TCMR Toolbox

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

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Citation

If you use the toolbox for published work, please cite:
Scherbaum, S., & Dshemuchadse, M. (in press). Psychometrics of the continuous mind: Time continuous multiple regression as a method to exploit the dynamics of computer mouse movements. Memory & Cognition. DOI: 10.3758/s13421-019-00981-x
To cite the toolbox as Software, please cite:
Scherbaum, S. (2017). TCMR: Time continuous multiple regression toolbox for mouse tracking. Retrieved from osf.io/5e3vn

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