Managing Research Flows with the RM System

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The RM Framework

• Basics of Research Flows

• The RM 4Es Framework

• The ResearchMap Framework
Research Flows Help to

• Store individual data transformation and analysis steps
• Compose larger research from individual research components (the components can be independent or connected by some control flow or data flow logics)
• Provide paths for automation
• Support easy modifications of research
• Foster collaborations
Research Flows Help

• Researchers to handle a few critical issues

1. Reproducibility
2. Provenance
3. Sharing
Research Flow Life Cycle

• Creation
• Execution
• Reuse
• Mapping
The RM4Es Framework

- Equation
- Estimation
- Errors (evaluation)
- Explanation

- The above 4Es cover all the needed components for any research flow
The ResearchMap Framework

- A research flow is a collection of all the needed steps (actions) taken by a researcher to reach the goal of a research project.
- A research map is a collection of all the possible research flows for a research project.
- A research map can be represented by a DAG (directed cyclic graph) with its node to represent a research status at every stage and with its edge to represent an action of employing certain statistical techniques (a statistical strategy).
The RM System

- Research Flow Composition
- Research Flow Execution
- Research Flow Mapping
- Research Flow Sharing
Research flow creation

• Design a research flow
  1. Find the right steps
  2. Set the right parameters
  3. Find the right data
  4. Connect appropriate pieces together

• Support both experts and novices
Research Flow Execution

• Research flow controller
• Event system
• Logging and database
• Scheduler
  • Resource provisioning
  • Fault tolerance
  • Efficient collaboration
  • Multi environment execution
Research flow mapping

• Mapping helps

1. Ease of use
2. Portability
3. Optimization
4. Fault tolerance

ResearchMap system provides intelligent supports.
Research flow sharing

- Template and component libraries
- Keyword and semantic search capabilities
- Composite research flows

ResearchMap system provides intelligent supports.