ReadMe.doc

This file contains instructions for running the Github Matlab repository vbTRACK\_2D. It is assumed that the user is familiar with Matlab and does not require a GUI.

1. Download repository to a single folder named, for example, D:\vbTRACK\_2D\_GitHub. There should be several subfolders and sub-sub-folders:

Bronson code

src and src\_ext

src

src\_ext

inputData

2. Open Matlab

Change working directory to top-level folder, e.g. D:\vbTRACK\_2D\_GitHub

Change path to this directory and its subfolders.

3. Open file run\_vbTRACK\_2D

4. Run this file.

5. One dataset, the track of an RNP particle following VSV infection of a a live mammalian A549 cell, is provided to demonstrate the program. Only the machine-learning part of our code is provided here. The code generates 5 figures:

Fig 1 is an xy plot of the raw data before ML.

Fig 3 is a plot of state vs time after ML. ML shows that 2 states are most probable. The plot shows that there is a single jump from State 1 to State 2.

Fig 4 is a plot of ML in progress. Six models, with 1 Gaussian, 2 Gaussians,…,6 Gaussians are tested. Each is optimized independently with 50 iterations. Note that the log of the probability L is a maximum for 2 states. This is an objective result of ML.

Fig 5 is a plot of the maximum log L for 1 Gaussian, 2 Gaussians, …… ,6 Gaussians. Note that model with 2 Gaussians has the largest value of log L for this dataset. Other datasets would give different results.

Fig 6 is an xy plot of the data following machine learning, which shows that there are only 2 states. All xy points in State 1 are colored red; all xy points in State 2 are colored green. Note that the center of state 2 is shifted significantly with respect to the center of State1. The particle jumps from one cage to a neighboring cage.