Sonification - Sound of Science
VU, WS 2013

Lecture 10 - Model Based Sonification

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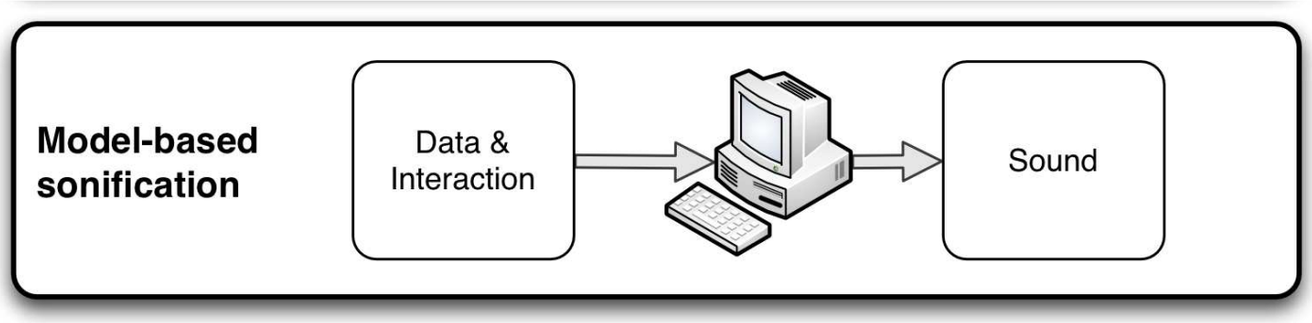
Model Based Sonification (MBS)



Thomas Hermann 1999

Describe what you hear?

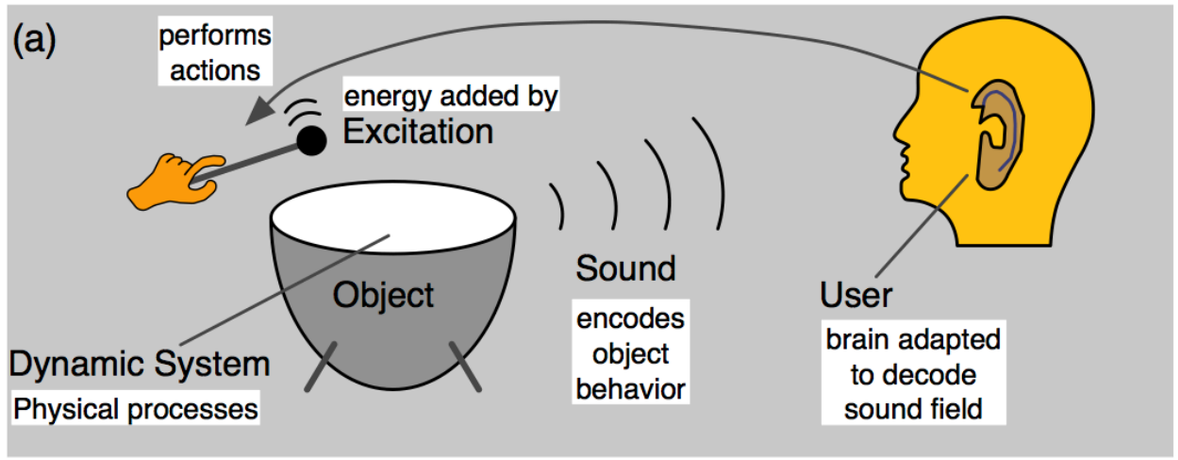
Listening Modes

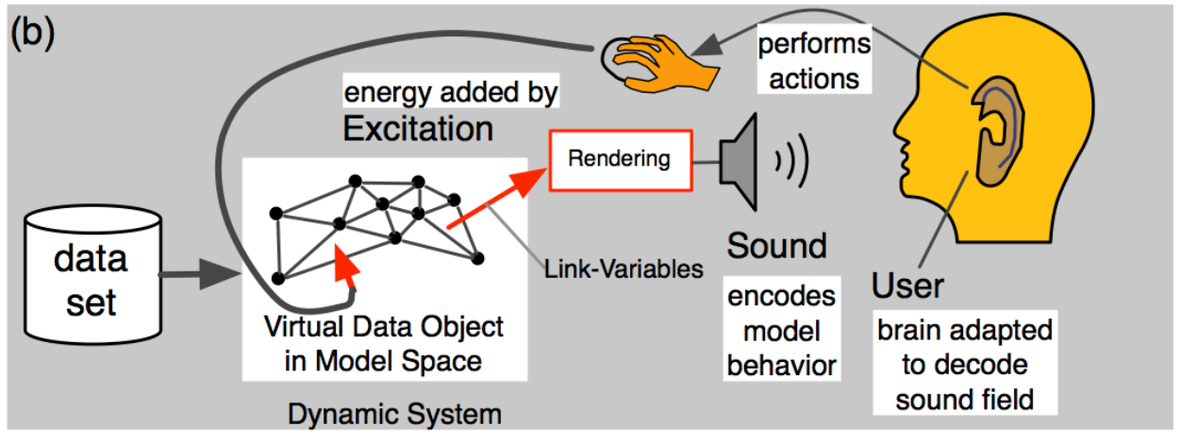
- Everyday Listening: source-identification or action

- Musical Listening: Rhythmic pattern, roughness, loudness, acoustic shape, harmony, melody, structure, ...

- Analytical Everyday Listening: shaking an opaque box and guessing the contents

Sonic Interaction Loop





MBS Definition

MBS is „defined as the general term for all concrete sonification techniques that

- *make use of dynamic models* which mathematically describe the *evolution* of a system in *time*,

- *parametrize* and configure them during initialization *with the available data* and

- *offer interaction/ excitation modes* to the user as the interface

to actively query sonic responses which depend systematically upon the temporal evolution model.“

- [Hermann, Handbook, p. 403]

MBS Advantages

Generality of Sonification Models (independent from data source, number and dimensionality of points,...)

Generality and Cardinality Independent (reusing the model, any size and dimension)

Learning (everyday listening)

Ergonomics

Computational complexity

MBS Examples

Data Sonogram Sonification Mode

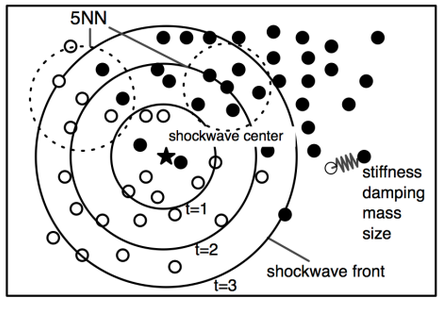


Figure 16.3: Data Sonogram Model Space

Tangible Data Scanning

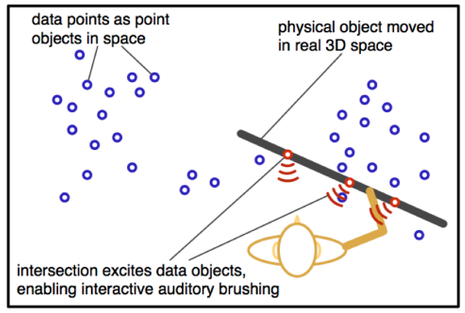


Figure 16.4: Tangible Data Scanning

Principal Curve Sonification

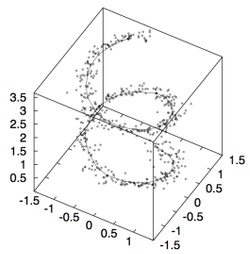


Figure 16.5: PCS for a spiral data set: noise structure along the spiral is difficult to see but easy to hear using PCS

Tangible Auditory Interfaces

based on fiducial markers of reactivision

http://reactivision.sourceforge.net

Data Sonogram

one mass-spring system per data vector

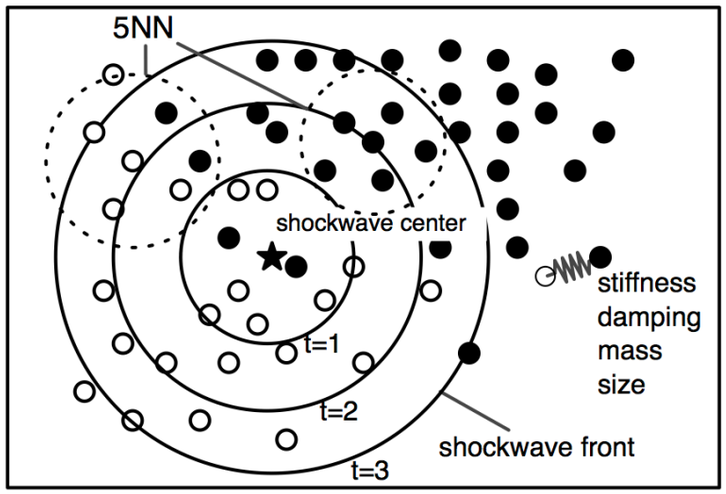


Figure 16.3: Data Sonogram Model Space

Assignment IV due on Monday 16.12.2013 11:59:59 pm

Data Sonogram of high dimensional data:
These data are the results of a chemical analysis of wines grown in the same region in Italy but derived from three different cultivars. The analysis determined the quantities of 13 constituents found in each of the three types of wines:

1) Alcohol
2) Malic acid
3) Ash
4) Alcalinity of ash
5) Magnesium
6) Total phenols
7) Flavanoids
8) Nonflavanoid phenols
9) Proanthocyanins
10) Color intensity
11) Hue
12) OD280/OD315 of diluted wines
13) Proline

downloaded from: http://archive.ics.uci.edu/ml/machine-learning-databases/