Towards Comprehensible Predictive Modeling

Michael Gleicher
Department of Computer Sciences
University of Wisconsin Madison
What is a **Good** model?
What is a **Good** model?

Accuracy
What is a Good model?

Descriptive Accuracy
Predictive Accuracy
What is a **Good** model?

- Descriptive Accuracy
- Predictive Accuracy
- Generalizability
- Efficiency in use
- Efficiency in construction
- Robustness
- Data required to build
- Conciseness
- Compactness
- Pre-criptive power
- Self-consistency
- Validatability
- Verifyability
- Simplicity
- Parsimony
Tradeoffs
What is a **Good** model?

- Descriptive Accuracy
- Predictive Accuracy
- Generalizability
- Efficiency in use
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- Pre-scriptive power
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- Parsimony

**Comprehensibility**
What is Comprehensibility?

The ability of some one
to understand some thing
for some reason

This is independent of...

where application, model type,
or how we help them do it
<table>
<thead>
<tr>
<th>Who?</th>
<th>What?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholders</td>
<td>Phase of the <strong>Process</strong></td>
<td>Reason for Wanting</td>
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<td>Developers</td>
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### Who, What, Why

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**Modeling is a process**

**There are many people involved**

**We should try to help all of them**
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**Who?**
- Stakeholders
- Developers – general purpose methods
- Data Scientists – general purpose process
- Domain Experts – specific applications
- Audience – uses the results
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## Mix and Match

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Visual exploration of modeling validation experiments

Our Motivation

Who?
- Stakeholders
- Developers
- Data Scientists
- Domain Experts
- Audience

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- Actionability
Pleasant Surprises

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Agenda

Understand Understandability

Metrics for Measuring

Tools for user control over tradeoffs
  tunable methods
  different methods to give options
3 Paths to Understandability

Easier to understand models

Better explanations/visualizations of existing models

Co-design of models and visualizations
3 Paths to Understandability

Easier to understand models
   Explainers (VAST 2013)

Better explanations/visualizations of existing models
   Protein Surface Classifier Validation (EuroVis14)
   Serendip (VAST14)

Co-design of models and visualizations
   Molecular Motion Illustration (TVCG12)
   Splatterplots (TVCG13)
Thanks!
To you for listening.
To the organizers for inviting me
To my students and collaborators.
To the NSF and Mellon Foundation for funding.

Towards Comprehensible
(Predictive) Modeling

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