Tracking with OMERO

Sébastien Besson / Gaudenz Danuser
OME / Harvard Medical School

8th Annual OME Users Meeting
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Tracking sub-cellular objects

Jaqaman et al. Cell 2011

Single particles

Applegate et al. JSB 2011

Histone-marked nuclei

Ng et al. JCB 2012

Microtubule plus-ends

Tracking framework (Jaqaman et al. Nature Methods 2008)
Object detection and object tracking including gap closing (particle disappearance), merging (e.g. vesicle fuse) and splitting (e.g. mitotic events)
Matlab tracking tool

- **U-Track**: [http://lccb.hms.harvard.edu/software.html](http://lccb.hms.harvard.edu/software.html)
- Object-based tracker initialization
- Workflow management/batch analysis
- Tracks/labelled track visualization
Integration with OMERO
Integration with OMERO

client-side analysis

U-Track

local analysis

OMERO Image
Integration with OMERO

OMERO

OMERO.matlab

Image

U-Track

client-side analysis

local analysis
Integration with OMERO

OMERO

Image

File annotation

hms-tracking

OMERO.matlab

U-Track

client-side analysis

local analysis

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Tracking in OME:RO: application
Impact on OMERO resources

- Major rewriting of OMERO.matlab toolbox (4.4.7 and above) cf Tuesdays analysis workshop

- Resources set up for daily testing of OMERO.matlab and derived Matlab-based projects (e.g. U-Track)

- Future development
  - Stronger articulation between various Matlab projects: Michael Porter (Dundee), Ian Munro/Yuriy Alexandrov (Imperial)
  - More writing functions / better exposition of the permissions...
  - Addition of integration test suites
Caching images for analysis
Caching images for analysis

OMERO

Limitations

offline work

Image

File annotation

U-Track

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Caching images for analysis

Limitations
- offline work
- poor/distant connection

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OMERO

U-Track

Image
File annotation

UT Southwestern Dallas
Caching images for analysis

**Limitations**
- offline work
- poor/distant connection
- parameters optimization

**Institutions**
- WTCCB Edinburgh
- OMERO
- UT Southwestern Dallas

**Diagram**
- Image
- File annotation
- U-Track

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Limitations
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- algorithm development

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Image

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**Limitations**
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- algorithm development

**Institutions**
- WTCCB
- Edinburgh
- OMERO
- OME-TIFF export
- U-Track
- UT Southwestern
  - Dallas

**Dates**
- Thursday, 27 June 13
Caching images for analysis

Limitations:
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BIO-FORMATS
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U-Track

File annotation

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Collaborative analysis

OMERO

File annotation

Image

U-Track

Groups
read-annotate
read-write

user-1

user-2

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OMERO

user-1

U-Track

user-2

user-3

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OMERO

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Analysis integration in OMERRO clients

Exposé/filter by namespace

Export analysis: ROIs/tables

Open with menu

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UT Southwestern, Dallas

Khuloud Jaqaman
Support 3D support

Mammalian kinetochores

3D nuclei tracking

Jaqaman et al. JCB 2010

Nathke lab, Dundee
Tracking in OMERO: example (II)