

Discussion

on

"Exploiting Non-Linear Structure in Astronomical Data for Improved
Statistical Inference"

by Ann B. Lee and Peter E. Freeman

Didier Fraix-Burnet

UJF-Grenoble / CNRS / IPAG

Dimensionality Reduction and Classification

Dimensionality Reduction

to ease statistical inference
to simplify interpretation

Classification

to ease memory
to find relationships between objects

Adanson 1763

Dimensionality Reduction and Classification

Dimensionality Reduction

to ease statistical inference
to simplify interpretation

Classification

to ease memory
to find relationships between objects

Adanson 1763

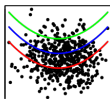
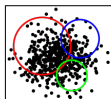
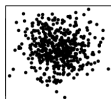
Dimensionality reduction
reduces number of **parameters**

Classification
reduces number
of **objects**

	Par1	Par2	Par3	Par4	...
Object1
Object2
Object3
Object4
...

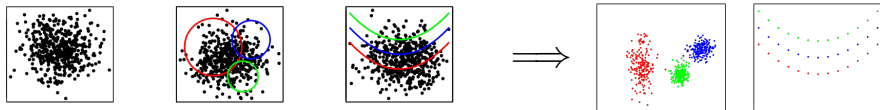
Classification and the Data Space

Why should we care about structures in the data space?



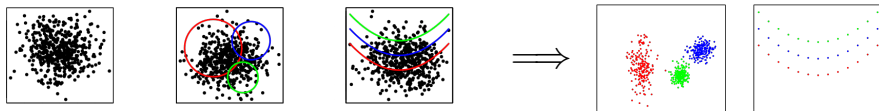
Classification and the Data Space

Why should we care about structures in the data space?



Classification and the Data Space

Why should we care about structures in the data space?



Object comparison



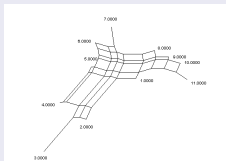
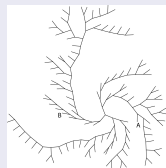
Distance-based
assume a metrics

Parameter-based
explore the metrics

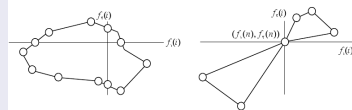
Classification and Structures in the Data Space

Continuous data space \longrightarrow classifying = organizing, ordering

Tree or split-network



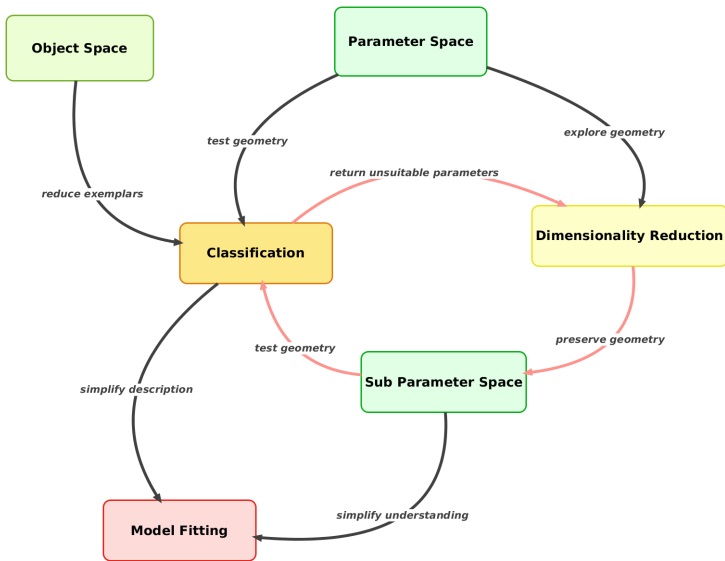
Convexity



(cf salesman problem)

Thuillard & Fraix-Burnet 2009

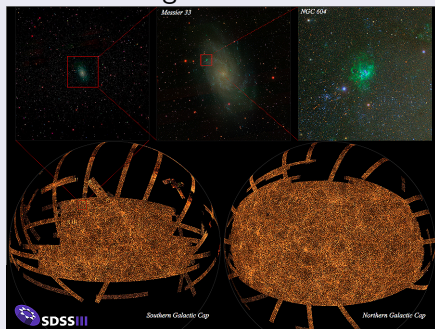
Finding the Right Data Space



A New Era for Astrophysics

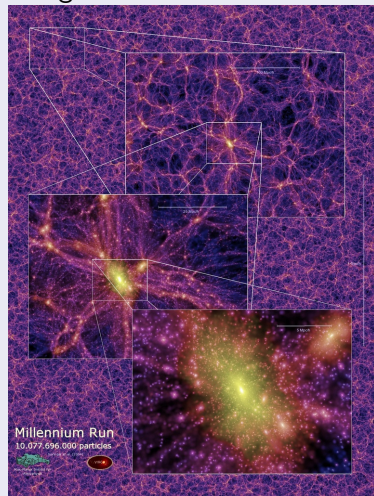
Observation

Huge databases



Theory

Huge numerical simulations



Complex objects \implies Model fitting = population comparison

a new way of thinking...