ALADDIN

Guy Blelloch, Lenore Blum • Carnegie Mellon University
In collaboration with Princeton University

ALgorithmic ADaptation, Dissemination and INtegration

Research Objectives

Improve the Process of Applying Algorithms to Real-World Problems

Approach

Organized Around **PROBEs**
➤ **PROB**lem-Oriented **E**xplorations
Each Starts with a **Workshop**
➤ Leads to ongoing research relationships and results

Broader Impact

Research / Industry Synergies
➤ Better theory
➤ Better applied technology
Combined with Outreach
➤ Better algorithms education

*College Workshop –
Carnegie Mellon, June 26-28, 2003*

*Women @SCS
Outreach Roadshow*

REUs – 33 students over the past four summers

http://www.aladdin.cs.cmu.edu

Significant Results: A Sampling

The CAPTCHA Project

Computer Human Authentication
➤ CAPTCHA used by Yahoo! et al
➤ ESP Game labels web images
Workshop on Human Interactive Proofs – Palo Alto, January 9-11, 2002

0:32 Time Left **The ESP Game** 0000 score
Taboo Words
CAT
LEOPARD
Your Guesses
Type your next guess:
Pass

Privacy in DATA
➤ Theory of **k-Anonymity**
*Privacy in DATA Workshop –
Carnegie Mellon, March 27-28, 2003*

SNP and Haplotype Analysis
➤ New methods for characterizing and applying haplotype structure
2nd RECOMB Satellite Workshop on Computational Methods for SNPs and Haplotypes – Carnegie Mellon, February 20-21, 2004
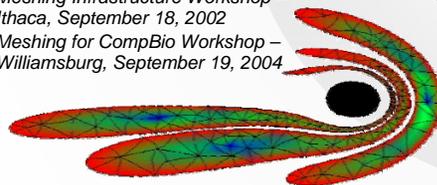
ALGORITHM CORE

Meshing for Blood Flow
➤ Meshing with dynamically moving interfaces
*Meshing Infrastructure Workshop –
Ithaca, September 18, 2002*
*Meshing for CompBio Workshop –
Williamsburg, September 19, 2004*

Graph Cuts for Vision and Data Analysis
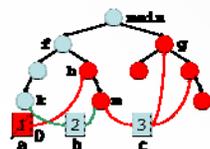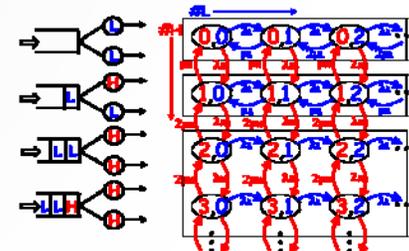➤ Graph partitioning for combining labeled and unlabeled data
*Workshop on Graph Partitioning in Vision and Machine Learning –
Carnegie Mellon, January 9-11, 2003*

SYNC and Multiserver Scheduling
➤ Dramatically improved mean response time
*Workshop on Multiserver Scheduling –
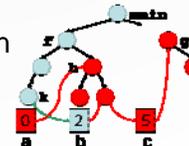Carnegie Mellon, April 18-19, 2004*
*CMU/TUe Collaborative Workshop –
Carnegie Mellon, July 2-3, 2005*

Dynamic Algorithms
➤ Self-adjusting computation
Workshop on Dynamic Algorithms & Applications – New Orleans, January 14, 2004

Algorithms in Economics
*Workshop on Auction Theory and Practice –
Carnegie Mellon, November 7-8, 2003*
*Market Design Workshop – Carnegie Mellon,
October 28-29, 2004*
*Workshop on Flexible Network Design –
Princeton, November 4-5, 2005*

Integrated Logistics
*Integrated Logistics Workshop –
Princeton, Oct. 31 – Nov. 1, 2002*
*Integrated Logistics Workshop II –
Carnegie Mellon, March 27-29, 2003*

Web Structure and Algorithms
➤ Analysis of "geometric" model having a power law and small separators
Workshop on Web Structure and Algorithms – Carnegie Mellon, April 9-10, 2004
WaterMellon Workshop on Extremal Graph Theory – Carnegie Mellon, May 21-23, 2005