

Mining Relationships among Variables in Large Datasets from Complex Systems [MIRACLE]

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with

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Project overview

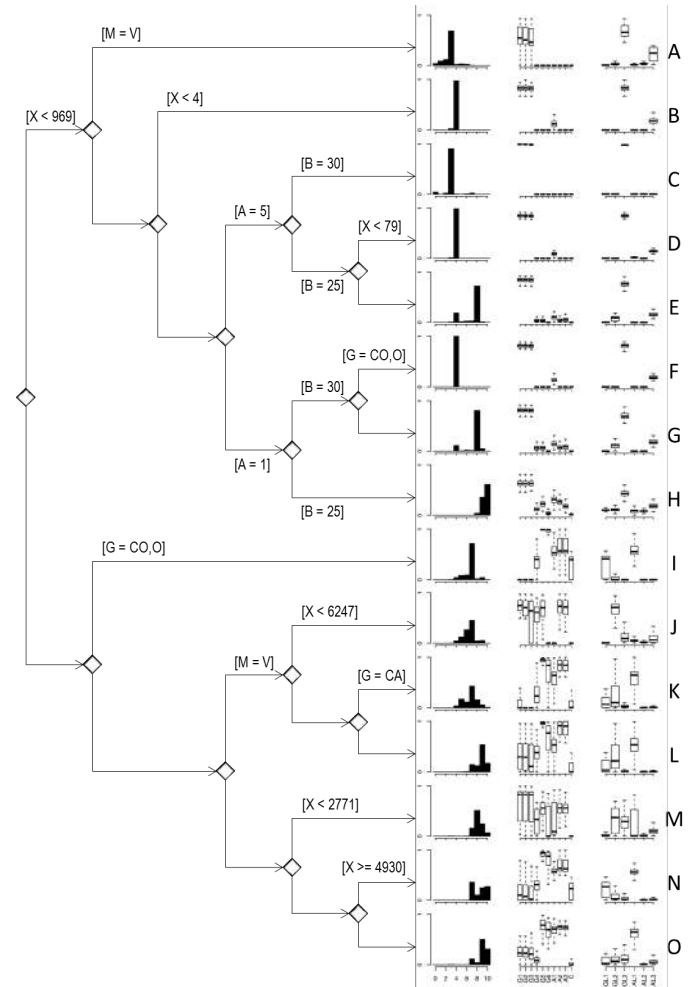
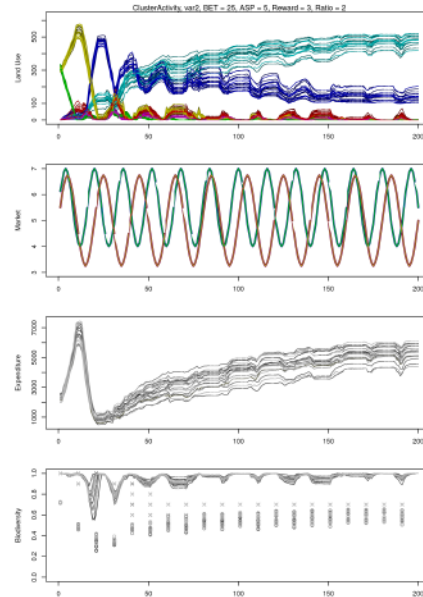
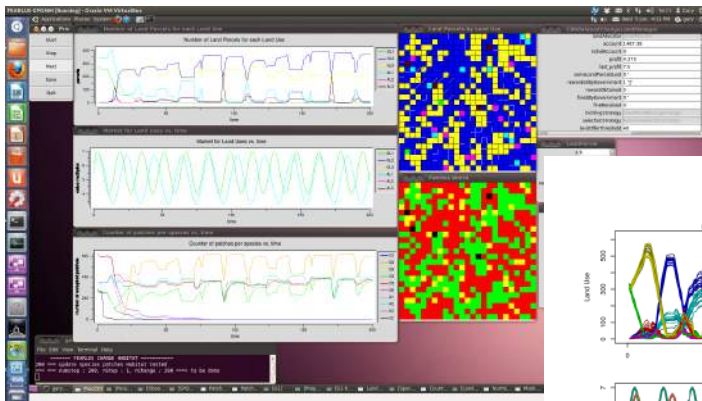


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- Complex systems have statistical properties that challenge their analysis using traditional statistics:
 - Path dependence
 - Irreducibility
 - Nonlinearity
 - Leptokurtic distributions of phenomena
 - Heteroskedastic time series
- Models need to use large parameter sweeps, but data can be difficult to summarise

Simulation output data as research data

- Visualisation and analysis challenges
e.g. 20,000 runs from FEARLUS-SPOMM





Overview of project plan

- Agree simulation output metadata standard
- Create tools allowing analysis and visualisation of simulation output data
- Make these available on the web
- Use the tools to explore relationships among variables in our own models



Objectives



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- Collect, extend and share analysis and visualisation methods
- Create web-based tools to facilitate this
- Conduct meta-analysis of our own projects and invite others to participate
- Try the techniques with empirical (non-model) datasets



Institutional context and objectives (1)

- University of Waterloo, Canada
 - Co-ordination
 - Development of web-based tools for analysis and visualisation
 - Running workshops
- Arizona State University, USA
 - Web-based interface development
 - Workflow management
 - Embedding in CoMSES Net



Institutional context and objectives (2)

- University of Twente, The Netherlands
 - Development of tools for analysis and visualisation of outputs from social simulations
 - Co-organisation of workshops
- University of Dundee and The James Hutton Institute, UK
 - Development of tools for discovering relationships among variables
 - Prototype agent-based data-mining algorithm



Deliverables



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- Reports
 - Tools for visualising high-dimensional nonlinear data
 - Final report
- Software
 - Data analysis tool set for R
 - Metadata tools
 - Visualisation tools
 - Website



Use cases (agent-based models)

- Land management and biodiversity (UK)
- Energy demand (UK)
- Land use, transportation and landscape management (Canada)
- Housing market in hazard-prone areas (The Netherlands)

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CoMSES Computational Model Library

- Browse
- Search
- Add
- Help

Showing 1 - 15 of 225 models.

Title ▲	Submitter	Post date
(Policy induced) Diffusion of Innovations - An integrated demand-supply Model based on Cournot Competition	M Rixin	Aug 29, 2011
Objective is to simulate policy interventions in an integrated demand-supply model. The underlying diffusion proceeds if interactions distribute awareness (Epidemic market process).		

Existing work: CoMSES Network

- The Open ABM library allows users to upload their models
- Aim is to provide a digital archive of ABM artefacts (source code, configuration files, etc.)
- Implements DDI and Dublin Core



Gary Polhill 0 new messages

My Status:

Looking at ourSpaces

Update



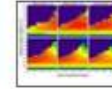
Projects



Models



Documents



Data



Maps



Blogs/Wikis

▲ My Resources

Edit X

22/06/2010 GILDED project meeting agenda
Budapest 2010
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18/06/2010 GILDED Annex 1
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18/06/2010 ABMED ont...

▲ My Projects

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Create Project

SwarmCloud
Supporting simulation environments on the Cloud
Co Investigator

PolicyGrid II
Supporting Interdisciplinary Evidence Bases for
Collaboration & Policy Making
Subcontractor

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Edoardo Pignotti

▲ Our Activities

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Edoardo Pignotti has added Edoardo Pignotti to the *e-Infrastructure* project.
[Comment](#)

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Edoardo Pignotti has added ...
Davies to the *ACE3* project.

Existing work: ourSpaces VRE

- Prototype provenance-enabled Virtual Research Environment allowing upload of digital artefacts



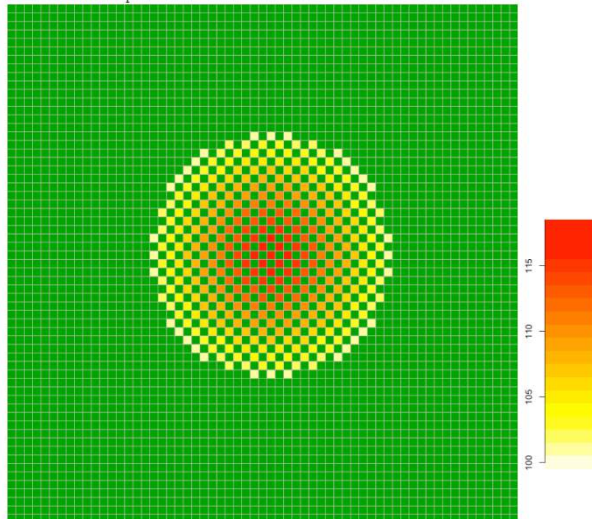
Other existing work



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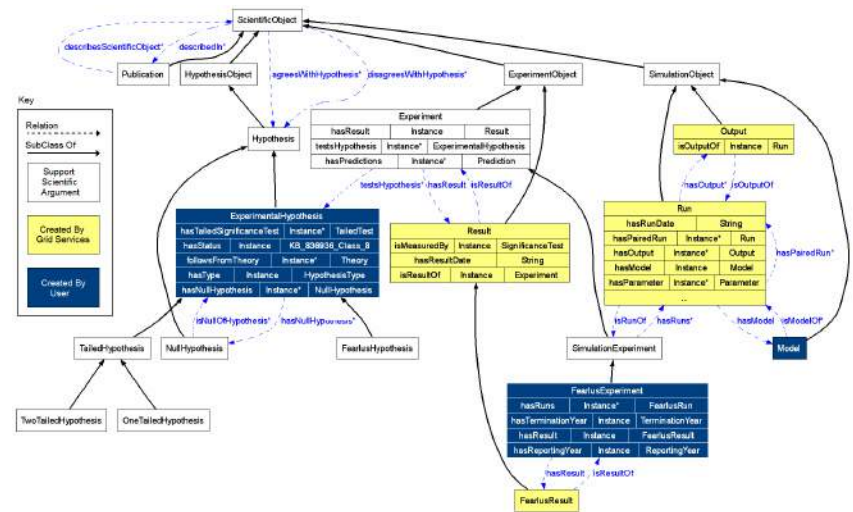
- MyExperiment – scientific workflows
- FEARLUS-G – semantic grid enabled agent-based model experimentation tool
- SLUCE2 Land Market Model web-based visualisation tool

Output
Transaction Price Map



Comments

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Communication

- Engage with relevant scholarly societies at conferences and with journal articles
 - European Social Simulation Association
 - International Environmental Modelling and Software Society
- Two international workshops are planned to engage with the research community
 - First is at iEMSs 2014 in June
 - “**Workshop G2:** Analyzing and Synthesizing Results from Complex Socio-ecosystem Models with High-dimensional Input, Parameter and Output Spaces”



Success criteria

- Agreed metadata standard for recording simulation output data
- Novel visualisation and analysis tools available to all via CoMSES website
- Interesting findings from our ABM output