Process Description:

"Tracking" takes in the objects identified in the detection step and links them together to construct their trajectories over time.

Input Channels:

Select which movies/channels you want to analyze.

Parameters:

Problem Dimensionality: 2 or 3.

Maximum Gap to Close: Longest gap resulting from temporary particle disappearance that the tracker will attempt to close.

Check "**Do segment merging**" to look for merging events.
Check "**Do segment splitting**" to look for splitting events.

Check "**Plot histogram of gap lengths …**" to view the number of closed gaps of various lengths. This plot helps in assessing whether the "maximum gap to close" parameter is good or too large (in which case the histogram of gap lengths will plateau for longer gaps).

Choose "**Overwrite existing result MAT file**" to overwrite previous results, if applicable. Otherwise, the software will create a new results file whose name is incremented by 1.

Choose "**Apply setting to all movieData**" if you are analyzing multiple movies and you want to analyze them all using the same parameter settings.

Cost Function:

Choose from the dropdown menus the functions to calculate the costs in the frame-to-frame linking step (Step 1) and the gap closing, merging and splitting step (Step 2).

Currently there is only one option for each:
Step 1: **costMatLinearMotionLink2**
Step 2: **costMatLinearMotionCloseGapsLink2**

These cost functions use per-particle motion modeling, with the following possible models:
(1) Brownian motion.
(2) Motion along a straight line with constant velocity.
(3) Motion along a straight line with constant velocity but in opposite direction of model in (2).

Motion modeling is implemented via the Kalman filter, whose functions are defined in the next block.

Click on "**Setting**" to define the parameters for each cost function.

NOTE: In practice, tracking is done in 3 iterations of frame-to-frame linking and then a step of gap closing, merging and splitting. The 3 iterations of frame-to-frame linking use the same cost function; they link the detected objects by first going forward through the movie, then backward, then forward again. In each iteration, they use the best tracking parameters learned from particle tracking up to that point.

Kalman Filter Functions:

Choose the Kalman filter functions for motion modeling. Currently there is only one option for each function.

Click on "**Setting**" to define the parameters for the initialization function, if desired.