Matlab functions for replicate regression

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Matlab function `replicate_regression.m`

[result, options] = replicate_regression(t, y, sigma, r, flag_fix_parameters, varargin)

Bayesian replicate regression for multiple time series measured in replicate.
Data must be provided as vectors and are transformed to logarithmic scale if desired.

FUNCTION ARGUMENTS

t, y, sigma, r input data (times, values, standard errors, replicate labels)
given as row vectors (see replicate_regression_core.m)

flag_fix_parameters (Boolean, optional) If set to 1, the options given in the following argument(s) will be accepted
without changes (otherwise they will be checked and updated)

varagin (optional) Either a list of property/value pairs for algorithm options (list see below).
or a structure containing the property/value pairs (this is mandatory if flag_fix_parameters is set to 1)

FUNCTION OUTPUT

result matlab struct with results from replicate regression

options matlab struct with options values that were used in the calculation

The options list is supposed to be ordered by priority; earlier options override later options. The function is a wrapper for the function 'replicate_regression_core'. In converting the data to logarithms, y and sigma are either taken to be medians and geometric standard deviations, or means and standard deviations of the data values. The choice is defined by the argument 'options.transformation'

Options for matlab function `replicate_regression.m`

OPTION	IN CORE	TYPE	DEFAULT	MEANING
options.verbose		Boolean	1	Output information during regression
options.is_logarithmic		Boolean	0	Declare that data are logarithmic
options.convert_to_logarithm		Boolean	1	Convert data to logarithms for regression
options.log_transformation		string	'arithmetic'	'arithmetic', 'geometric'
options.run_crossvalidation		Boolean	0	Run crossvalidation
options.set_std		float	nan	Value to replace all data standard deviations
options.insert_std		float	1	Value to replace missing data standard deviations
options.start_at_t		float	0	Start regression curves at starting time 'start_at_t' (instead of t=0)
options.start_value		float	nan	Fixed start value for regression curves
options.shift_data		string	'mean'	Policy for shifting data before regression 'none', 'fixed_start_value', 'mean', 'initial', 'fixed_1'
options.shift_value		float	nan	Shift used when shifting the data
options.basis	X	string	'cos+sin'	Type of basis functions
options.n_comp	X	int	nan	Fixed number of basis functions
options.n_comp_min		int	1	Minimal number of basis functions
options.n_comp_max		int	20	Maximal number of basis functions
options.use_offset	X	Boolean	1	Use constant function as one of the basis functions
options.constant_before_start	X	Boolean	0	Set all basis functions constant for t¡0
options.deviation_same_start		Boolean	0	Enforce identical start values for all replicates
options.remove_offset	X	Boolean	0	Omit offset when creating the regression curves
options.t_smooth		float	nan	Time constant for setting decreasing prior widths
options.t_jump	X	float	nan	Time constant for initial jump basis function
options.t_interp		float	t	Time points for interpolated regression curves
options.average_std	X	string	'std_dev_mean'	Type of uncertainty to be reported for average curve
options.central_offset_mean	X	float	0	Prior mean sigma_alpha_0 (for alpha_0)
options.central_offset_width	X	float	1	Prior width sigma_alpha_0 (for alpha_0)
options.central_first_mode_mean	X	float	0	Prior mean sigma_alpha_1 (for alpha_1)
options.central_first_mode_width	X	float	1	Prior width sigma_alpha_1 (for alpha_1)
options.central_mode_mean	X	vector	[]	Prior means sigma_alpha_m (for alpha_m)
options.central_mode_width	X	vector	[]	Prior widths sigma_alpha_m (for alpha_m)
options.central_jump_mean	X	float	nan	Prior means sigma_alpha_jump (for alpha_jump)
options.central_jump_width	X	float	nan	Prior widths sigma_alpha_jump (for alpha_jump)
options.deviation_offset_mean	X	float	0	Prior mean sigma_beta_0 (for beta_0)
options.deviation_offset_width	X	float	1	Prior width sigma_beta_0 (for beta_0)
options.deviation_first_mode_mean	X	float	0	Prior mean sigma_beta_1 (for beta_1)
options.deviation_first_mode_width	X	float	1	Prior width sigma_beta_1 (for beta_1)
options.deviation_mode_mean	X	float	[]	Prior means sigma_beta_m (for beta_m)
options.deviation_mode_width	X	float	[]	Prior widths sigma_beta_m (for beta_m)
options.deviation_jump_mean	X	float	0	Prior means sigma_beta_jump (for beta_jump)
options.deviation_jump_width	X	float	1	Prior widths sigma_beta_jump (for beta_jump)
options.flag_draw_sample	X	Boolean	1	Draw sample curve parameters and curve from the posterior
options.flag_time_derivative	X	Boolean	0	Compute time derivative curves