IISE
Operations Research Division

Spring 2018

Division Newsletter

As we reach the end of the spring semester, we know that many of you are preparing for the IISE Annual Conference, which will be held in Orlando this year!

We hope that you will take a few minutes to look over some of the recent activities and achievements of our members. Our Annual Teaching and Best Paper awards are attracting many outstanding nominations and submissions. Our Undergraduate Student Research Dissemination Award has resulted in an exciting competition! We are also very fortunate that many of you are willing to serve the division as board members. Two new members will be joining the board this year.

We look forward to seeing many of you in Orlando in May!

OR Division Board

Board Members

2017-2018 President
Scott Grasman

Immediate Past President
Sandra Eksioglu

President-Elect 2017-2018
President 2018-2019
Chase Rainwater

President-Elect 2018-2019
Katie McConky

Directors
2016-2018
Katie McConky
Christina Rinaudo

2017-2019
Hugh Medal
Lizhi Wang

2018-2020
Ambarish Acharya
Guiping Hu

Our <u>Town Hall Meeting</u> will be on <u>Monday May 21 at 5pm</u> in Java Sea 2.

This will be an excellent opportunity for you to learn more about the OR Division and get involved!

Look for the IISE OR Division on Social Media!
Search for "OR Division on IISE"

Find us on **f**
Linked in

AWARD FOR EXCELLENCE IN THE TEACHING OF OPERATIONS RESEARCH 2018

Lizhi Wang and David Goldsman

Dr. Lizhi Wang, Associate Professor, Department of Industrial and Manufacturing Systems Engineering, Iowa State University, for his excellent delivery of a variety of Operations Research courses including IE 312 Optimization, IE 634 Linear Programming and IE 634 Computational Optimization. His Department Chair, Dr. Gul Kremer praised Dr. Wang for his continuous improvement of his courses, his excellent rapport with students, and his innovative ways of infusing OR courses with interdisciplinary domain examples such as genomics. His students' comments include "I honestly think that this (IE 312 Optimization) is among the top three classes I have received at Iowa State. One time I heard a student say after lecture, 'This was a great lecture,' which is something I had never heard before. He demonstrates a clear interest that students learn the material," and "Professor Wang showed a great deal of patience in order to make sure every student understands the material; he is easily available for questions or help and wants you to succeed."

Dr. David Goldsman, IISE Fellow, and Professor, H. Milton Steward School of Industrial and System Engineering, Georgia Tech, for his excellent teaching of ISyE 3044 Simulation Analysis and Design, an undergraduate simulation course. Skills learned in this course are used by nearly 1/3 of all senior design projects. Reflecting on watching one of Dr. Goldsman's lectures, nominator Dr. Craig Tovey said "He was lively and kept the 180-student class attentive, but what really impressed me was how he smoothly moved between generalities and specific numerical examples displayed visually." His students' comments include "He uses a unique combination of humor, intellect, and common sense to convey highly challenging concepts in a way that students can easily understand them. Reflecting back on the professors I've had at Georgia Tech, Dr. Goldsman stands out to me as the professor who made me excited to learn. He made the topic of simulation colorful and exciting every day of class," and "He is extremely clear in his teaching style; he keeps concepts simple for students to easily grasp, but still provides challenging opportunities to apply theory to more complex, dynamic situations.

Congratulations to Dr. Lizhi Wang and Dr. David Goldsman

Many thanks to our award committee members:
Hugh Medal – Chair, Evrim Dalkiran, Ridvan Gedik, Murat Kurt , Mohammad Marufuzzaman, and Ruben Proano.

Dr. Lizhi Wang
Associate Professor
Iowa State University

Dr. David Goldsman
Professor
Georgia Tech

OPERATIONS RESEARCH TRACK
BEST PAPER AWARD 2018

"Cost-Sensitive Feature Selection Using Mixed Integer Programming"

By: Mai Abdulla and Daehan Won

Tuesday May 22nd, 12:30 pm Java Sea 2

Abstract: In the era of big data, machine learning has emerged as an effective technique in many real-world applications including medical diagnosis and data-driven decision making. Feature selection is a crucial part of machine learning applications since it aims to select a small subset of highly informative features that are capable of discriminating samples related to given tasks. Traditional feature selection methods ignore the cost component and work for the purpose of correct classification. Since ignoring feature costs may result in good features in theory but not in practice, developing cost-sensitive classifiers that minimize the total costs of selected features remains a subject of much interest. In this paper, we propose new mathematical feature selection models that limit the total cost of selected features by incorporating a budget constraint. To impose the cost directly, we construct two Mixed Integer Programming (MIP) models based on:(1) linear program Support Vector Machine and (2) linear program Multi-Surface Method Tree . To demonstrate the effectiveness of our models, empirical experiments are conducted on medical diagnosis data from UCI repository. It shows that our proposed models are capable of selecting a low-cost subset of informative features and provide comparative classification performance compared to other existing methods.

Many thanks to the award committee members:
Christina Rinaudo – Chair
Ridvan Gedik
Scott Grasman
Katie McConky
Lizhi Wang

Congratulations To:

Mai Abdulla and Daehan Won

Department of Systems Science and Industrial Engineering

The State University of New York at Binghamton

Binghamton, NY, USA

IISE
Operations Research Division

Undergraduate Research Award!

GOAL: The goal of this award is to recognize scholarly work as well as ability to effectively communicate results from an undergraduate student or student teams.

ELIGIBILITY: The first author of the paper must be a full-time undergraduate student at the time of submission. The paper must present original research conducted while the applicant was a student.

PROCESS: The winner is decided based both on their written paper and their oral presentation. Finalists are selected before ISERC, but the winner is announced at ISERC.

PRIZES: All finalists will receive a banquet ticket, and cash prizes for 1st, 2nd and 3rd places in the amount of $400, $200, and $100 respectively!

FINALISTS: The winner will be announced at the conference.

See more about the 2018 finalists on the next page.

This year the award is joint sponsored by Kettering University and University of Arkansas.

Christopher Aden
"Optimization Models for Locating Public Electric Vehicle Charging Stations with Queuing Constraints"
University of Louisville

Developing optimization models for locating public electric vehicle charging stations has become an emerging field of study in recent years due to concerns on fossil fuel emissions and energy sustainability. This paper proposes two mixed integer optimization models for locating public charging stations in urban areas. The first model maximizes electric vehicle charging demand coverage while reducing customer walking distance, and the second model adds queueing constraints to ensure that customers' expected waiting times are within a pre-specified threshold. Both models consider passenger as well as freight/mass transit vehicles (e.g., trucks and buses). The passenger vehicles are expected to accept longer thus slow charging times, while freight/mass transit vehicles only accept fast charging times. The paper reports computational results based on randomly generated instances resembling central business district of a Midwestern city in the U.S.

Megan Wellner
"Gender-based Selection Strategy for Genomic Selection"
Iowa State University

Genomic selection is a technique that breeders use to select plant or animal individuals to mate and produce new generations of species. The conventional selection approach was to select individuals that are either observed or predicted to be the best based on the assumption that parents with better phenotypes will produce better children. A major limitation of this approach is its focus on the short-term genetic gains at the cost of genetic diversity and longterm growth potential. Recently, several new genomic selection approaches were proposed to maximize the long-term potential, but they were not effective in achieving the potential that was preserved in the short-term. We propose a gender-based selection strategy, which was inspired by how two genders of wild animals take different roles in fighting for food and caring for their offspring. Our selection approach selects individuals with the highest short-term achievement as male, and then select individuals that are the most complementary to the male as their female partners to emphasize the probability to produce outstanding offspring in the long term. We will present simulation results that compare the performance of the new approach against the state-of-the-art approaches in the literature.

Trent Sahinkaya
"International Space Station Resupply Trip Minimization"
Texas A&M University - Commerce

This paper aims at mitigating operational cost of a resupply chain of the International Space Station (ISS). Two aspects of the supply chain have been considered in the minimization problem: (1) reduction of necessary number of resupply missions to keep the ISS supplied and (2) enhancement of utilization of cargo inventory via flexible scheduling strategy. To consider complex interactions between elements in the ISS supply chain, the simulation-based scheduling approach has been proposed under SpaceNet® simulation software, using the NASA launch schedule and cargo data from 2015 through 2018. The main obstacle with creating such a model is that there are a number of assumptions and generalizations necessary to simulate the system, while still attempting to have it be applicable to real world scenarios. To make the simulation more realistic, various conditions of a supply chain addressed in existing literatures are incorporated into the proposed approach. The developed simulation model is verified with cargo utilization and demand under different usage levels in a control model. As a result, the proposed approach is able to effectively minimize the operational cost of an ISS supply chain.

The OR Division Board fills three positions each year. This year we are welcoming Ambarish Acharya and Guiping Hu to the OR Division Board, and re-welcoming Katie McConky. Katie will serve as Vice President/President-Elect. Ambarish and Guiping are the new incoming directors. Many thanks to Sandra and Christina, our outgoing members of the board, for their service to the division.

New Board Members:

Katie McConky
RIT

Ambarish Acharya
E&J Gallo Winery

Guiping Hu
Iowa State University

Continuing Board Members:

Scott Grasman
Kettering University

Chase Rainwater
Univ. of Arkansas
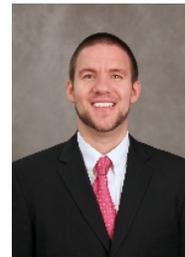
Hugh Medal
Mississippi State

Lizhi Wang
Iowa State University

Outgoing Board Members:

Christina Rinaudo
US Army Corps of
Engineers

Sandra Eksioglu
Clemson University

Katie McConky
RIT
(Returning!)

What's happening in Orlando?

The upcoming IISE Annual Meeting and Expo features the following OR Track sessions:

	Session Title	Session Time	Room
Sun 5/20	Advanced Algorithm Design	8:00 AM	Pacifica BR4
	Machine Learning Applications	8:00 AM	Java Sea 2
	Transportation Problems	8:00 AM	Pacifica BR3
	Decision Under Uncertainty	11:00 AM	Pacifica BR3
	Mathematical Model and Applications	11:00 AM	Pacifica BR4
	Linear Programming and Applications	12:30 PM	Java Sea 2
	OR Applications in Humanitarian Logistics	2:00 PM	Java Sea 2
	OR Undergraduate Student Research Competition	2:00 PM	Pacifica BR 4
	Scheduling Applications	3:30 PM	Pacifica BR 4
	Energy Storage	5:00 PM	Pacifica BR 4
	Integer Programming and Applications	5:00 PM	Java Sea 2
	Applications of Stochastic Optimization	5:00 PM	Gardenia 2
Mon 5/21	Electric Vehicle Service Optimization	8:00 AM	Java Sea 2
	OR Applications in Healthcare	12:30 PM	Java Sea 2
	Routing and Scheduling	2:00 PM	Java Sea 2
	Advance Optimization Techniques	3:30 PM	Hibiscus 2
	Network Optimization and Facility Location Problems	3:30 PM	Java Sea 2
	Operations Research Division Town Hall	5:00 PM	Java Sea 2
Tues 5/22	Analytics in the US and Mexico	8:00 AM	Java Sea 2
	Games and Game Theory	8:00 AM	Java Sea 1
	Catastrophe Disaster and Event Management	12:30 PM	Java Sea 1
	Discrete Optimization and Applications	12:30 PM	Java Sea 2
	Queuing Theory and Applications	2:00 PM	Java Sea 2
	Transportation, distribution, and food networks	3:30 PM	Java Sea 1

Be sure to check the conference schedule for updates.

Operations Research Track co-chairs:
Christina Rinaudo (Christina.H.Rinaudo@erdc.dren.mil)
Lizhi Wang (lzwang@iastate.edu)
Ridvan Gedik (rgedik@newhaven.edu)