TCMR Toolbox

A toolbox for time continuous multiple regression on mouse movements and for basic mouse movement analysis in Matlab

(C) Stefan Scherbaum 2017

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Citation

If you use the toolbox for published work, please cite:

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Revision log

Revision 1.1: minor bugfixes, rewriting of smooth function to increase performance and fix bugs with tilted vectors

Revision 1.2: changed the calculation of warped velocities and angles, since the original calculation was susceptible to errors due to highly oversampled stimlock data (e.g. sf=1000 Hz)

Additional Requirements

The toolbox requires the following additional toolboxes

- **Matlab Statistics Toolbox**

- **fminsearchbnd**: contrained simplex algorithm for Matlab

(https://de.mathworks.com/matlabcentral/fileexchange/8277-fminsearchbnd--fminsearchcon, John D'Errico, 2012)

- **geom2d**: geometry library for Matlab

(https://de.mathworks.com/matlabcentral/fileexchange/7844-geom2d,David Legland, 2017)

Tutorial

Atutorial script and dataset are provided in the Demodata folder.

List of Functions

**TCMR related functions**

TCMRegression.m Performs TCMR and yields betas

normalizeRegressors.m Normalizes the regressors before applying TCMR

plotRegression.m Plotting of TCRM results

findStatSegments.m Extraction of significant segments from betas

plotSegmentLines.m Plotting of segments into plotRegression plot

writeSegmentTable.m Output segments as CSV

findStatPeaks.m Extraction of peaks from betas

plotPeaks.m Plotting of peaks into plotRegression plot

writePeakTable.m Output peaks as CSV

fitRegression.m Fitting of gauss curves for parameter extraction

plotModelLines.m Plotting of segments as given by gauss parameters

plotModelPeaks.m Plotting of peaks as given by gauss parameters

writeParameterTable.m Output parameters as CSV

**Basic mouse movement analysis**

correctSampleTiming.m Corrects unregular sample timings

calcTrajectories.m Calculates time warped Angle, Velocity etc.

calcMovementContinuity.m Calculates Movement Index and Returns

calcStatic.m Calculates Mean and Maximum Deviation

**Statistics**

jackKnifeStats.m Jackknife corrected t-test (see findStatPeaks)

jackKnifeStats2.m Jackknife corrected t-test for two samples

jackKnifeSte.m Jackknife corrected standard error of the mean

ste.m Standard error of the mean

VIF.m Calculates Variance inflation factors for regressors

**General plotting and output**

animateXY Create a movie of X-Y-movements

imagep Heatmap for 1D trajectory data

imagep2d Heatmap for 2D trajectory data

errorArea.m Lineplot with shaded error areas around lines

markx.m Marks position on x-axis

marky.m Marks position on y-axis

subplots.m Opens subplots

subplotxy.m Opens subplots

**Helper functions**

addToMatrix Adds a vector as a line into an existing matrix

catTrialLog Concatenates data from trial structs

fitGauss.m Fitting of gauss curve

gauss\_curve.m Gauss curve

gausswindow.m A gauss window for smoothing

getColorLines.m Provides color & linemarkers

getColorValues.m Converts color letters to numerical format

normLength.m Timenormalizes signals by interpolation or fillup

normScore.m Normalizes variables to requested range

out.m Extended output function

smooth.m Smoothing of signals