

Computing Simple Explanations from Numerical Data

Location

All classes and workshop activities will take place in the Administrative Science Building, Room 106, at The University of Alabama in Huntsville.

Registration

The workshop is offered free of charge. However seats are limited.

Register by calling:
256.824.6804

or

email your name, affiliation, position,
phone number and email address to:

Dr. Fan Tseng at:
tsengf@uah.edu

For additional information visit:
cas.uah.edu/tsengf/workshop.htm

This workshop is sponsored by:

UAH Rotorcraft Systems Engineering and
Simulation Center
and

Center for the Management of Science &
Technology (CMOST)
Dept of Management & Marketing
College of Administrative Science
UAH



Computing Simple Explanations from Numerical Data

with Dr. Klaus Truemper

May 3 and 4, 2007
The University of Alabama in Huntsville
College of Administrative Science

**Learn how to get useful, robust
statistical data from sample sizes
previously thought too small to be
statistically significant!**



Computing Simple Explanations from Numerical Data

This workshop includes six application-oriented sessions designed to prepare participants to use a new technique for constructing simple explanations from numerical data.

Researchers and practitioners in many fields must often make decisions with results from relatively few and often incomplete data sets.

This workshop will introduce participants to a new analysis technique that provides more robust solutions to very difficult questions from comparatively few data records where numerous data elements per record are given.

Applications of this new technique arise in a variety of fields, including bioinformatics, engineering, economics, finance, drug research and certification, and health-care management.

The techniques used in these sessions are applicable to analysis involving rotorcraft systems and the requirement to construct safety and reliability predictions from numerical data. It is applicable to condition-based maintenance and reliability-centered maintenance.

The Leibniz System is the key software for this technique. People attending the workshop will learn how to use the software for the construction, evaluation, and operation of intelligent systems during lab sessions. Participants can choose to attend either the first day or both days of the workshop. Day one will focus on the overview of the technique and the Leibniz System modules. Day two will focus on more advanced techniques.



Truemper during an earlier talk at UAH

About the Instructor

Dr. Klaus Truemper is Professor Emeritus of Computer Science at the University of Texas at Dallas. He has a long distinguished record in computer science, operations research and mathematics. He has published extensively on topics that include intelligent systems, computational logic and combinatorics. He is the author of three books and a number of academic papers. His work has been supported by grants from the National Science Foundation, the U.S. Department of Defense, the Office of Naval Research, Italy's National Center for Systems Analysis and Computer Science and the Italian Ministry of Education and Research.

Workshop Schedule

Thursday, May 3

10:00 - 11:30 a.m.

Obtaining Explanations from Numerical Data

The explanation problem demands the construction of two explanations that tell why the numerical records of one population differ from those of a second population. The explanations must be simple enough that humans can comprehend them for decision making.

A new multi-step method called EXARP solves the explanation problem. The steps carry out discretization of data, selection of important factors, construction of explanations, and validation. While these terms are familiar in machine learning, the actual processes are quite different from prior ones. In particular, in each step a so-called alternative random process (ARP) is introduced that attempts to distort information or disrupt the computing process. Appropriate action by the solution algorithms prevents the ARPs from reaching these goals.

The lecture covers various examples in bioinformatics, economics, engineering, finance, and medicine. They show EXARP to be very effective even when data sets are very small.

1:30 - 3:00 p.m.

Explanation Modules of the Leibniz System

Discretization and learning logic modules of the Leibniz System, input and output files, computation of important factors and explanations, treatment of continuous effects.

The session discusses use of the modules, including preparation of input, selection of parameter files, and evaluation of output files including statistical validation tests.

3:00 - 4:00 p.m.

Lab Session

This lab session demonstrates the computation of explanations.

Friday, May 4

10:00 - 11:30 a.m.

Algorithms for Computation of Explanations

Alternate random processes, discretization, learning of logic formulas, important factors, construction of explanations, and validation.

This is a blackboard session where the mathematical theory underlying the Leibniz System is presented in a classroom atmosphere. The audience is encouraged to ask questions.

1:30 - 3:00 p.m.

Advanced Explanation Topics

Outliers, effect intervals, importance functions, costs of tests and optimal explanations, and normative constraints imposed on explanations.

This session is a continuation of the morning program. Here, advanced concepts and related algorithms underlying the Leibniz System are discussed.

3:00 - 4:00 p.m.

Lab Session

This lab session demonstrates more advanced topics on the computation of explanation.