PETRI NET TUTORIAL – PART 2:

ANALYSIS TECHNIQUES FOR MULTISCALE MODELS

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@ ICSB 2011, Heidelberg
INTRODUCTION

ANALYSIS TECHNIQUES FOR MULTISCALE MODELS
VISUALIZE SPATIAL TEMPORAL DATA

- How to visualize data of 1D, 2D, 3D Models?
- Snoopy is not suitable to plot spatial temporal information
- Other mathematical programs are need, like:
  - Gnu plot
  - Matlab
  - Scilab

Information does not show up very well in simple line plots
**VISUALIZE SPATIAL TEMPORAL DATA**

- How to visualize data of 1D, 2D, 3D Models?
- Snoopy is not suitable to plot spatial temporal spatial information
- Other mathematical programs are needed, like:
  - Gnu plot
  - **Matlab**
  - Scilab

  - Automatisation using scripts
  - Several plotting options for 1D, 2D, 3D data
  - Matrix, 3D array operations
  - Movies
ANALYSIS TECHNIQUES FOR MULTISCALE MODELS

VISUALIZE DATA OF 1D MODELS
1D MODEL IN SNOOPY

Information does not show up very well in simple line plots

Spatial information are encoded in color/place name:
Spezies_X
1D MODEL – DATA STRUCTURE/PREPROCESSING

- Time Vector:
  - X
  - Time

- Data Matrix:
  - Spezies_1
  - Spezies_2
  - Spezies_3
  - Spezies_4
  - Spezies_5

Time x Space

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1D MODEL VISUALISATION
ANALYSIS TECHNIQUES FOR MULTISCALE MODELS

VISUALIZE DATA OF 2D MODELS
**2D Model in Snoopy**

Spatial information are encoded in color/place name:

*Spezies* _X_ _Y_
2D MODEL – DATA STRUCTURE/PRE-PROCESSING

For each time point $t$ one matrix $X \times Y$ rearranges to a 3D array:

- Time Vector
- $X$ (time vector)
- $Y$ (image vector)

Rearrange Data

$\Rightarrow$ 3D Array
2D Model – Visualisation
2D MODEL – VISUALISATION

![Diagram of a 2D model with visualisation](image)

- **X**
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6

- **Y**
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6

- **Time = 0**
  - **Species Level**
  - 0
  - 20
  - 50
  - 100
  - 150

- **Diagram notes**:
  - `[neighbour2D(x,y,a,b)]`
  - `(x,y) → (a,b)`
  - `cAMP Grid2D 150` at `(10,10)`

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VISUALIZE DATA OF 3D MODELS
Spatial information are encoded in color/place name:

Spezies\_X\_Y\_Z
Rearrange Data

For each time point t one 3D Array $X \times Y \times Z$  

$\Rightarrow$ 4D Array $x$ Time
3D MODEL – VISUALISATION

Volume Visualisation – Render 3D Object
3D MODEL – VISUALISATION

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