MARCH 2020

Junior Faculty Interest Group

Please send your comments and feedback to the JFIG media coordinator:

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President's Column

by EHSAN SALARI
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Wichita State University

It has been an honor and a pleasure for me to serve as the JFIG president over the past year. JFIG was established in 2001 with the mission of creating a forum to support activities that promote peer interaction and networking among junior faculty. In pursuing this mission, JFIG had an active presence at the 2019 INFORMS Annual Meeting and served its members by organizing several events as outlined in this column.

The JFIG annual paper competition is one of the most popular and long-standing competitions in the INFORMS community and highlights some of the best research car-

ried out by the junior faculty. The 2019 JFIG paper competition received 34 high-quality eligible papers. Jennifer K. Ryan (University of Nebraska-Lincoln) and David A. Goldberg (Cornell University) kindly agreed to co-chair the review committee of the paper competition, where 33 faculty members from various fields joined to serve as judges. I would like to sincerely thank our co-chairs and judges for their hard work and dedication throughout the paper competition. The six finalists selected by the review committee presented their papers in two technical sessions organized by JFIG at the Annual Meeting. The winners of the paper competition were announced during the JFIG luncheon at the Annual Meeting.

Every year, JFIG organizes a luncheon at the Annual Meeting to bring junior faculty together to network and interact with each other and also to highlight and celebrate their accomplishments. In 2019, more than 75 JFIG members attended the luncheon. I would like to take the opportunity to thank our sponsors for their gracious support of this event. In addition, JFIG sponsors a session cluster every year to foster interaction between junior and senior faculty by discussing best practices and strategies for academic career development. In 2019, JFIG organized four panel discussion sessions, where senior faculty shared their experience and knowledge on an array of different topics. The sessions were well received and attended by junior faculty. I would like to give special thanks to the panelists whose commitment was key to the success of those sessions.

Over the years, JFIG has increasingly made use of every opportunity to promote its mission and activities, particularly, among junior faculty. This has led to an increasing trend in membership over recent years and a record number of members in 2019. As part of a recent initiative, JFIG participated in the New Faculty Colloquium (NFC) at the 2019 INFORMS Annual Meeting to promote its activities to junior faculty who attended the colloquium. I would like to thank Siqian Shen (University of Michigan) and Nickolas Freeman (University of Alabama), the co-chairs of the 2019 NFC, for the opportunity. JFIG would like to continue collaborating with NFC to better identify and meet the needs of junior faculty at the beginning of their careers.

None of the activities mentioned above would have been made possible without the dedication and hard work of the JFIG officers. Our current JFIG officers are

- Canan Gunes Corlu (Boston University), Treasurer
- Zhijie Sasha Dong (Texas State University), Media Coordinator
- Gokce Palak (Shenandoah University), Secretary
- He Wang (Georgia Tech), VP/President-Elect
- Ehsan Salari (Wichita State University), President

This year, there will be three vacancies on the JFIG board as Canan, Gokce, and I are approaching the end of our terms. Canan and Gokce have served on the JFIG board for four and two years, respectively. Please join me in thanking them for their invaluable contribution to JFIG during their terms. We will be seeking nominees for the open officer positions in the coming weeks. Please consider running for one of these positions to help shape the future of JFIG.

Finally, I would like to congratulate He on his appointment as the incoming JFIG president and wish him and other board members the best of luck with their planned endeavors for the coming year.

President Elect's Column

by He Wang

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Georgia Institute of Technology

It is my great pleasure to serve as the incoming JFIG president. I was delighted to see that in the past year, JFIG experienced a continued growth in terms of membership and activities, and remained strong financially. Our paper competition received submissions from many brilliant junior researchers in a wide range of topics (see abstracts from the six finalists in this newsletter). Our signature event at the INFORMS annual meeting – the JFIG Luncheon – was again sold out! In addition, we successfully organized several panel sessions at INFORMS meeting, covering topics that are most relevant to junior faculty – from publication, grant writing to teaching and tenure process. Of course, none of this would have been possible without the amazing support from our JFIG officers, both junior and senior faculty in the INFORMS community who graciously agreed to serve as judges and panelists, our sponsors, as well as the dedicated INFORMS staff.

In the upcoming year, I look forward to sustaining and building upon current activities. I am planning to encourage more submissions to the JFIG paper competition and increase attendance to the JFIG luncheon. I am also hoping to increase the visibility of our forum through collaboration with other INFORMS societies and organizations, such as the New Faculty Colloquium, the Women in OR/MS Forum (WORMS), the Minority Issues Forum (MIF), and the newly announced Diversity, Equity, and Inclusion (DEI) program. For example, we will co-sponsor a junior faculty breakfast event at the MSOM conference in June 2020, so stay tuned! Finally, if you have any ideas or suggestions about our events, we would love to hear from you.

2019 JFIG Paper Competition

by JFIG Leadership Team

The JFIG paper competition has been organized by JFIG since 2001 with the goal of promoting and encouraging research among junior faculty. The competition serves to increase the visibility of research conducted by junior faculty and the graduate students working with them within the fields of operations research and management science.

This year, we received 34 eligible papers. Each paper was written by junior faculty, sometimes with help from their students or industry partners. The papers were evaluated based on the importance and timeliness of the topic, appropriateness of the research approach, and the significance of research contribution. This year, the submitted papers spanned a wide range of research areas including operations management, optimization, economics, applied probability, ML/statistics, healthcare, game theory, and simulation.

The review process was overseen by two invited co-chairs:

- Jennifer Ryan (University of Nebraska-Lincoln)
- David Goldberg (Cornell University)

Paper competition co-chairs Jennifer Ryan (left) and David Goldberg (right)

We are thankful to them for their service and help. This competition would be impossible were it not for their efforts. We would also like to thank the following reviewers from a wide variety of areas who volunteered their time and expertise to evaluate the submissions:

Ana Muriel	Anton Kleyweg
Basak Kalkanci	Cong Shi
Damian Beil	Danny Segev
Demet Batur	Diwakar Gupta
Fatma Kılınc-Karzan	Goker Aydin
Guillaume Roels	Henry Lam
Hui Zhao	Hyun-soo Ahn
Jeff Linderoth	Kris Iyer
Lauren Lu	Mladen Kolar
Oleg Prokopyev	Ozlem Ergun
Paat Rusmevichientong	Phillipp Afech
Qihang Lin	Saeed Ghadimi
Sajad Modaresi	Sergei Savin
Shuangchi He	Tava Olsen
Tinglong Dai	Weijun Xie
Yao Xie	Yiwei Chen
Yunan Liu	

Six finalists were selected by the review committee and invited to present at the JFIG sponsored sessions at the 2019 INFORMS Annual Meeting and the winners were announced at the JFIG Luncheon.

JFIG Luncheon (top) and paper competition co-chairs (bottom)

Below are the paper summaries from the finalists. Congratulations to them!

First place: *Distributionally Robust Optimization with Shape Information*

by Ruiwei Jian and Yuanyuan Guo (U Michigan)

Ruiwei Jiang (center) with the paper competition co-chairs.

Abstract: Distributionally robust optimization (DRO) is an alternative approach of stochastic programming (SP) for decision making under uncertainty. Different from SP, DRO does not assume perfect knowledge of the probability distribution of the uncertain parameters. Instead, it considers a family of probability distributions (termed an ambiguity set) that satisfy certain characteristics of uncertainty, e.g., moments or divergence from a reference distribution. In practice, the decision maker often possesses certain shape information of the uncertainty. For example, wind prediction errors are usually unimodal, and service durations in appointment scheduling systems are often log-concave. The shape information can be incorporated into the ambiguity set to make DRO less conservative. Unfortunately, such incorporation often results in computational intractability. For example, the incorporation of unimodality makes it prohibitive to even evaluate worst-case expectations in DRO, and incorporating log-concavity deprives the convexity of ambiguity sets. This paper investigates an alternative framework to incorporate shape information in a computationally tractable manner. In particular, we consider a class of concentration inequalities that are implied by the shape information. Then, we use these inequalities as a proxy of the shape information when defining ambiguity sets, potentially leading to an infinitely constrained ambiguity set. We show that, for a wide class of random objective functions, the corresponding DRO model can be recast as a stochastic program with respect to an unambiguous probability distribution. This facilitates efficient solution algorithms (e.g., sample average approximation) for DRO models with shape information. Furthermore, we extend this result to two-stage adaptive DRO with fixed recourse. Finally, we demonstrate the theoretical results via a computational case study on single-server appointment scheduling. We consider two alternative models, with one focusing on system performance metrics (e.g., total waiting/idle time) and the other focusing on individual performance metrics (e.g., maximum waiting time and overtime). In both models, we compare a DRO model possessing only moment information and another one with both moment and shape information. Via out-of-sample simulations, we demonstrate that incorporating shape information significantly improves the performance of the optimal appointment schedules, in both system and individual metrics.

Second place: *Value of High-Quality Logistics: Evidence from a Clash between SF Express and Alibaba*

by Ruomeng Cui (Emory), Meng Li and Qiang Li (Rutgers)

Ruomeng Cui (center) with the paper competition co-chairs.

Abstract: Consumers regard product delivery as an important service component that influences their shopping decisions on online retail platforms. Delivering products to customers in a timely and reliable manner enhances customer experience and companies' profitability. In this research, we explore the extent to which customers value a high-quality delivery experience when shopping online. Our identification strategy exploits a natural experiment: a clash between SF Express and Alibaba, the largest private logistics service provider with the highest reputation in delivery quality in China and the largest online retail platform in China, respectively; the clash resulted in Alibaba unexpectedly removing SF Express as a shipping option from Alibaba's retail platform for 42 hours in June 2017. Using a difference-in-differences design, we analyze the market performance of 129,448 representative stock-keeping units (SKUs) on Alibaba to quantify the economic value of a high-quality delivery service to sales, product variety, and logistics rating. We find that the removal of the high-quality delivery option from Alibaba's retail platform reduced sales by 14.56% during the clash, increased the contribution of long-tail to total sales—sales dispersion—by 3%, but did not impact the variety and logistics rating of sold products. Further, we also identify product characteristics that attenuate the value of high-quality logistics and find that the removal of SF Express is more obstructive for (i) star products as compared to long-tail products, because the same star products are likely to be supplied by competing retail platforms that customers can easily switch to, (ii) expensive products, because customers need a reliable delivery service to protect their valuable items from damages or losses, and (iii) less-discounted products, because customers are more willing to sacrifice the service quality over a price markdown.

Third place: *Design of Incentive Programs for Optimal Medication Adherence*

by SZE-CHUAN SUEN (USC), DIANA M. NEGOESCU (MINNESOTA) AND JOEL GOH (NUS)

Sze-Chuan Suen (second from right), Diana Negoescu (first from left) and Joel Goh (second from left) received award from the competition co-chairs.

Abstract: Premature cessation of antibiotic therapy (non-adherence) is common in long treatment regimens and can severely compromise health outcomes. In this work, we investigate the problem of designing a schedule of incentive payments to induce socially optimal treatment adherence levels with heterogeneous patient preferences for treatment adherence that are unobservable to a health provider. Unlike past contract theoretic models, a unique challenge in this problem is that any prior commitment that a patient makes to a given level of treatment adherence typically cannot be enforced and contracted upon in practice. Consequently, we had to develop new analyses to handle this problem feature. We show that the optimal payment schedule can be constructed through the solution of a convex optimization problem and we conduct a numerical study using representative data in the context of the tuberculosis epidemic in India. We find that using the optimized schedules to encourage adherence would be very cost-effective compared to linear incentives or the no-incentive status quo policy.

Honorable mention: *Dynamic Assortment Optimization with Changing Contextual Information*

by XI CHEN (NYU), YINING WANG (FLORIDA) AND YUAN ZHOU (UIUC)

Abstract: In operations, an important research problem facing a retailer is the selection of products or advertisements for display. For example, due to the limited shelf space or available slots on a website, the retailer needs to carefully choose an assortment from the set of substitutable products. In practice, customers' choice behavior is usually not given as a prior and cannot be easily estimated due to the insufficiency of historical data. This motivates the research of dynamic assortment optimization.

We study the dynamic assortment optimization problem under a finite selling season of length T. At each time period, the seller offers an arriving customer an assortment of substitutable products under a cardinality constraint, and the customer makes the purchase among offered products according to a discrete choice model. Most existing work associates each product with a real-valued fixed mean utility and assumes a multinomial logit choice model. In many practical applications, feature or contextual information of products is readily available. In this work, we incorporate the feature information by assuming a linear relationship between the mean utility and the feature. In addition, we allow the feature information of products to change over time so that the underlying choice model can also be non-stationary.

To solve the dynamic assortment optimization under this changing contextual MNL model, we need to simultaneously learn the underlying unknown coefficient and make the decision on the assortment. To this end, we develop an upper confidence bound (UCB) based policy and establish the regret bound on the order of $O(d\sqrt{T})$, where d is the dimension of the feature. We further establish a lower bound $\Omega(d\sqrt{T}/K)$, where K is the cardinality constraint of an offered assortment, which is usually small. When K is a constant, our policy is optimal up to logarithmic factors. In the exploitation phase of the UCB algorithm, we need to solve a combinatorial optimization for assortment optimization based on the learned information. We further develop an approximation algorithm and an efficient greedy heuristic. The effectiveness of the proposed policy is further demonstrated by our numerical studies.

Xi Chen (second from right) and Yining Wang (first from right) received award from the paper competition co-chairs.

Honorable mention: *Why is Maximum Clique Often Easy in Practice?*

by JOSE L. WALTEROS (BUFFALO), AUSTIN BUCHANAN (OKLAHOMA STATE)

Abstract: To this day, the maximum clique problem remains a computationally challenging problem. Indeed, despite researchers' best efforts, there exist unsolved benchmark instances with one thousand vertices. However, relatively simple algorithms solve real-life instances with millions of vertices in a few seconds. Why is this the case? Why is the problem apparently so easy in many naturally occurring networks? In this paper, we provide an explanation. First, we observe that the graph's clique number ω is very near to the graph's degeneracy d in most real-life instances. This observation motivates a main contribution of this paper, which is an algorithm for the maximum clique problem that runs in time polynomial in the size of the graph, but exponential in the gap $g := (d+1) - \omega$ between the clique number ω and its degeneracy-based upper bound $d+1$. When this gap g can be treated as a constant, as is often the case for real-life graphs, the proposed algorithm

runs in time $O(dm) = O(m^{1.5})$. This provides a rigorous explanation for the apparent easiness of these instances despite the intractability of the problem in the worst case. Further, our implementation of the proposed algorithm is actually practical—competitive with the best approaches from the literature.

Jose Walteros (first from right) and Austin Buchanan (second from right) with the paper competition co-chairs.

Honorable mention: *A Model of Queue-Scalping*

by LUYI YANG (JOHNS HOPKINS), ZHONGBIN WANG (NANKAI), SHILIANG CU (GEORGETOWN)

Luyi Yang (left) with the paper competition co-chairs.

Abstract: Recent years have witnessed the rise of queue-scalping in congestion-prone service systems. A queue-scalper has no material interest in the primary service but proactively enters the queue in hopes of selling his spot later. This paper develops a queueing-game-theoretic model of queue-scalping and examines its implications for the service system. Contrary to conventional wisdom, which suggests that scalping, borne out of capacity scarcity, should be most rampant in a queue where the demand volume far exceeds capacity, we find instead that a queue with an intermediate demand volume can be most susceptible to scalping, whereas queues with either a very small or a very large demand volume may not be financially attractive to scalpers and thus impervious to scalping. This result implies that an effort to mitigate scalping through capacity expansion may only lead to the presence of more scalpers. Further, when queue-scalpers are present, they often increase the system throughput, the service provider's revenue and social welfare, but decrease consumer surplus. This implies that the presence of scalping can not only benefit the service provider but also shield it from public outrage as customers would blame the scalpers for extracting their surplus, rather than the service provider. We also compare and contrast queue-scalping with other common mechanisms in practice, namely, pay-for-priority, line-sitting, and callbacks.

2019 JFIG Panel Discussion Sessions

This year, JFIG organized four panel sessions during the INFORMS Annual Meeting in Seattle. The sessions attracted panelists from various institutions who provided us with much needed advice on a diverse set of topics.

Sunday, October 20

Best Practices in Teaching OR/MS

- Esra Buyuktahtakin Toy (New Jersey Institute of Technology)
- James Cochran (University of Alabama)
- John Maleyeff (Boston University)
- Dessislava Pachamanova (Babson College)

Monday, October 21

Survival Guide for Junior Faculty

- Dursun Delen (Oklahoma State University)
- Sandra Eksioglu (University of Arkansas)
- Maria Esther Mayorga (North Carolina State University)
- Douglas Morrice (University of Texas-Austin)

Tuesday, October 22

Tips for Successful Publication

- Shane Henderson (Cornell University)
- Martin Savelsbergh (Georgia Institute of Technology)
- Alice Smith (Auburn University)
- Christopher Tang (University of California-Los Angeles)

Tips for Writing Successful CAREER Proposals

- Laura Albert (University of Wisconsin-Madison)
- Siddhartha Banerjee (Cornell University)
- Susan R. Hunter (Purdue University)
- Sheldon Jacobson (University of Illinois)
- Edwin Romeijn (Georgia Institute of Technology)

Officer Positions

JFIG wants you! This is a call for officer nominations for three open positions on the JFIG Board, including:

- Vice-president/President-elect
- Secretary (two-year term)
- Treasurer (two-year term)

If you know of a JFIG member who is interested in any of the above positions, please email us at jfig.informs@gmail.com with their name and email address. If you are interested in a position, then please ask a JFIG member to nominate you, providing us with the same information. The deadline for nominations is **March 13, 2020**. After the nomination deadline, JFIG will reach out to all candidates in order to obtain a brief biographical note to be used during the voting period. The positions are effective **April 1, 2020**.

Sponsors

We would like to thank our sponsors for their generous support and help. The activities of this group could never take place without your sponsorship.

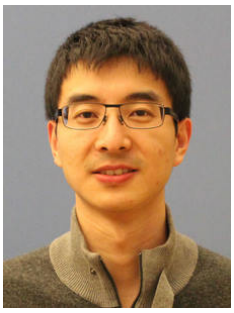
Thank you!

Would you like to sponsor us and help JFIG with our activities? If so, please contact our treasurer, Canan Gunes Corlu at canan@bu.edu.

JFIG Leadership Team

INFORMS has been supporting junior faculty through JFIG since 2001. Our mission is to create a forum to increase junior faculty interaction with each other, with senior faculty, and with industry, and to provide opportunities for networking and collaborative research. Currently, our leadership team is as follows:

President: Ehsan Salari,
✉ ehsan.salari@wichita.edu



Vice President/: President-Elect He Wang,
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