VACCINE

Visual Analytics for Command, Control, and Interoperability Environments

A U.S. Department of Homeland Security Center of Excellence

Teaching Visual Analytics:
Leveraging Multidisciplinarity

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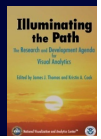
Definition

Visual Analytics[1] is the science of analytical reasoning facilitated by interactive visual interfaces

People use visual analytics tools and techniques to

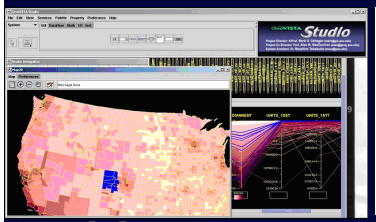
- Synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data
- Detect the expected and discover the unexpected
- Provide timely, defensible, understandable assessments
- Communicate assessment effectively for action



1. Illuminating the Path: The R&D Agenda for Visual Analytics, Editors: Thomas and Cook

Motivation

To solve today's and tomorrow's problems requires exploring, analyzing, and reasoning with massive, multisource, multiscale, heterogeneous, streaming data



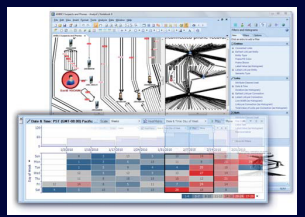
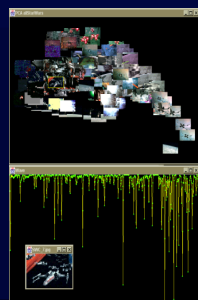
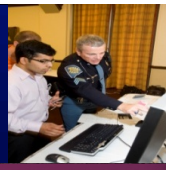


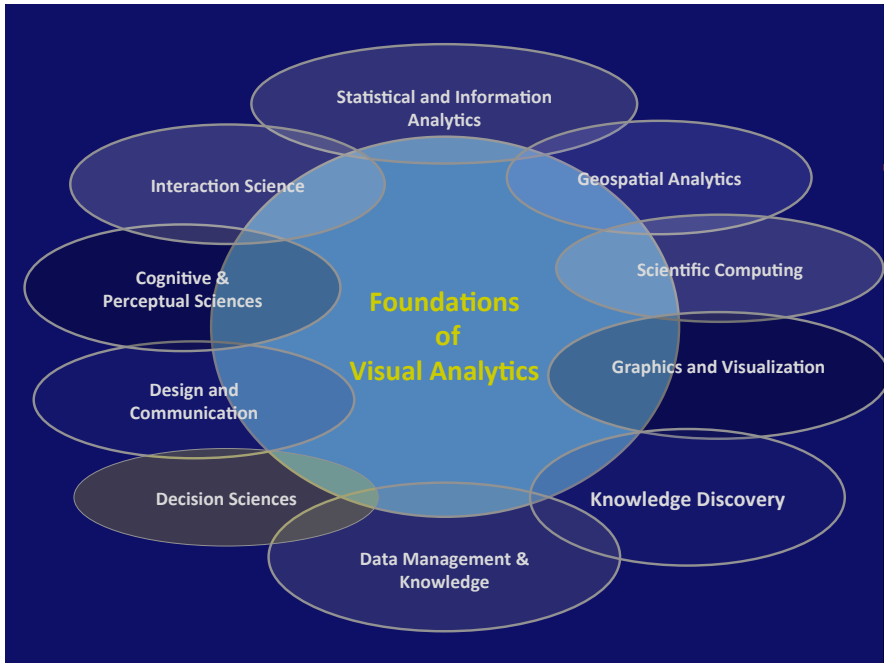
Image of Analyst's Notebook



VA Goals – Solution Driven



- Enable effective decision making through interactive visual analytic environments
- Enable effective communication of information
- Provide quantitative, reliable, reproducible evidence
- Enable user to be more effective from planning to detection to response to recovery
- Enable proactive and predictive visual analytics
- Enable effective situational awareness (perception, comprehension, projection)



Course Outline

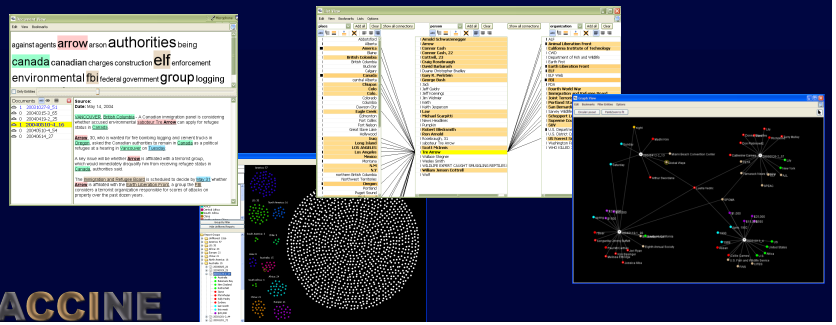
Week	Topic	Contents
1	Introduction	Analytical exercise
2–3	Analytical reasoning	The analysis process, critical thinking, sensemaking, and situation awareness
4	Perception	Human perception, preattentiveness, color, shape, and texture
5	Cognition	Cognitive theory
6–7	Data management	Representations, transformations, and statistics (temporal and spatial)
9	Visual representations	Visualization techniques
11	Interaction	Interaction techniques
12	Communication	Production, presentation, and dissemination
13	Collaboration	Collaborative VA
14	Evaluation	Evaluating VA
15	Advanced topics	Conducting VA research, novel computing platforms, and mobile VA

Jigsaw: Visual Analytics for Investigative Analysis and Exploration of Document Collections

"Putting the pieces together"

Goal: Assist investigators with understanding, sense-making, and analysis of large, unstructured and structured document collections

Approach: Provide multiple visual perspectives on the documents and entities within them, highlighting connections between entities



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May 2012

VA Course Challenges

1. Broad field to cover in 15 weeks
2. Students with diverse backgrounds
3. Teacher expertise in normally only portion of course topics

To Program or Not to Program….

- We design course without programming expertise required
- Challenges:
  - Evaluating students results fairly across projects of different types(design studies, application use, new techniques)
  - Overcoming faculty biases

Current Results

- Graduate class offered twice with 10-15 students per semester
- Variety of student backgrounds
- At least 5 projects have lead to conference submissions

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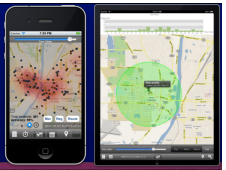

- Explore criminal, traffic and civil data on-the-go
- Risk assessment
- Use current spatial + temporal context into analysis

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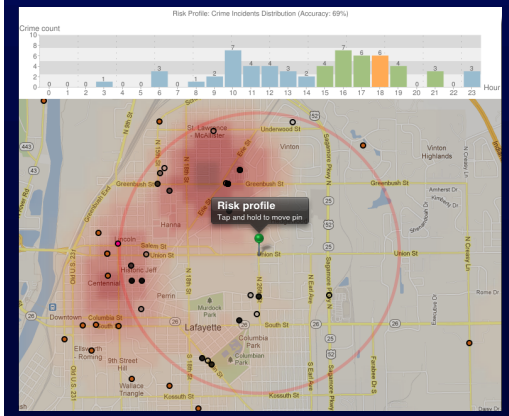

- Linked views to explore multivariate spatiotemporal dataset
- Analytical tools to help explore data

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For Further Information

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