LTOS Quick Guide

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1 About

LTOS is a program for localization and detection and tracking of single particles in two-dimensional greyscale TIFF images and videos.

2 Installation

LTOS is available at `https://github.com/MarkusRose/ParticleTracker` under the GPL. It requires a python interpreter, as well as some additional packages provided below. It can be run from the command line, or with a GUI.

2.1 Getting Python

LTOS is written in Python 3.6. The distribution that was used during development and testing is Anaconda Python 3 (`https://www.anaconda.com/`).

2.2 Required Packages

- numpy
- scipy
- pandas
- matplotlib
- tkinter

2.3 Running LTOS

```
python main.py
```

3 Using LTOS

3.1 The Graphical User Interface

3.1.1 The Main Window

3.1.2 The Detection Menu

3.1.3 The Tracking Menu

3.1.4 Detect and Track in one Window

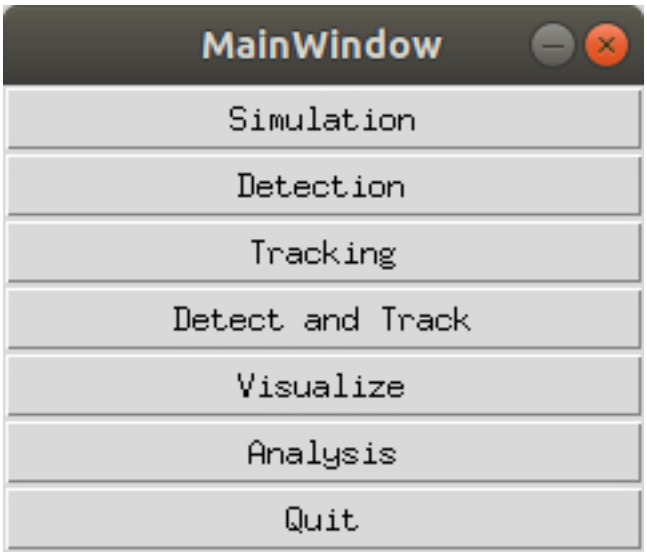
3.1.5 Visualization of Images, Detections and Tracks

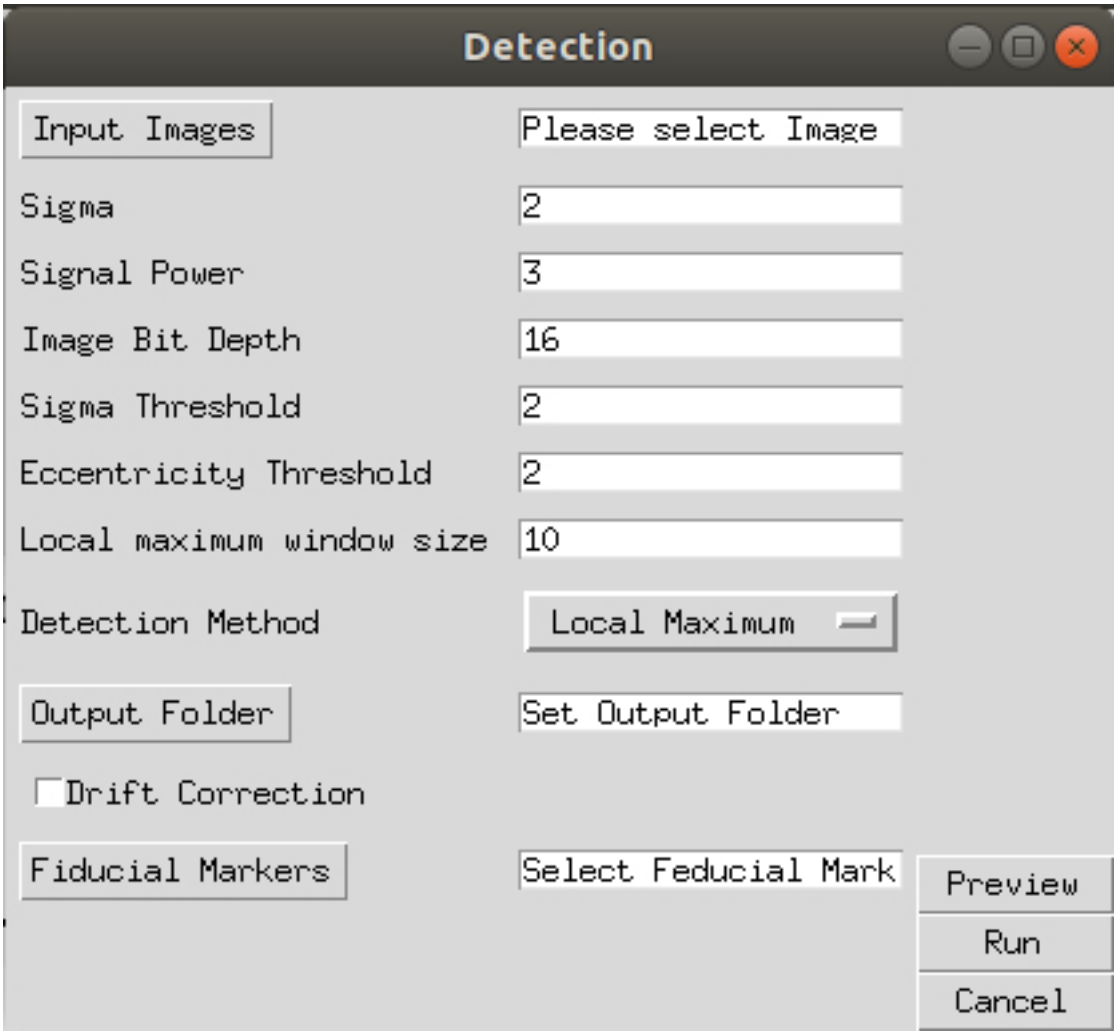
3.1.6 Simulation Window

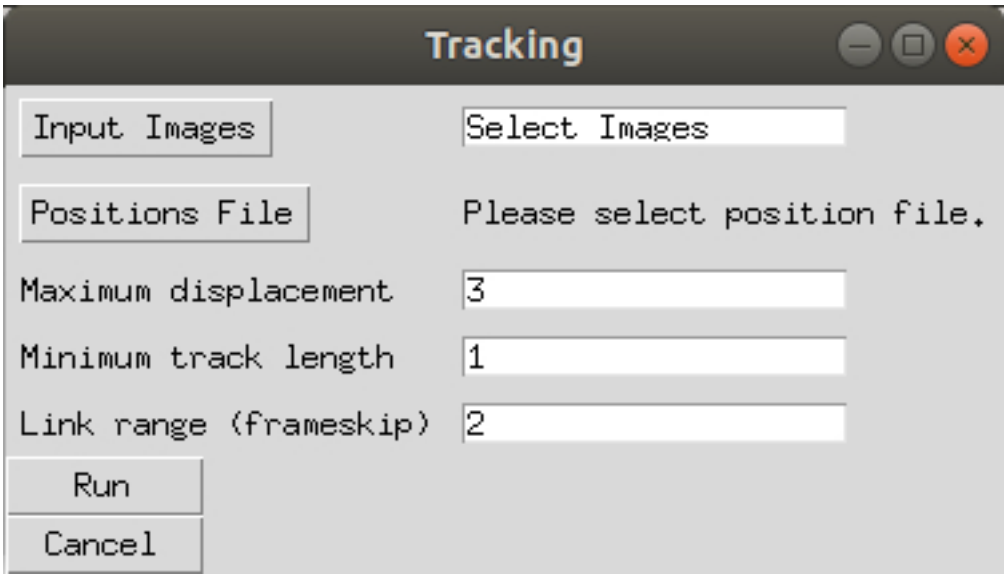
3.1.7 Analysis Tools for obtained Tracks

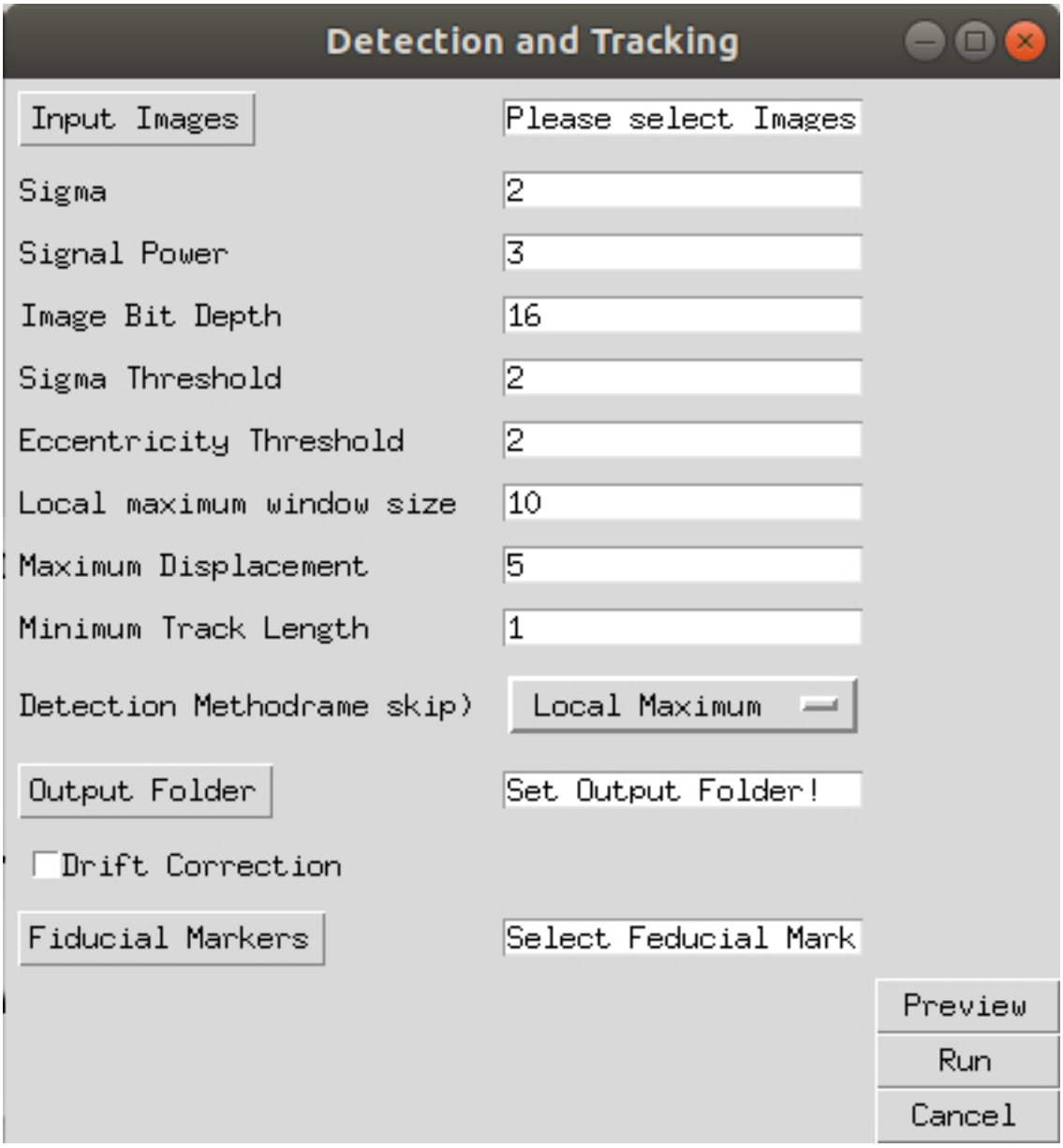
3.2 Working from Command Line

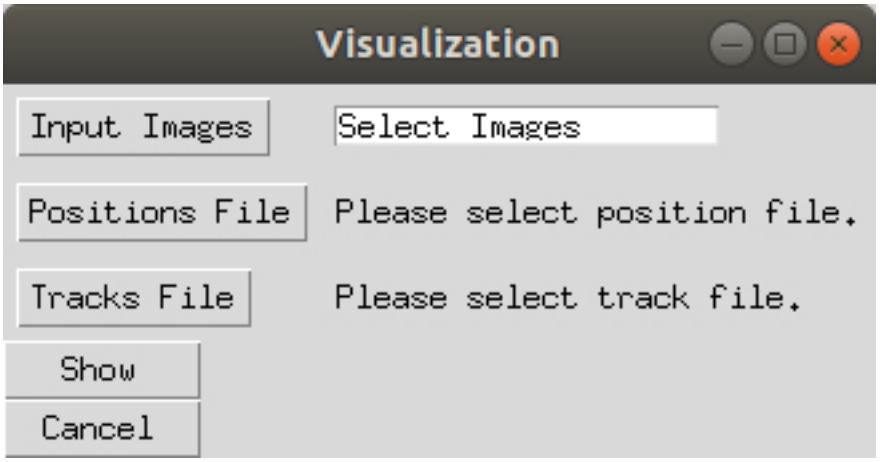
4 Program Output

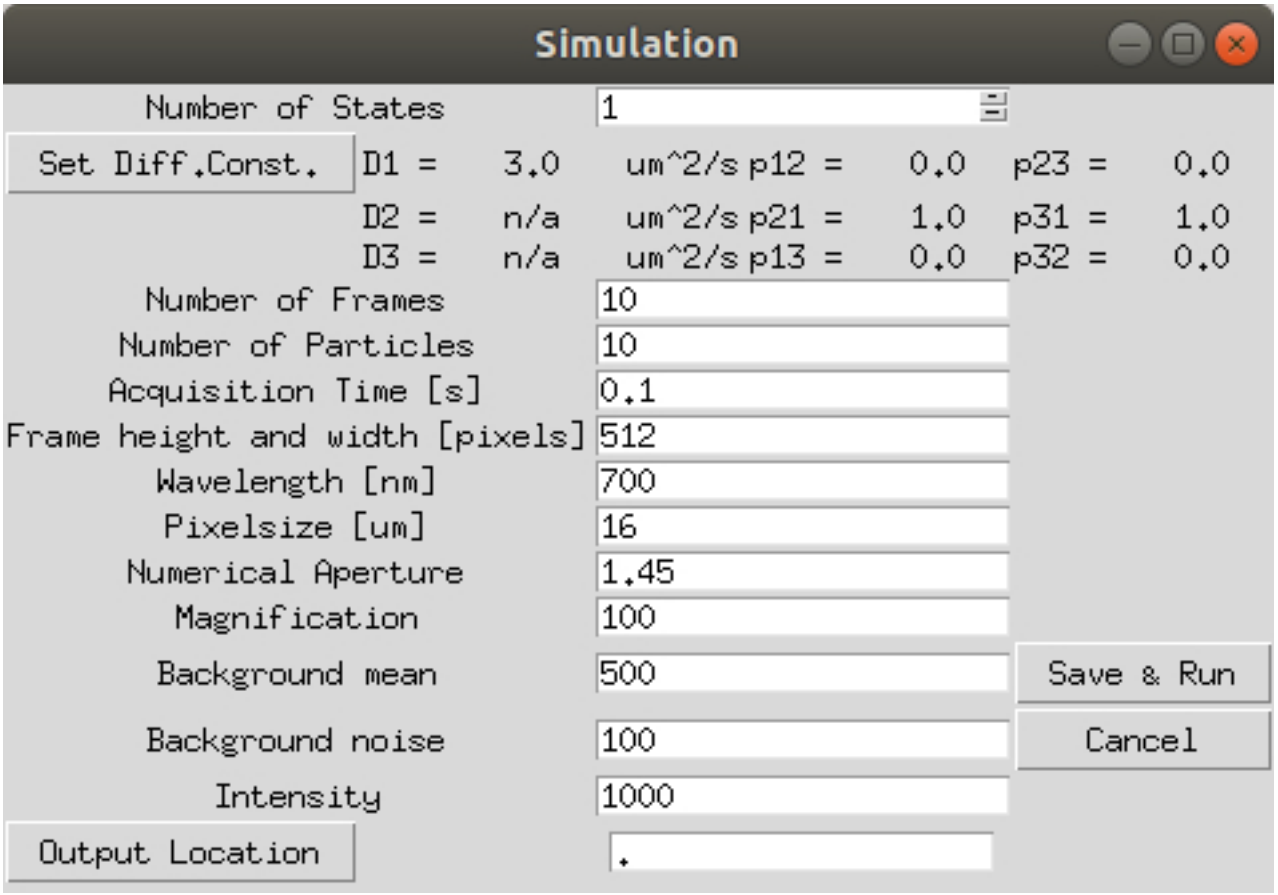

MainWindow
Simulation
Detection
Tracking
Detect and Track
Visualize
Analysis
Quit

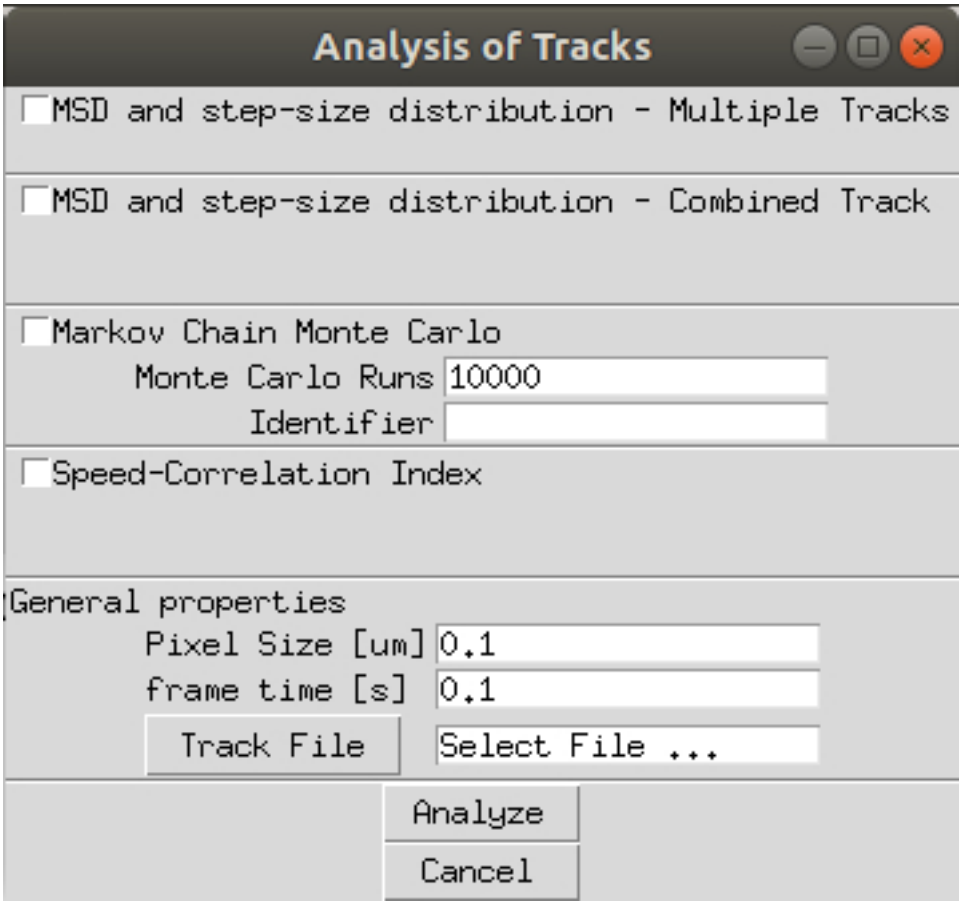

Detection
Input Images
Please select Image
Sigma
2
Signal Power
3
Image Bit Depth
16
Sigma Threshold
2
Eccentricity Threshold
2
Local maximum window size
10
Detection Method
Local Maximum
Output Folder
Set Output Folder
Drift Correction
Fiducial Markers
Select Feducial Mark
Preview
Run
Cancel


Tracking
Input Images
Select Images
Positions File
Please select position file.
Maximum displacement
3
Minimum track length
1
Link range (frameskip)
2
Run
Cancel


Detection and Tracking
Input Images
Please select Images
Sigma
2
Signal Power
3
Image Bit Depth
16
Sigma Threshold
2
Eccentricity Threshold
2
Local maximum window size
10
Maximum Displacement
5
Minimum Track Length
1
Detection Methodrame skip)
Local Maximum
Output Folder
Set Output Folder!
Drift Correction
Fiducial Markers
Select Feducial Mark
Preview
Run
Cancel


Visualization
Input Images
Select Images
Positions File
Please select position file.
Tracks File
Please select track file.
Show
Cancel


Simulation
Number of States
1
Set Diff.Const.
D1 = 3.0 um^2/s
D2 = n/a um^2/s
D3 = n/a um^2/s
p12 = 0.0
p21 = 1.0
p13 = 0.0
p23 = 0.0
p31 = 1.0
p32 = 0.0
Number of Frames
10
Number of Particles
10
Acquisition Time [s]
0.1
Frame height and width [pixels]
512
Wavelength [nm]
700
Pixelsize [um]
16
Numerical Aperture
1.45
Magnification
100
Background mean
500
Background noise
100
Intensity
1000
Output Location
.
Save & Run
Cancel


Analysis of Tracks
MSD and step-size distribution - Multiple Tracks
MSD and step-size distribution - Combined Track
Markov Chain Monte Carlo
Monte Carlo Runs
10000
Identifier
Speed-Correlation Index
General properties
Pixel Size [um]
0.1
frame time [s]
0.1
Track File
Select File ...
Analyze
Cancel