Symbolic analysis of time series

# Symbolic analysis using the method by Kamberaj & van der Vaart :

# Makefile\_symb\_mpi --- make file for compiling and creating the executable symbrun.exe (MPI version); To be used as: make -f Makefile\_symb\_mpi

# Makefile\_symb\_ser ----- make file for compiling and creating the executable symbrun\_ser.exe (serial

# version); To be used as: make -f Makefile\_symb\_ser

# This class contains the following files:

# demo\_symb.f90:

This file is initializing the SYMB\_CLASS, which is the module used for symbolization of the dynamical variables. It contains the subroutines/functions used to read the input parameters for symbolization of the time series.

This subroutine calls the function 'SYMB\_DRIVER', which is part of the module SYMB\_CLASS found in these fortran subroutines/functions:

# symbmodule.f90 -- Parallel (using MPI protocols) of the SYMB\_CLASS

# symbmodule\_ser.f90 -- Serial version of the SYMB\_CLASS

# SYMB\_CLASS contains the following subroutines/functions:

# subroutine read\_embdparam() -- it reads the embedded parameters calculated from the EMBD\_CLASS functions

# subroutine write\_xyzs() -- It prints out the symbolic Trajectories of dynamical variables

# subroutine Allocate\_Symbolics() -- It is used to allocate memory for the global dynamical variables of the SYMB\_CLASS

# subroutine deAllocate\_Symbolics() -- It is used to free the memory allocated for the global dynamical variables of the SYMB\_CLASS

# subroutine symbolize\_trajectoryMC(Ndof, nframes, X, global\_XS, tau, mopt, Nmc) -- Symbolizes the time series using Monte Carlo Method 1 (0,1,2,...)

# Parallel and Serial versions

# subroutine symbolize\_trajectory(Natoms, Ndim, nframes, X, XS, topt, mopt) -- Symbolizes the time series using Method 2 (0,1,2, ...) (only serial routine)

# subroutine symbolize(Natoms, Ndim, nframes, X, XS) -- Symbolizes the time series using Method 3 (0 and 1) (only serial routine)

# subroutine symbolic\_entropy1D(ndata,xs,m,tau,H) -- Computes the Shannon entropy of one dimensional symbolic time series

# The Input Parameters of the Module are:

Number of Time Frames - **Nframes**

Number of time series - **Natoms**

Dimensionality of the problem - **Ndim**

Set debugging flag value - **Debug**

Symbolic method flag (1: 0s, 1s; 2: 0s, 1s, 2s, etc; 3: Monte Carlo) - **qSymbolic**

Set Nr of Monte Carlo Steps - **Nmc**

Chose the format of Input/Output data – **frmt**

A bash shell script is given below:

!#/bin/bash

root=../fortran

nframes=10000

natoms=2

ndim=1

qSymbolic=1

Debug=1

nmc=1000

parallel=0

NP=2

Frmt=’csv’

if [ parallel == 1 ]; then

mpirun -np $NP ${root}/symbrun.exe ${nframes} ${natoms} ${ndim} ${qSymbolic} ${Debug} ${nmc} ${frmt}

else

${root}/symbrun\_ser.exe ${nframes} ${natoms} ${ndim} ${qSymbolic} ${Debug} ${nmc} ${frmt}

fi