Enabling Multi-scale Science

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Support:
FAPESP-MSR Virtual Institute (NavSCALES and eFarms projects)
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We are DATASCOPE engineers

Software is the device/tool
We are DATASCOPE engineers

DATA + ANALYSIS PROCESSES + VISUALIZATIONS
We are DATASCOPE engineers

But what about a SCALESCOPE?

DATA + ANALYSIS PROCESSES + VISUALIZATIONS
Scale changes

Legend
High : 0.9
Low : 0

Grupo de Estudos em Geoprocessamento

GE
O

GEO

rupo de Estudos em Geo
processamento
Multi-scale scenario

Satellite sensors

Ground sensor network
Graph showing changes in biomass and temperature over time (TIME). The graph indicates fluctuations in both parameters with a marked change in temperature (∆T) at a specific point in time.
Recurring multi-scale problems

Data heterogeneity and quality
  space
  time
-> how to find common denominator (conversion?)
  (cleaning?)
-> how to visualize?

Sophisticated series of events
  in space
  in time
-> how to mine, correlate, visualize?
Recurring multi-scale problems 2

Complex interactions within and across scales
complex networks
cause and effect are not synchronous
-> how to model and provide traceability?

Model heterogeneity
multiple expertises
complementary views of the world
-> how to support model interaction?
A few ideas

1. Annotations/ontologies
A few ideas

2. Extend series mining
Mining co-evolving series
A few ideas

3. Aggregations, graphs and workflows
A few ideas
4. Adapt versioning
Scenario 0

1:250k

1:1M
Scenario 0.1

1:250k

1:1M
Scenario 0.1.2

1:250k

1:1M
A given version and interactions
Example

0  d0

DBV
d0

Data
-
Example

d0

0.1

d1

DBV

d0

d1 - watershed polygons

Data
Example

<table>
<thead>
<tr>
<th>DBV</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>d0</td>
<td>-</td>
</tr>
<tr>
<td>d1</td>
<td>- watershed polygons</td>
</tr>
<tr>
<td>d2</td>
<td>- watershed polygons</td>
</tr>
<tr>
<td></td>
<td>- rivers</td>
</tr>
</tbody>
</table>
Example

DBV

Data

d0
- watershed polygons

d1
- watershed polygons
- rivers

d2
- watershed polygons

d3
- main river
Scenario 0.1.1

Scale 1:250k

Scale 1:1M
Scenario 0.1.2

Scale 1:250k

Scale 1:1M
A few ideas

5. Profit from visual analytics
Visual analytics

Portrayal of trends as interconnected, annotated curves

Animations

Microsoft’s WWT and Layers