedback and future plans.

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1. Course overview and program

The first International Training Course on “Challenges in Image Data Management and Analysis” was held at EMBL Heidelberg, on 13th-15th November 2016.

The goal of this course was to present the capabilities and technologies currently available to imaging facility staff in the field of image data management and analysis. The aim was to raise awareness on the current challenges and capabilities in the field and to provide the course participants with a new set of tools (and references) that can be used to tackle such challenges and improve their own facility’s working life.

The course included topics and involved speakers across the broad domain of biological and medical imaging in order to (i) build connections and identify points of synergy between the members and technologies of these two communities and (ii) share experience, know-how and best practice in image data management and analysis.

The course consisted of 6 sessions:

- I. Data management, anonymization, provenance and curation
- II. Segmentation, Image filtering and pre-processing
- III. 3D Rendering and Visualization, Registration and Quality Control
- IV. Object tracking, signal quantification, statistics and feature extraction
- V. Cloud-based analysis, compression and storage
- VI. Ethics and Data Publication.

Each session included introductory didactic lectures followed by a hands-on session, with the exception of the Session VI on day 3 which included lectures and a final round table/discussion.

Here is the detailed program for the course.

DAY 1 - Sunday, November 13th 2016

08:45 - 09:00	Welcome and introduction	
Session I: Data management, anonymization, provenance and curation		
09:00 - 09:45	<i>Lecture: "Data management, anonymization, provenance and curation"</i>	Andrew Janke (CAI, University of Queensland, AUS)
09:45 - 10:30	<i>Lecture: "Image data management"</i>	Jason Swedlow (University of Dundee, UK)
10:30 - 10:45	Coffee Break	
10:45 - 12:00	<i>Hands-on: "Data Management with OMERO"</i>	Balaji Ramalingam & Petr Walczysko (University of Dundee, UK)
12:00 - 13:15	<i>Hands-on: "Data management, anonymization, provenance and curation"</i>	Andrew Janke (CAI, University of Queensland, AUS)
13:15 - 14:15	Lunch	
14:15 - 15:30	<i>Hands-on: "Image management with OpenImadis"</i>	Alexandre Dufour (Institut Pasteur, Paris, FR)
15:30 - 15:45	Coffee Break	
Session II: Segmentation, Image filtering and pre-processing		
15:45 - 16:30	<i>Lecture: "Learning-based image segmentation"</i>	Anne Kreshuk (University of Heidelberg, DE)
16:30 - 18:00	<i>Hands-on: "Learning-based image segmentation"</i>	Anne Kreshuk (University of Heidelberg, DE)
18:30 - 20:00	Dinner at EMBL	

DAY 2 - Monday, November 14th 2016

Session II: Segmentation, Image filtering and pre-processing (cont.)		
09:00 - 09:45	<i>Lecture: "Image segmentation: a classification with applications to brain segmentation"</i>	Christian Barillot (IRISA, FR)
Session III: 3D Rendering and Visualization, Registration and Quality Control		
09:45 - 10:30	<i>Lecture: "3D visualization and rendering"</i>	Jens Rittscher (University of Oxford, UK)
10:30 - 10:45	Coffee Break	
10:45 - 12:15	<i>Hands-on: "3D visualization and rendering"</i>	Jens Rittscher (University of Oxford, UK)
12:15 - 13:15	Lunch	
Session IV: Object tracking, signal quantification, statistics and feature extraction		
13:15 - 14:00	<i>Lecture: "Icy – the next-generation bio-imaging software"</i>	Alexandre Dufour (Institut Pasteur, Paris, FR)
14:00 - 15:30	<i>Hands-on: "Scripting in Icy"</i>	Alexandre Dufour (Institut Pasteur, Paris, FR)
15:30 - 15:45	Coffee Break	
15:45 - 17:15	<i>Hands-on: "Meaningful and robust Quantification of intensities & Batch image analysis using CellProfiler"</i>	Christian Tischer (EMBL Heidelberg, DE)
18:30 - 20:00	Dinner downtown	

DAY 3 - Tuesday, November 15th 2016

Session V: Cloud-based analysis, compression and storage		
09:00 - 09:45	<i>Lecture: "How to set up an imaging-biomarker analysis platform?"</i>	Annegreet van Opbroek (Erasmus Medical Centre, NL)
09:45 - 10:30	<i>Lecture: "Cloud based analysis, compression and storage"</i>	Andrew Janke (CAI, University of Queensland, AUS)
10:30 - 10:45	Coffee Break	
10:45 - 12:00	<i>Hands-on: "Running a medical-image-analysis pipeline in the cloud"</i>	Hakim Achterberg (Erasmus Medical Centre, NL)
12:00 - 13:00	Lunch	
13:00 - 14:15	<i>Hands-on: "Cloud based analysis, compression and storage"</i>	Andrew Janke (CAI, University of Queensland, AUS)

Session VI: Ethics and Data Publication		
14:15 - 14:45	Lecture: "Image Manipulation in the Real World"	Anne Nielsen (Editor, EMBO J.)
14:45 - 15:15	Open discussion	
15:15 - 15:45	Lecture: "SourceData Project"	Thomas Lemberger (Chief Editor, Mol. Sys. Biol.)
15:45 - 16:15	Lecture: "Image Data Resource project"	Jason Swedlow (University of Dundee, UK)
16:15 - 17:00	Open discussion & Wrap-up	

2. Applications received and participants' selection

We received 42 applications for this course and 20 participants were selected. The course's organizers carried out participants' selection on the basis of:

- The statements that candidates provided when applying; i.e. description of their profile and motivation for attending the course;
- Nationality: aiming at having a balance between the European and international participants;
- Gender balance.

Here is a breakdown of speakers' and participants' nationality and gender.

Country of employment of participant or invited speaker	SPEAKERS		PARTICIPANTS	
	# male	# female	# male	# female
from Europe:				
Austria			1	
Bulgaria			1	1
Czech Republic			1	
Finland			3	
France	2			
Germany	2	2		2
Italy			1	
Netherlands	1	1		1
Norway			1	1
Sweden				1
United Kingdom	4			
other nationalities:				
Australia	1			1
Argentina			2	1
India			1	
South Africa			1	

3. Course feedback

The course was extremely well received, both in terms of content and organization (Figure 1). Overall, participants felt that all topics were adequately covered and were pleased with the balance between lectures and practical sessions (Figure 2).

Feedback results can be found at: <https://www.surveymonkey.net/results/SM-R3X9JNTN/>

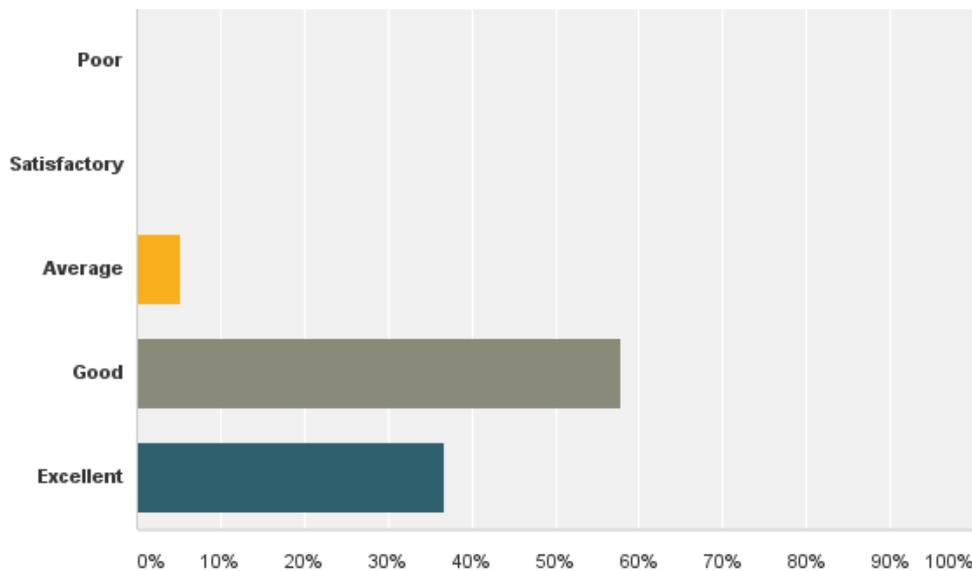


Figure 1. Overall rating for the entire course

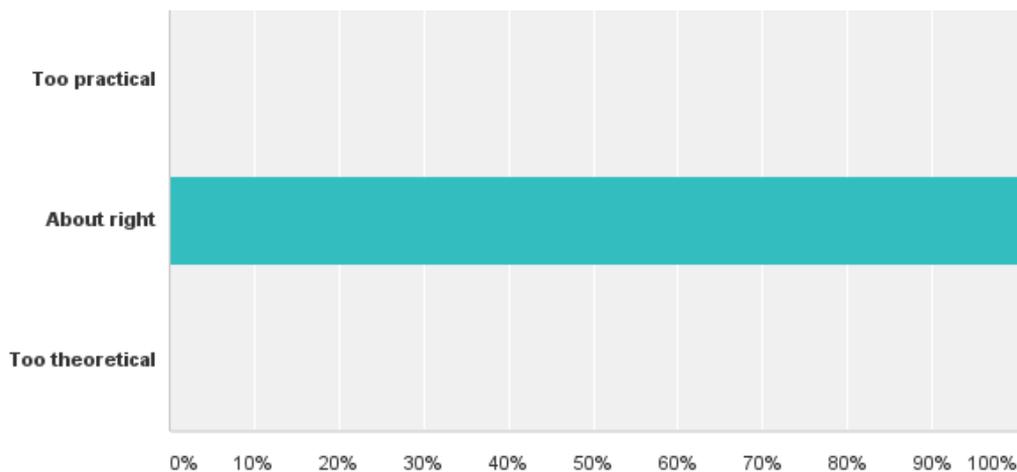


Figure 2. The balance of theoretical and practical content across the course

The vast majority of the participants (84%) indicated that they will use the tools/resources covered in the course in their future work and 95% would recommend attending this course.

4. Future plans

The course's audience was quite diverse in terms of background and technical knowledge; therefore, some participants found it quite challenging to follow the hands-on sessions, particularly as they required a wide range of software tools. Most speakers brought virtual training environments that included installed software and demo datasets to the course, eliminating the need for participants to install software and allowing them to access the learning environment after the course to reproduce what had been done in the classroom. For future editions of the course we will aim to simplify this approach and create a single virtual training environment, or virtual machine (VM), with all software tools required. This will reduce the participants' confusion due to having to access multiple VMs, not connect to each other.

Additionally, we will circulate some pre-course materials well in advance to allow participants to familiarize themselves with Unix and/or any other programming language to be used during the course. It will help those that have little familiarity with command line and scripting.

Finally, the program for this event was quite ambitious in terms of breadth of topics covered and time allocated to do so. Consequently, for future editions of the course we will aim at improving the overall program balance, taking into account the feedback received on individual sessions, and allocate 0.5 – 1.0 additional days for the hands-on sessions to allow participants to run data analysis workflows.