INFORMS Roundtable Spring Meeting Agenda
July 24-25, 2016
Grand Traverse Spa and Lodge
Traverse City, MI
THEME: "Machine Learning"

Sunday, July 24, 2016

1:30PM	***Outing – Northern Michigan Asylum tour - Meet in the lobby at 1:15pm***	
5:00PM	***Reception***	***Level 17***
6:00PM	***Meeting – Roundtable Introductions***	***Level 17***
6:30PM	***Dinner***	***Level 17***

Monday, July 25, 2016

7:00 AM	***Breakfast***	***Mackinac BC***
8:00 AM	***Session 1: Worried about Intelligent Machines? Just follow the data.***	***Mackinac A***

Whether you call it "cognitive computing," "machine learning," or "smart machines," we have to admit that Artificial Intelligence is back. Recommendation systems are everywhere. Companies are clamoring for predictive and prescriptive analytics engines. And a day doesn't go by without news of another learning or advanced reasoning system that is doing something better than we can imagine.

The emergence of these systems and the ever-increasing hype around them has put many companies in the difficult position of having to figure out their "AI strategy." In this talk I present the issue of where these technologies can be used and when to adopt them comes down to the question of what is driving this new resurgence. I will outline the argument that this renaissance of AI technologies is less a product of the technologies themselves and more a result of a change in the data environment in which they work. I will show that the better a company understands what it does with its own data, the more likely it is that it can be codified and that code can be used to drive an intelligent machine.

Prof. Kristian Hammond, Northwestern University

Kristian Hammond is a Professor of Computer Science at Northwestern University and co-founder of the transformative Artificial Intelligence startup Narrative Science. He is an accomplished researcher in the areas of human-machine interaction, context-driven information systems, and artificial intelligence. During his career, he has had funding from the NSF, DARPA, ONR, AFOSR, Boeing, McKinsey, Microsoft, AT&T, the Knight Foundation and Google. He has also been the driver behind the creation,

funding, and sale of three start-ups based on his technologies. As part of his pedagogical mission, he also spent a year as a technology correspondent for WTTW's Chicago Tomorrow. Most recently, Dr. Hammond was part of the United Nations working group tasked with shaping the international policy landscape regarding the control and regulation of the lethal autonomous devices. In September 2015, he was named the Illinois Technology Association's Technologist of the Year.

Dr. Hammond holds a Ph.D. in Computer Science from Yale University.

9:00 AM Break

9:30 AM Session 2: Monetizing Bayesian Networks… and the promise of machine-learning causality Mackinac A

It's time for us to push the envelope as a data science community. We've proven our ability to find the most obscure of facts (e.g., humans share 50% of their DNA with bananas). We've uncovered patterns in untamable datasets that lead to ground-breaking insights. We've even learned how to predict the future. But that is no longer enough. Our audiences want to know why things are happening, and more notably, how to change the futures we predict. They want the identification of root causes, typically the product of human reasoning and experience. Influence requires intervention–and intervention requires an understanding of the rules of a system. That requires causal–rather than simply observational–inference. Alex will introduce causal inference in the context of Bayesian Belief Networks (BBNs). BBNs produce accurate predictive forecasts, but with appropriate modeler input are also able to represent causal relationships between variables and pinpoint the drivers of desired outcomes. Alex will also present case studies of BBN modeling applications across airline planning, asset evaluation, retail consumer behavior modeling and critical infrastructure assessment. He will describe a detailed study where a Booz Allen team joined millions of guest stay records, loyalty program records, and promotional data from a leading global hotel chain to predict the customer-level impacts of promotional campaigns and estimate campaign return on investment.

Alex Cosmas, Booz Allen Hamilton

Alex Cosmas is the managing Principal of Booz Allen Hamilton's Boston Office and Chief Scientist in the firm's Analytics practice. He is a recognized expert in the use of predictive and probabilistic models to perform both deductive and inductive reasoning from large datasets, and leads a capability team delivering advanced analytics across the public and private sectors. Alex has consulted for Fortune 100's both domestically and internationally in the areas of demand modeling, consumer choice, network modeling, revenue management and pricing. He is a member of the Institute for Operations Research and Management Science (INFORMS) and the Airline Group of the International Federation of Operations Research Societies (AGIFORS). He earned a B.S. in Applied Physics from Columbia University's School of Engineering and Applied Science, an M.S. in Technology & Policy and an M.S. in Aerospace Engineering, both from the Massachusetts Institute of Technology.

10:30 AM Break

11:00 AM Session 3: A Machine Learning Approach to Capacity Forecasting Mackinac A

Machine Learning (ML) models can be effective tools for predicting behavioral decisions of rational actors who exhibit some form of historical consistency. This talk will describe how ML models can be applied to a particular freight transportation capacity forecasting problem.

A significant challenge facing the freight transportation industry is a shortage of qualified drivers. To address this challenge some large truckload carriers augment a company-employed driver fleet with Independent-Contractor (IC) drivers who are offered greater flexibility in determining both the freight they select and their work schedules. This paradigm presents a significant challenge to planners who need to forecast IC capacity (number of IC drivers who will work) over a 1-4 day rolling horizon. These forecasts are an integral component of down-stream decisions related to pricing, load acceptance, and scheduling of company drivers.

Using a combination of driver attributes and historical behavior metrics that serve as predictor variables, we can apply ML algorithms to estimate the probability that specific IC drivers will elect to take a time-off breaks in the near horizon. While the variance associated with these specific decision probabilities may be too large to support direct action, we are able to establish that aggregated estimates follow a probability distribution with small enough variance to provide significant business value. In the course of the discussion, we will provide an overview of various ML algorithms, including CART and CHAID trees, logistic regression, and neural networks. We will also describe the framework for estimating business benefit and the corresponding results.

Ted Gifford, Schneider National

Ted Gifford is a Distinguished Member of Technical Staff at Schneider National. His technical responsibilities include lead design of models/algorithms for various problems in logistics, transportation networks, revenue management, supply chain design, and capacity planning. His current research is centered on combining machine learning techniques with math programming models to solve various problems in transportation logistics, operations and asset productivity, and safety. His previous positions include Vice President of Engineering & Research at Schneider National, Director of Quantitative Research at McKinley Capital Management, and Associate Professor of Computer Science and Mathematics at the University of Alaska. Mr. Gifford has an M.S. in Operations Research from Georgia Institute of Technology, an M.A. in Mathematics from University of California, Berkeley.

12:00 ***Lunch*** ***Mackinac BC***

1:30 PM ***Session 4: Machine Learning*** ***Mackinac A***

Late addition

Kathy Lange, SAS

2:30 PM ***Break***

3:00 PM ***Session 5: Deep Learning at Ford Motor Company*** ***Mackinac A***

The field of machine learning is advancing rapidly, especially in the area of deep neural networks. At Ford we are using machine learning to create analytics solutions throughout the company. This presentation will describe and demonstrate some recent examples of applying deep learning, including numerous examples from autonomous vehicles.

Dr. Bryan Goodman, Ford Motor Company

After 15 years of applying machine learning and optimization methods to business analytics problems at Ford Motor Company, Bryan Goodman started a group working on machine learning applications for

autonomous vehicles and advanced driver assistance systems. He currently leads the Machine Learning Center of Excellence in Ford's Global Data, Insight, & Analytics organization, which includes autonomous vehicle perception systems.

Bryan received his BS degree in mathematics and chemistry from Hope College, and his PhD in physical chemistry and computational science & engineering from the University of Illinois.

4:00 PM ***Discussion and Wrap-Up*** ***Mackinac A***

4:30 PM ***Adjourn***

6:00 PM ***Farewell Dinner*** ***The Pavilion***