



CCICADA Overview

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April 8, 2011

In the Beginning DIMACS

- DIMACS began as a center for **D**iscrete **M**ath and **T**heoretical **C**omputer **S**cience in 1989
 - Research
 - Special focus programs
 - Education programs
 - Outreach

- Topics have broadened through time...
 - Mathematical biology & epidemiology
 - Communications & networks
 - **Data management and data analytics**
 - **Homeland Security**
 - **Disaster Management & emergency response**

- Highly Interdisciplinary



Homeland Security at DIMACS & CCICADA

- ❑ Laboratory for Port Security
- ❑ Analytics for Intelligence Community
- ❑ DHS Centers of Excellence
 - Center for Dynamic Data Analysis (DyDAn), 2006
 - **Command Control & Interoperability Center for Advanced Data Analysis (CCICADA), 2009**
 - Data management and data analytics
- ❑ Sensor Management for Nuclear Detection
- ❑ Emergency response: heat events (Brad)



CCICADA Partners

- Alcatel-Lucent Bell Labs
- AT&T Labs - Research
- Carnegie-Mellon Univ.
- City College of NY
- Geosemble Technologies
- Howard University
- Morgan State University
- Princeton University
- Regal Decision Systems
- Rensselaer Polytechnic Inst.
- Rutgers University (Lead)
- Telcordia Technologies
- Texas Southern Univ
- Tuskegee University
- U Mass - Lowell
- UMDNJ
- University of Illinois,
- USC



CCICADA: Overview

- ❑ Many activities in homeland security require drawing conclusions from massive flows of data
 - Arriving quickly
 - From disparate sources
 - Subject to error/uncertainty
- ❑ **Challenge:** There is lots of information available BUT much of it is unstructured and noisy
 - Books, newspaper articles, journal publications, reports, images, maps, satellite images, and audio and video streams



CCICADA Research: The Basics

- *Addressing the entire “data analytic spectrum”*
 - Extracting information from diverse sources
 - Filtering, cleansing, and structuring data
 - Enriching information using linkages and text processing
 - Resolving inconsistencies or ambiguities
 - Analyzing information for patterns, anomalies...



Watson Relates to Homeland Security?

□ Strategy & Decision Making

- Clue selection
 - Searching for Daily Doubles
 - Learning about categories
 - Keeping control of Board
- Betting strategy
- Buzzing in

Optimization
Under
Uncertainty

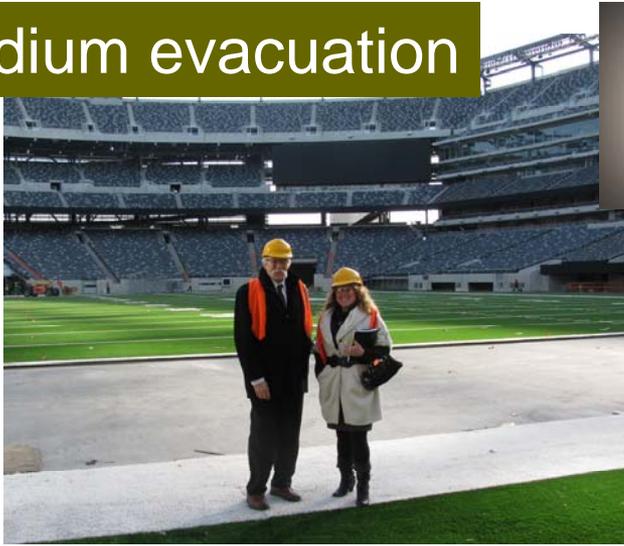
□ Question Answering

- Complexity and ambiguity of natural language
- BROAD domain
- High precision
- Speed

<http://www.youtube.com/watch?v=3PqaTxLEc-Y>

A Sample of Projects

Stadium evacuation



Nuclear detection



Cargo inspection

Students' Guide to CCICADA

- ❑ **Goal:** Increase participation in data analytics, and motivate students to consider grad schools, etc.
- ❑ **Data Sciences Summer Institute:** 6-week summer program at U. Illinois offering a comprehensive introduction to data analytics
- ❑ **CCICADA REU:** Eight-week residential summer research program at Rutgers with one-on-one mentoring by CCICADA researchers
- ❑ CCICADA Graduate Fellows Program
- ❑ DHS MSI Summer Research Team Program



Crime Map
Research Project