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CARTEMI 2004, Ischia

Application of Quasitopoi, Galois Connections, 16 years after ...

abstract

Application of Quasitopoi, Galois Connections, 16 years after ...

Int'l Conference on Real Analysis and Measure Theory »CARTEMI«
Ischia, Italy, 2004
"Application of Quasitopoi, Galois Connections, 16 years after ..."
Rolf D. Brandt, BEB, Hannover, Germany
eM Institute, "located world wide" (L'Aquila, Hannover, Montpellier, Toledo, ...)

abstract:

For practical purposes it is really one of the most efficient ways to construct limits (and colimits) via simple liftings of limits (colimits) of atoms for the corresponding universal structure. Applying these techniques is nothing else than just practising the real kernel of Topoi, Galois Theory, and other universal constructions.

Lifting of Galois Connections is applying atoms in Galois Theory. We will give examples for industrial applications with regard to topological editors and topological navigation techniques, optimisers, pattern recognition, forecasters, chasing correspondences in data universes, data and referential integrity, and time series.

Working with "measures" means in this sense use of "continuous accumulations" instead of values for individual intervals, working "analytically" corresponds to universal principles, e.g. partial morphisms, cartesian closedness, limits and so on instead of methods from numerical analysis.

The *"spirit of topological structures in the sense of Alexander Grothendieck"* helps nowadays even with constructing models for theoretical physics as well as computer science.

agenda

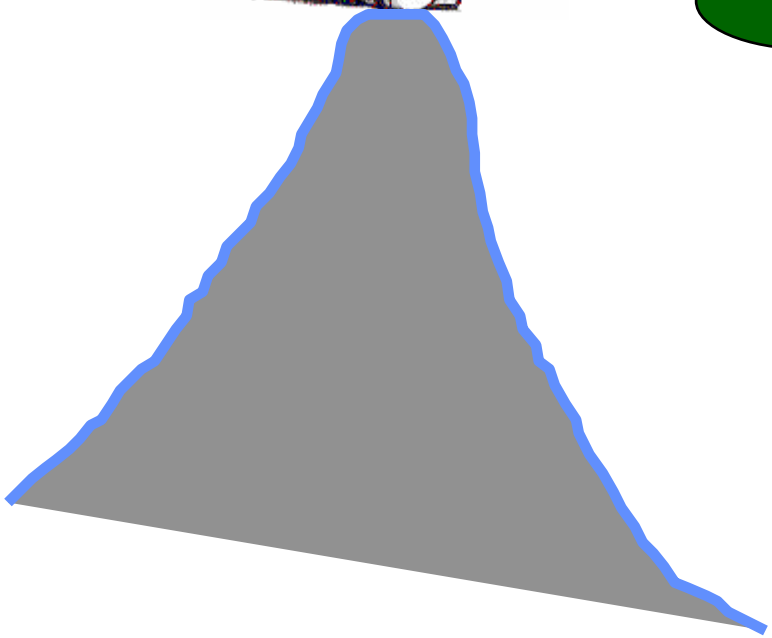
Application of Quasitopoi, Galois Connections, 16 years after ...

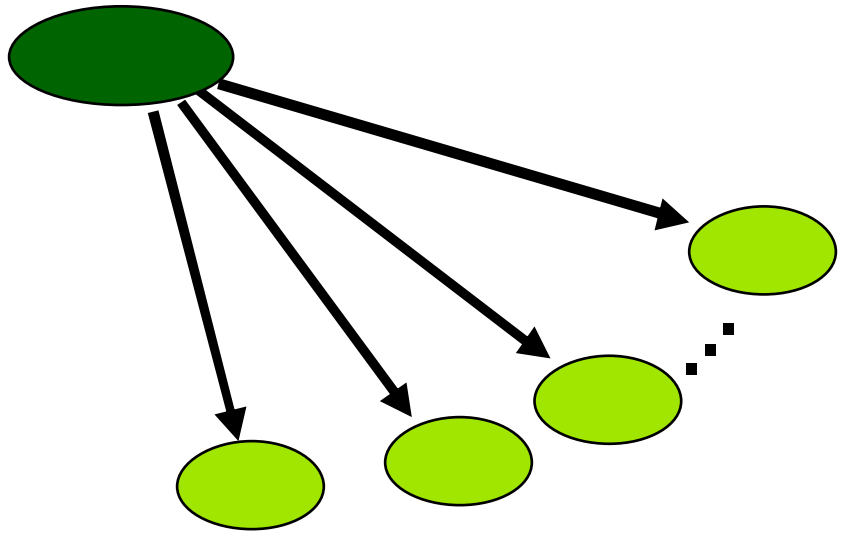
- ***C***ategorical background
- ***A***toms for concrete constructions / algorithms
- ***R***iemann goes Topology
- ***T***opological universes
- ***E***uler abstracts for applications
- ***M***easure theory
- ***I***ndustrial applications

categorical topology

Application of Quasitopoi, Galois Connections, 16 years after ...

top cats - initial structures and the dual - final structures





categorical topology

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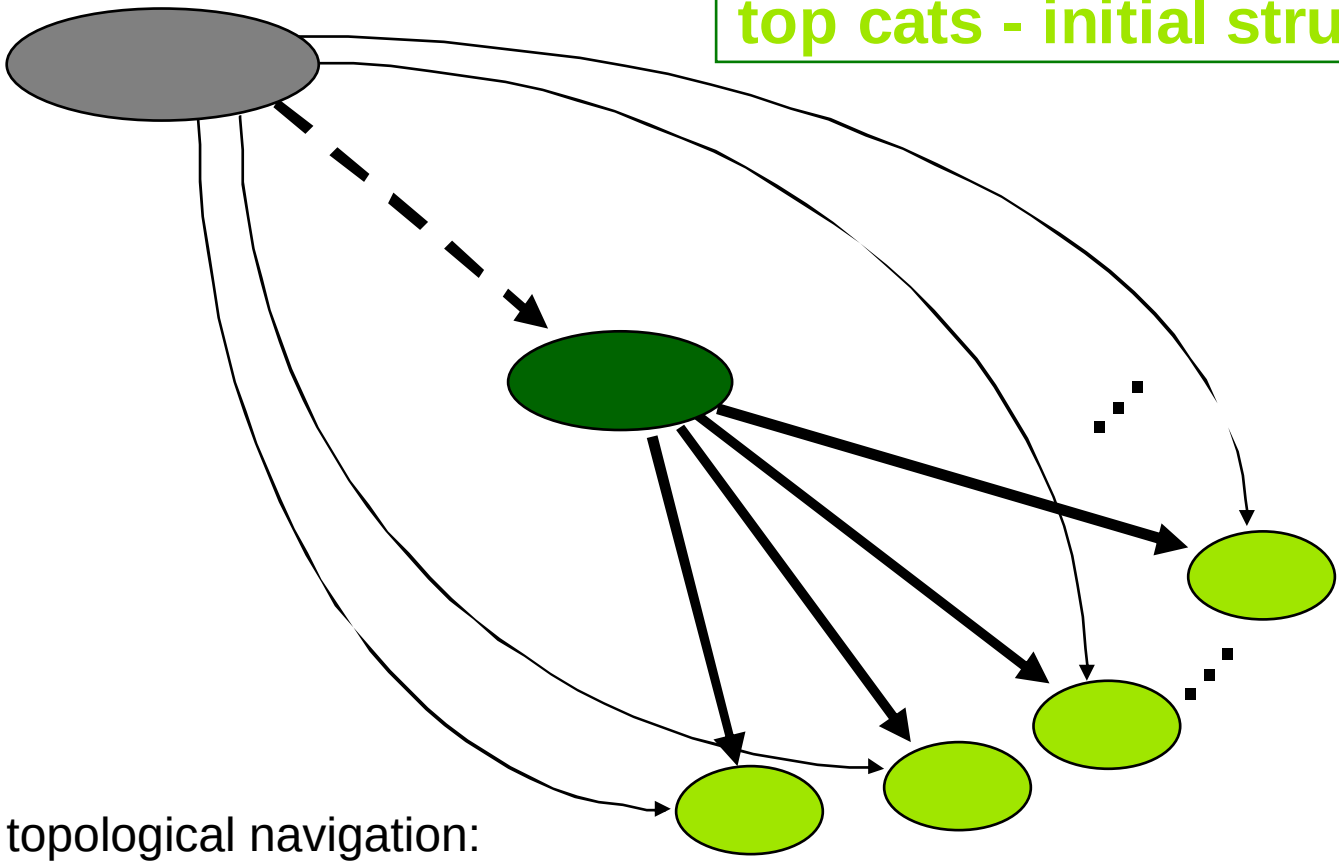
top cats - initial structures



relevant for topological navigation:

subspace (easy handling, construction & views of parts of grids) **dual: quotient**

product (all different views easy to construct, navigate & linkable) **dual: coproduct**

quasitopoi partial morphisms

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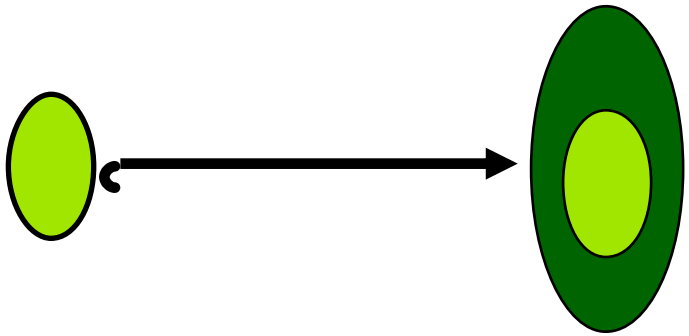
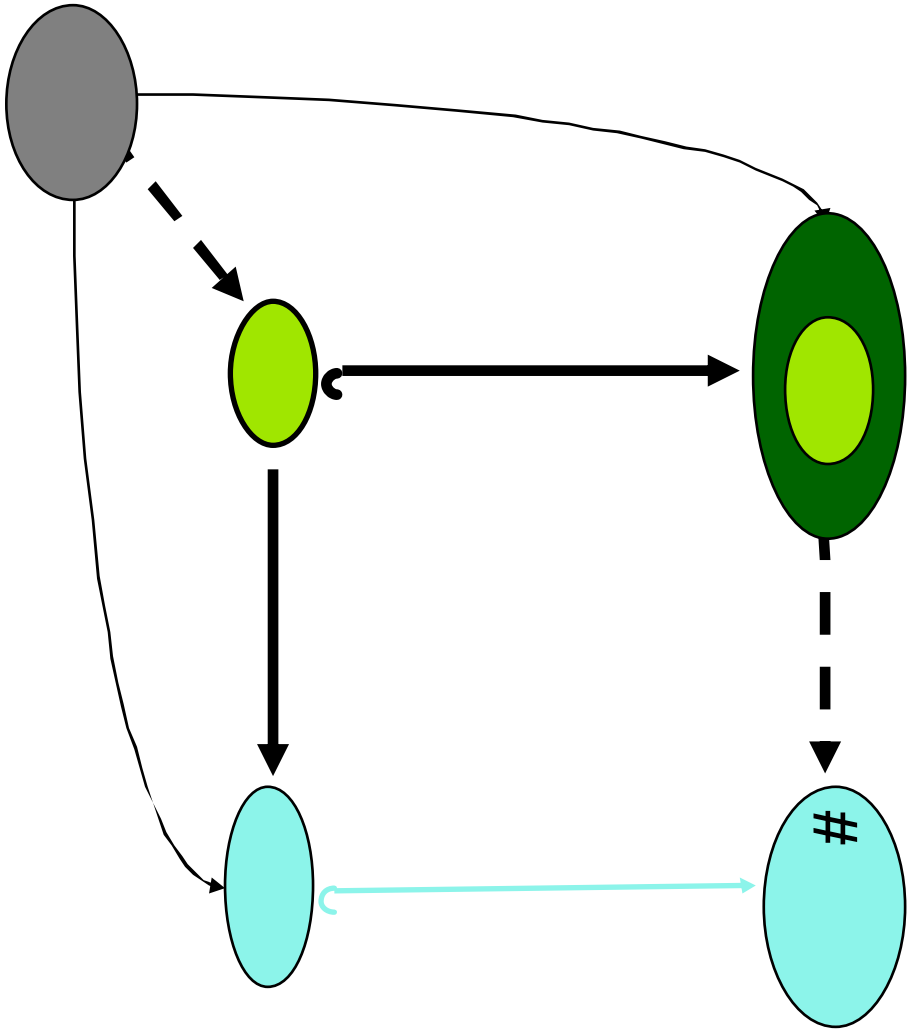


quasitopoi partial morphisms

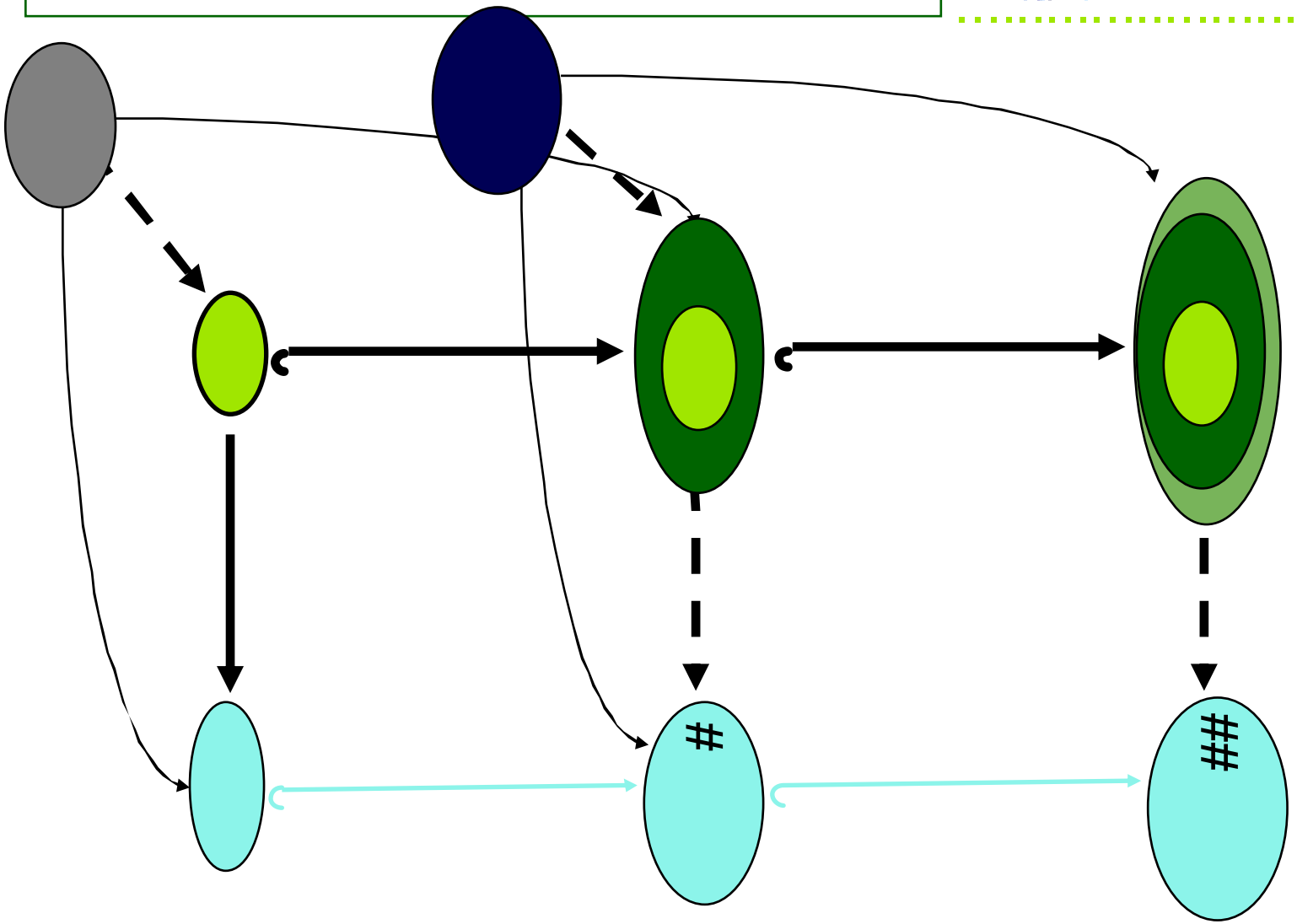
Application of Quasitopoi, Galois Connections, 16 years after ...



1-point-extensions ...

quasitopoi: partial morphisms

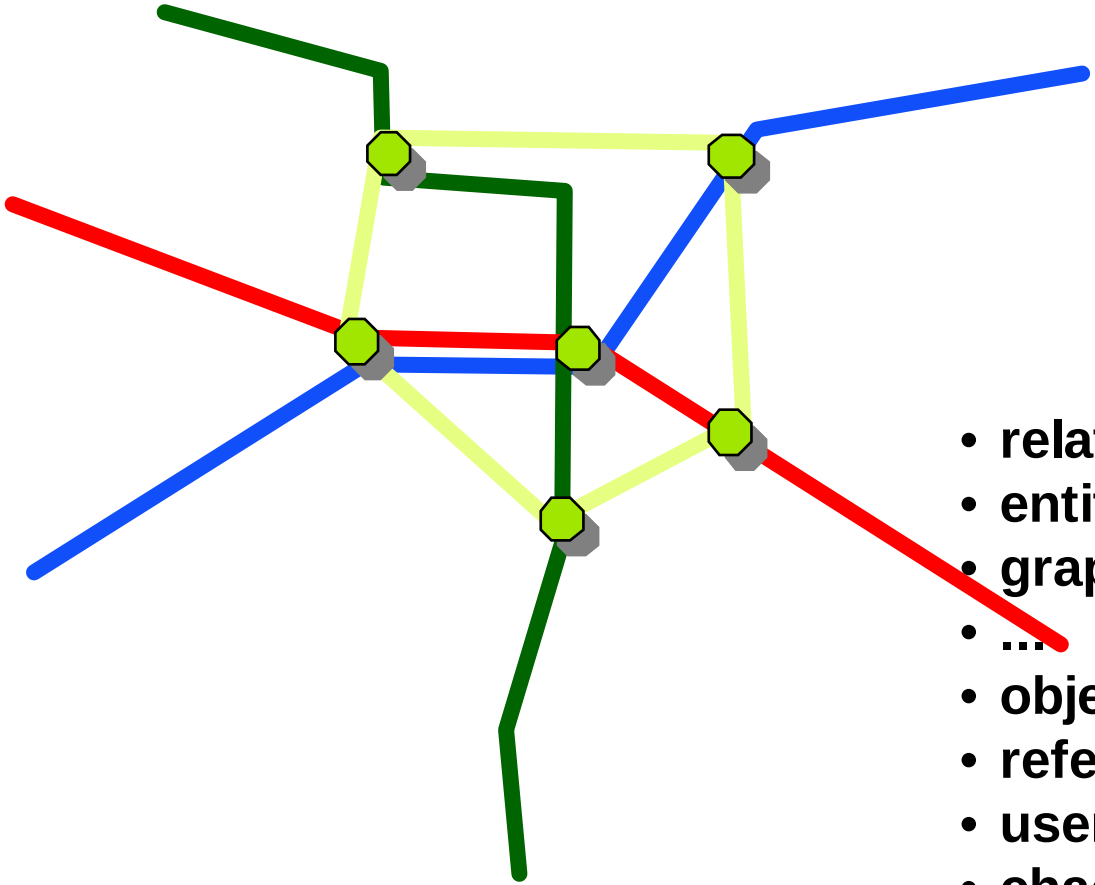
Application of Quasitopoi, Galois Connections, 16 years after ...

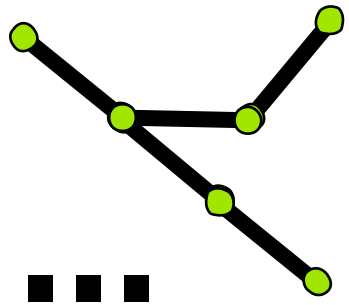


relevant for forecasters, schedulers, optimisers, pattern rec., etc.

relations vs points

Application of Quasitopoi, Galois Connections, 16 years after ...





- relational DBs
- entity relationship models
- graph theory in comp. sc.
- ...
- object orientation (oop)
- referential integrity
- user's view
- chaos in big info systems

need of cat top assistance

SCADA & ConCADA

Application of Quasitopoi, Galois Connections, 16 years after ...

SCADA*):

- steering of physical grid
- control of infrastructure
- and other features

ConCADA**):

- GasPortfolioManagement
- steering of contracts
- control of contractual limits
- optimising flexibility
- and other features

*) **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition

) **Contract **C**ontrol **A**nd **D**ata **A**cquisition

where we have to go ... ?

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my 5-point-"edit"-program: computer assistance for

- ≅ better isos e.g. automation of reorder-optimiser for visualisation, ...
- part of grid (subspaces)
- gluing together grids (coproducts)
- simplifying grids/interrelations, "portfolios" (quotients)
- product of grids (products)

my 5-point-"navigator"-program: computer assistance for

- ≅ "topology" of configuration (ref. integrity)
- arbitrary relation (or point/object) "on top" (e.g. actions)
- neighbourhoods stepwise visible (partial morphisms)
- alternative info ("fuzzy", "navigation")
- "pattern" recognition (quick reconstruction/reuse of path)

cattop editors + cattop navigators

=> new topological features required !!!

Galois Theory

- universal constructions

atoms for construction of

- limits

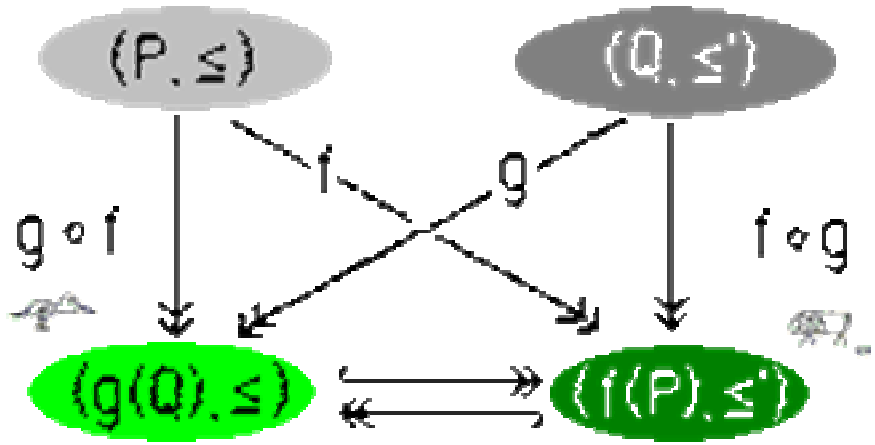
and the dual

- colimits

=>

lifting of Galois Connections

atoms in Galois Theory



Human Interface Supervison System

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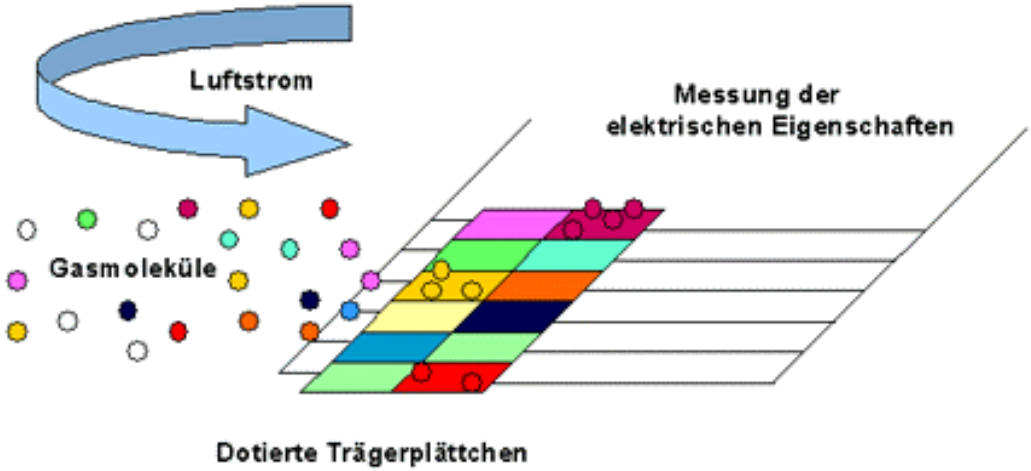
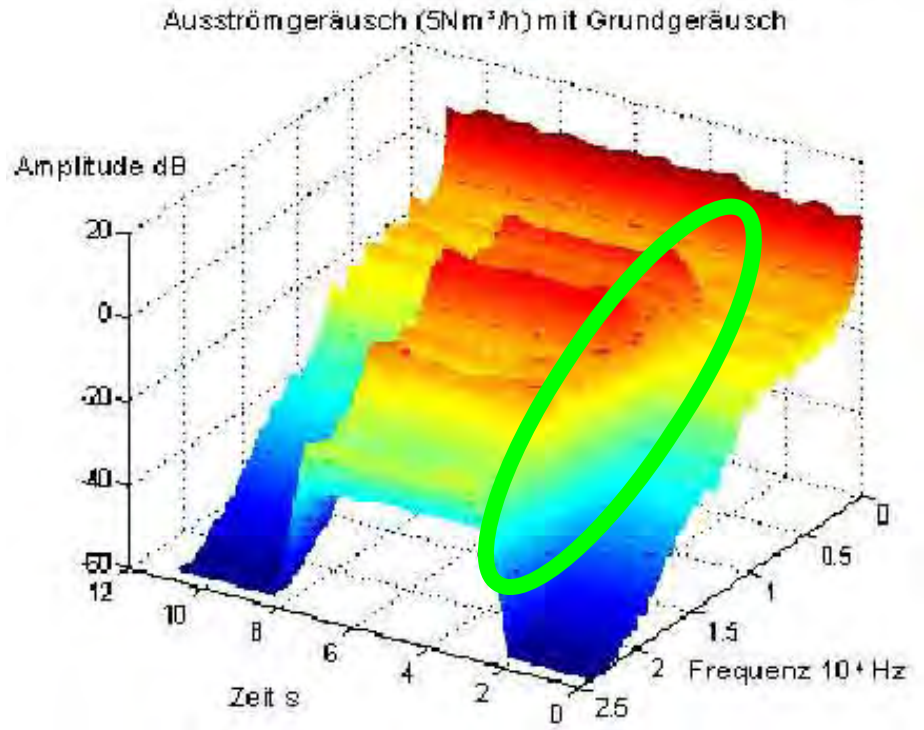


pattern recognition:

fuzzy logic & neural nets

better => PreTOPs



Intelligente Erdgasförderung

EXPO2000 HANNOVER

Registriertes Projekt der Weltausstellung

industrial applications

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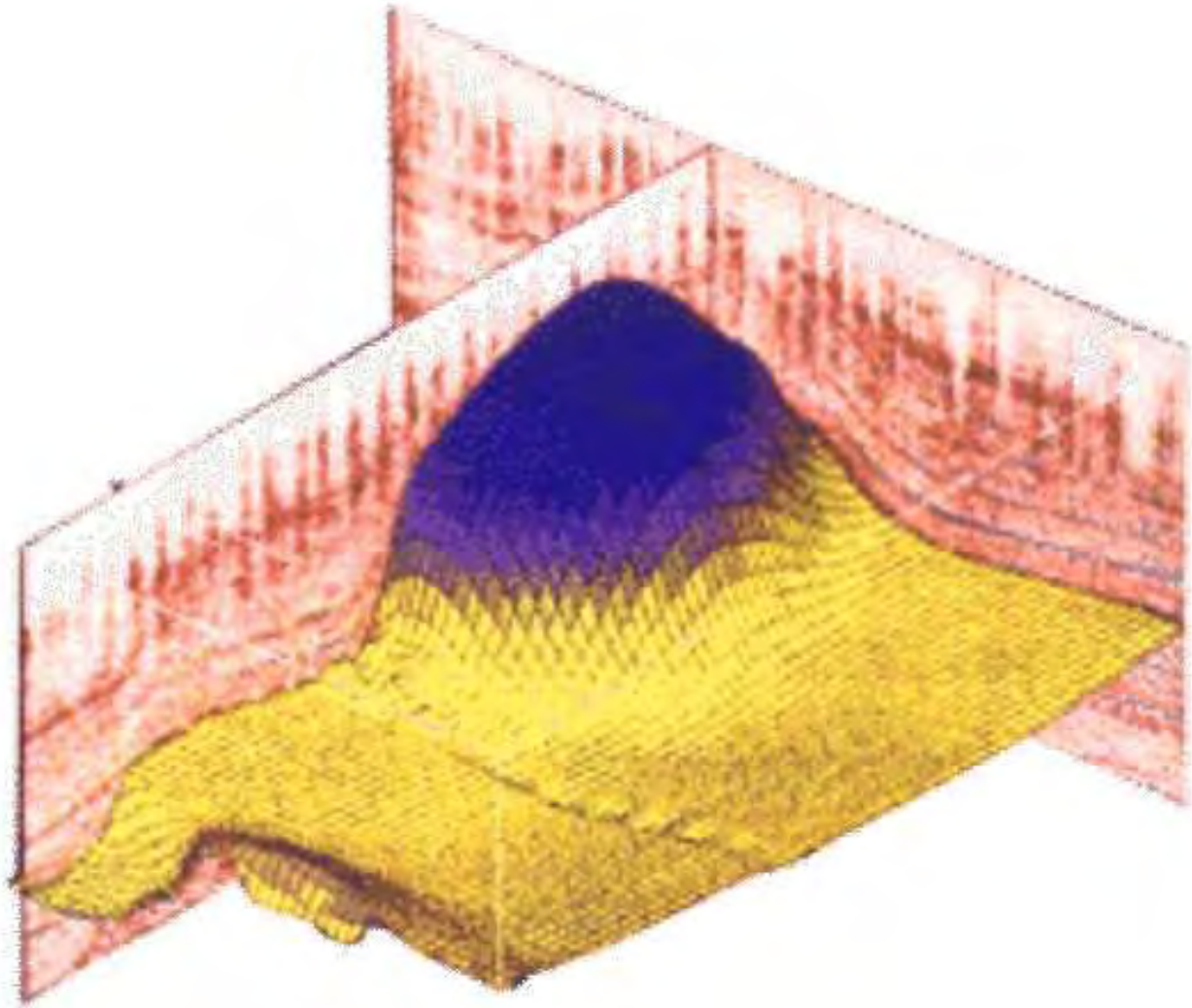

relevant for forecasters, schedulers, simulators, optimisers, pattern rec., etc.

time series

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CONVEGNO DI ANALISI REALE E TEORIA DELLA MISURA

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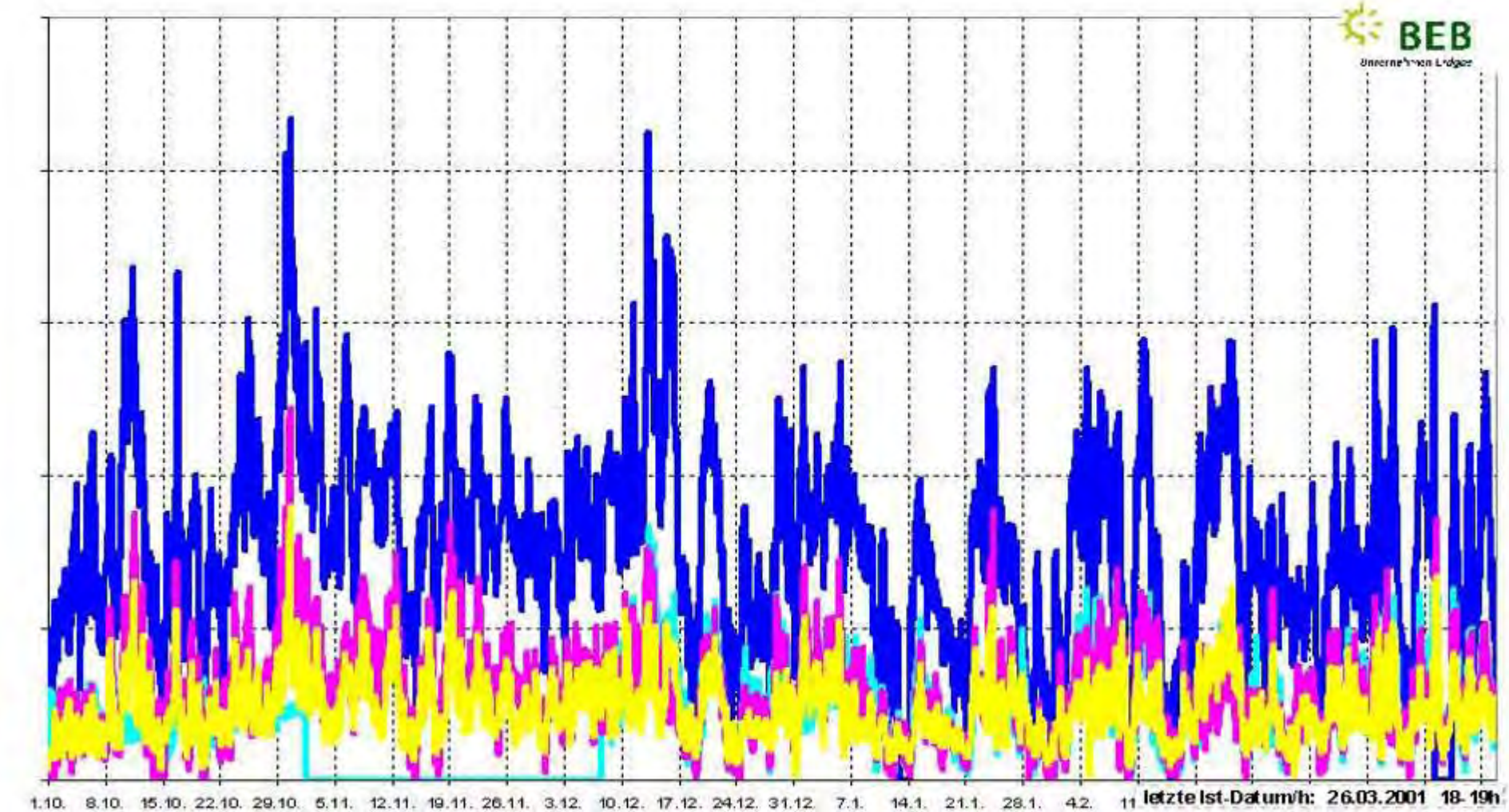

bin packing

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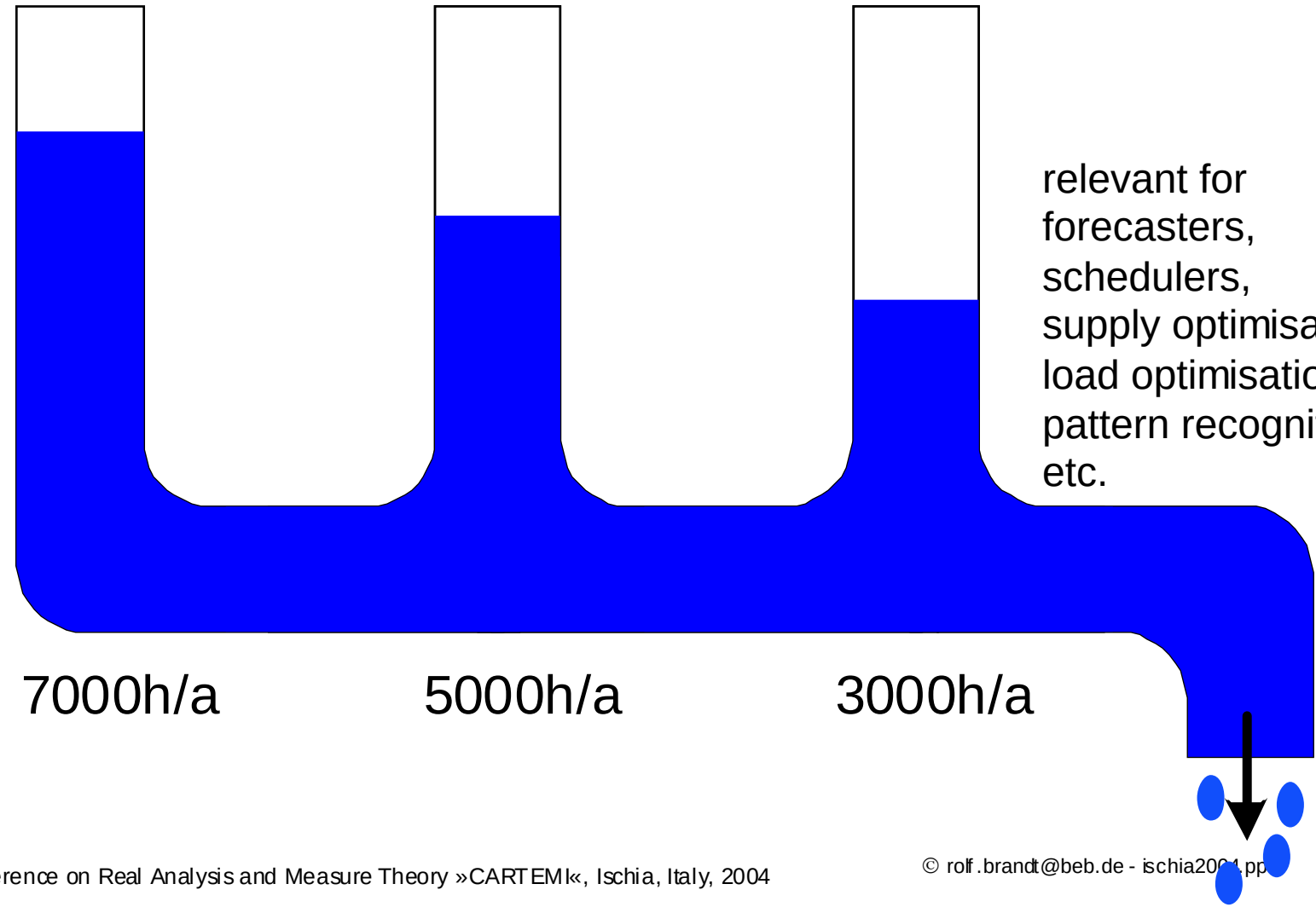

relevant for
forecasters,
schedulers,
supply optimisation,
load optimisation,
pattern recognition,
etc.

forecasters

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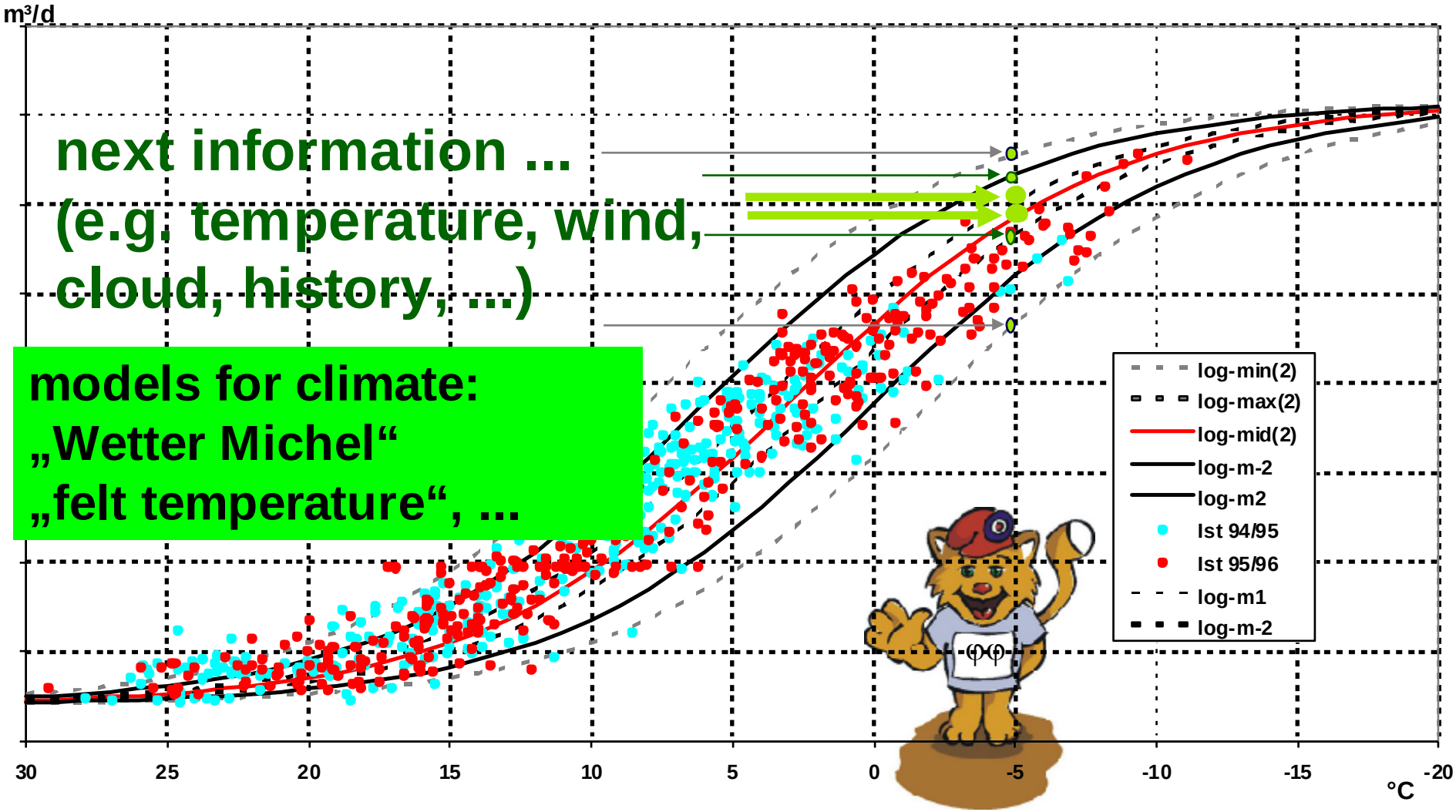

ECG's

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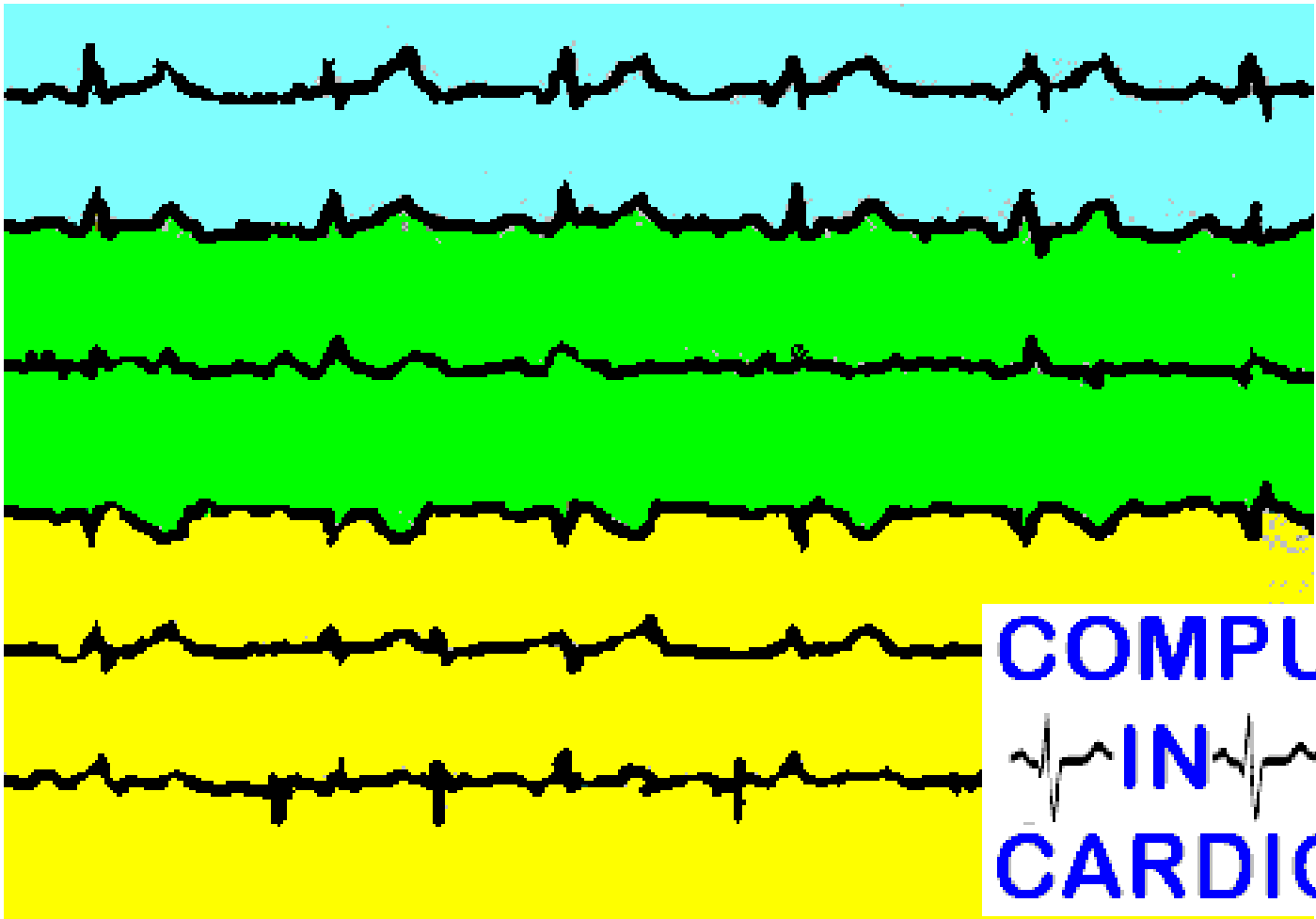

... thank you for your kind attention ...