The Center for Dynamic Data Analytics Quarterly Newsletter

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Announcements

- **White House Technology Convergence Commission**: The CDDA has been invited to participate in the White House Technology Convergence Commission, organized by TechAmerica. The goal of the commission is to proactively provide recommendations to the U.S. federal government on the convergence of social, mobile, analytics, and cloud (SMAC) and its ability to improve efficiency, services and capabilities while driving innovation and the economy. More info here.

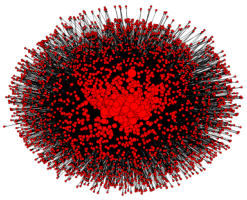
- The CDDA **Fall 2014 Workshop and IAB Meeting** is scheduled for **Tues. Nov. 4th and Wed. Nov. 5th** and will be held at the Livingston Student Center on the Rutgers Livingston Campus in Piscataway, NJ. Please register here.

- The CDDA is in the early stages of organizing a **Big Data Tools Marketplace Report** to help catalog and describe the multitude of data analytics tools that are being offered and implemented in the current technology market. A presentation is being planned for the Fall 2014 CDDA Meeting to describe the report. If you are interested in learning more, please contact james.mielke@rutgers.edu for further information.

Current Projects

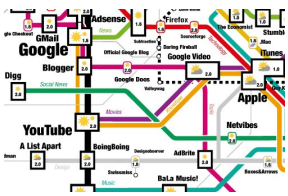
- Tissue Quantification Project: PI, Dimitris Metaxas, IAB Collaborators, Colin Miller and Hui Jing Yu, BioClinica
- Anomaly Detection in Dynamic Networks: PI, Leman Akoglu, IAB Collaborator, Steve Cento, Northrop Grumman Aerospace Sector
- Remote Volume Rendering Pipeline for mHealth Applications: Researcher, Ievgeniia Gutenko, IAB Collaborator, Ron Cha, Samsung Research America
- Statistical Stylometry: PI, Yejin Choi, Stony Brook
- Big Graph Mining: PI, Tina Eliassi-Rad, Rutgers
- Privacy Preserving Data Mining: PI, Jaideep Vaidya, Rutgers
- The Reality Deck - 1.5 Gigapixel Display: PI, Arie Kaufman, Stony Brook
- 4D Cardiac Fluid Flow Modeling: PI, Dimitris Metaxas, Rutgers
- Optimal Bidding Strategies in Sequential Auctions: PI, Michael Katehakis, Rutgers
- Exploring the Role of Gaze Behavior in Video Annotation: PI, Dimitris Samaras, Stony Brook
- How Fast is NFSv4.1 -- A Benchmark Study of the Linux NFSv4.1: PI, Erez Zadok, Stony Brook
- Surgical Tool Segmentation from Ultrasound: PI, Ilker Hacihaliloglu, Rutgers
- Scalable Parallel Processing Algorithms for Sequence Alignment and Assembly: PI, Song Wu, SB
- Polyglot: NLP for all the World's Languages: PI, Steve Skiena, Stony Brook
- Natural Language Understanding with Logic Programming: PI, Paul Fodor, Stony Brook
- RFID Sense-a-Tags for the Internet of Things: PI, Petar M. Djuric, Stony Brook
- Collaborative Information Seeking: PI, Chirag Shah, Rutgers

Contents



The Top 50 UK PR Twitter accounts and their followers. Porter Novelli Global via Flickr.

"Hiding within those mounds of data is knowledge that could change the life of a patient, or change the world." – Atul Butte, Stanford School of Medicine



Informationarchitects.jp presents the 200 most successful websites on the web, ordered by category, proximity, success, popularity and perspective in a mindmap.

Publications

- Focused Clustering and Outlier Detection in Large Attributed Graphs
- From Large Scale Image Categorization to Entry-Level Categories
- A Guide to Selecting a Network Similarity Method
- Improved Heuristic Search for Sparse Motion Planning Data Structures
- Planning with Transaction Logic
- Visual Correlation Analysis of Numerical and Categorical Data on the Correlation Map
- Mining data from mobile devices: a survey of smart sensing and analytics
- Cost-Oblivious Storage Reallocation
- User-driven system-mediated collaborative information retrieval
- Volume-specific parameter optimization of 3D local phase features for improved extraction of bone surfaces in ultrasound

Big Data News

- How Cities Are Using Analytics to Improve Public Health
- A Predictive Analytics Primer
- IBM Watson Data Analysis Service Revealed
- Visual Data Discovery: 4 Storytelling Approaches Compared
- A Process for Human-Algorithm Decision Making
- ebook: Moneyball Analytics for Healthcare
- Do You Know Who Owns Analytics at Your Company?

Upcoming Conferences

- 11/4-5/14: Piscataway, NJ—CDDA Fall 2014 Workshop and IAB Meeting
- 11/6-7/14: Miami, FL—Social and Digital Analytics Innovation
- 11/10-13/14: Las Vegas, NV—Data Analytics Week
- 11/17-18/14: Barcelona, Spain—1st Intl. Conf. on Predictive APIs and Apps
- 11/18-19/14: Boston, MA—Big Data for Finance Summit
- 12/2-3/14: London, England—Big Data Europe Conference 2014
- 12/15-19/14: Cambridge, MA—4th ASE Intl. Conference on Big Data
- 12/28-29/14: New Delhi, India—Big Data and Analytics for Business
- 1/11-13/15: Richmond, VA—Ops Research and Comp., Algor. and Softw. For Analytics
- 1/14-16/15: Rio de Janiero, Brazil—NetScix2015, Conference on Network Science

Featured Publication - Predicting Spending Behavior using Socio-Mobile Features

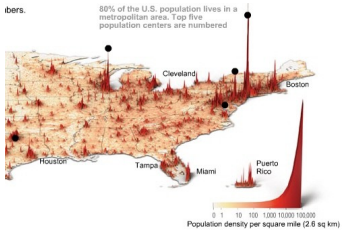
Dr. Vivek Singh

Abstract— Human spending behavior is essentially social. This work motivates and grounds the use of mobile phone based social interaction features for classifying spending behavior. Using a data set involving 52 adults (26 couples) living in a community for over a year, we find that social behavior measured via face-to-face interaction, call, and SMS logs, can be used to predict the spending behavior for couples in terms of their propensity to explore diverse businesses, become loyal customers, and overspend. Our results show that mobile phone based social interaction patterns can provide more predictive power on spending behavior than often-used personality based features. Obtaining novel insights on spending behavior using social-computing frameworks can be of vital importance to economists, marketing professionals, and policy makers.

Introduction—People's social behavior has been shown to affect their obesity levels, reproductive fitness, productivity, software adoption, college choices, substance abuse, political affiliations, and health characteristics (e.g. [5, 6]). In the last decades, many researchers in sociology, social psychology, cultural anthropology, and even economics have also described the spending behavior as a social construct, pointing out that social relations influence consumer behavior (e.g. [22]). Recently, mobile devices have been employed to both study the links between the various facets of human behavior [8, 9], and also influence human behavior in positive ways [4]. Multiple efforts have attempted to monitor health state, affect, mobility, social dominance and personality traits (e.g. [10, 12, 15]) using mobile sensing. Our work extends these efforts to a new domain: spending behavior. Analyzing a dataset consisting of social interaction patterns and self-reported spending data for 52 adults (26 couples), we show that there are significant links between social behavior and spending patterns. In particular social interaction patterns measured via face-to-face interactions, call, and SMS logs, can be used to predict couple's propensity to: (1) explore diverse businesses, (2) engage frequently with them, (3) and overspend. These findings not only motivate a potentially new line of investigation into spending behavior using mobile phone sensing, they also demonstrate the feasibility of undertaking similar studies at a larger scale in the near future. Understanding which couples are likely to explore diverse businesses and engage frequently with them is vital information for marketing campaign managers. It affects two fundamental aspects of marketing: *customer acquisition* and *customer retention*.

(for more, please visit here)

To discuss possible ideas based on this publication, please contact Dr. Vivek Singh at vivek.k.singh@rutgers.edu



Time Magazine uses visual hills (spikes) to emphasize the density of American population in its map.

Featured Publication - Anomaly, Event, and Fraud Detection in Large Network Datasets

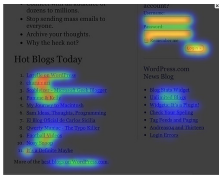
Dr. Leman Akoglu

Abstract - Detecting anomalies and events in data is a vital task, with numerous applications in security, finance, health care, law enforcement, and many others. While many techniques have been developed in past years for spotting outliers and anomalies in unstructured collections of multi-dimensional points, with graph data becoming ubiquitous, techniques for structured graph data have been of focus recently. As objects in graphs have long-range correlations, novel technology has been developed for abnormality detection in graph data. The goal of this tutorial is to provide a general, comprehensive overview of the state-of-the-art methods for anomaly, event, and fraud detection in data represented as graphs. As a key contribution, we provide a thorough exploration of both data mining and machine learning algorithms for these detection tasks. We give a general framework for the algorithms, categorized under various settings: unsupervised vs. (semi-)supervised, for static vs. dynamic data. We focus on the scalability and effectiveness aspects of the methods, and highlight results on crucial real-world applications, including accounting fraud and opinion spam detection.

Motivation and Overview - When analyzing data, knowing what stands out in the data is often at least, or even more important and interesting than learning about its general structure. The branch of data mining concerned with discovering rare occurrences in datasets is called abnormality detection. This problem domain has numerous applications in security, finance, healthcare, law enforcement, and many others. In addition to revealing suspicious behavior, anomaly detection is vital for spotting rare events, such as rare diseases or side effects in the medical domain. To tackle the abnormality detection problem, many techniques have been developed in past years, especially for spotting outliers and anomalies in unstructured collections of multi-dimensional data points. On the other hand, graphs provide a powerful machinery for representing a wide range of data types in physical, biological, social, and information systems. As such, graph data (a.k.a. network, relational data) have become ubiquitous in the last decade. As a result, researchers have recently intensified their study of methods for anomaly detection in structured graph data. Graph representation of datasets inherently impose long-range correlations among the data objects. For example in a reviewer-product review graph data, the extent a reviewer is fraudulent depends on... (for more, please visit here)

To discuss possible ideas based on this publication, please contact Dr. Leman Akoglu at leman@cs.stonybrook.edu

"There were 5 exabytes of information created between the dawn of civilization through 2003, but that much information is now created every 2 days." – Eric Schmidt, of Google, said in 2010.



CrazyEgg lets you explore the behavior of your visitors with a heat map. More popular sections, which are clicked more often, are highlighted as "warm" – in red color.

Collaboration Outreach

This section will feature requests for introductions to potential collaborators for all CDDA participants. Example: "Jane Doe from Rutgers is looking for collaborators in the Ads and Commerce Division of Google." or "John Doe from (CDDA Member Company) would like to discuss a possible collaboration with data scientists who have expertise in analytical chemistry." Listings will be anonymized upon request. Please contact james.mielke@rutgers.edu for postings

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"From Chaos to Knowledge"

cdda.rutgers.edu

About CDDA

The Center for Dynamic Data Analytics (CDDA) is a National Science Foundation (NSF) sponsored Industry and University Cooperative Research Program (I/UCRC) established between Rutgers University and the State University of New York (SUNY), Stony Brook.

The motivation for this center is the lack of scalable algorithms, methods and solutions for addressing the ever increasing amounts of industry-related data. The focus is on data sets that are massive, dynamic, complex and multidimensional, or what is commonly known as Big Data analytics. The goal of the center is to discover, develop and apply data analytics solutions to industry problems such that the chaotic data is transformed into knowledge and industry products.

NSF Factsheet—CDDA

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