



informatics Junior Faculty Interest Group

Please send your comments and feedback to the JFIG Media Coordinator:

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President's Column



by MANISH BANSAL
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Grado Department of Industrial and
Systems Engineering, Virginia Tech

The JFIG was founded in 2001 with the mission “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.” It is my great honor to serve as the President of JFIG over the past year (20th year of JFIG). Even though the world has been recovering from the COVID pandemic, it is still quite challenging for junior faculty to maintain work-life balance, especially with young (unvaccinated) kids at home. Because of these reasons, we (JFIG team) transitioned some of our traditional JFIG events to the virtual format and I was delighted to see significant increase in the participation of the JFIG members in these events. In addition, JFIG continued to grow in terms of membership and remained strong financially.

The JFIG paper competition is one of the most prestigious and long-standing competitions in the INFORMS community and highlights some of the best research carried out by the junior faculty. The 2021 JFIG paper competition had 31 eligible high-quality papers. I am thankful to Dorit Hochbaum and Alice Smith, who volunteered to co-chair the review committee of the paper competition. I also would like to thank faculty members (23) from various fields who served as the judges: Round 1 - Ron Askin, George Lan, Jay Sethuraman, Amitabh Basu, Larry Leemis, David Shmoys, Saif Benjaafar, Erick Moreno-Centeno, Cole Smith, David Bergman, Barry Nelson, Greys Sosis, Ebru Bish, Georgia Perakis, Aurelie Thiele, Bill Cook, Subhash Sarin, Alex Vinel, Guillermo Gallego, Andrew Schaefer, Teresa Wu, Daniel Kuhn, and Siqian Shen; Round 2 – Stephen Chick, Panos Kouvelis, Daniel Kuhn, David Simchi-Levi, and Cole Smith (Lead). Despite their busy schedules, our senior colleagues worked hard and dedicated their valuable time to maintain the high-standards and timeliness throughout the paper competition. The six finalists selected by the review committee presented their papers in two technical hybrid-sessions organized by JFIG at the INFORMS Annual Meeting.

We also successfully organized five virtual/hybrid panel discussions on wide range of topics that are of interest to JFIG members such as publication and review process, federal and industry funding, and research collaborations. As promised last year, we also collaborated with members of Minority Issues Forum (MIF) and Diversity, Equity, and Inclusion (DEI) program, to organize a webinar on “Impact of issues related to race and culture on career of junior faculty” that will benefit our members

and INFORMS community, in general. To further broaden the involvement of JFIG members in organizing events, we invited volunteers to co-moderate these panel discussions: Hrayr Aprahamian, Albert Berahas, Ahmed Aziz Ezzat, Shannon L. Harris, and Raghu Bollapragada, and Sait Tunc. I am thankful to the volunteers for their help and involvement. Also, I would like to thank the schools and departments who sponsored the JFIG events in 2021.

I am highly grateful to JFIG officers, Ruomeng Cui, Ruiwei Jiang, Stanley Lim, and Peter Zhang, for their significant support, dedication, and hard work in raising funds, organizing events, and ensuring smooth functioning of JFIG. This year, there will be three vacancies on the JFIG board as Peter, Ruomeng, and I are approaching the end of our terms. We are seeking nominees for the open officer positions (President-Elect, Secretary, and Treasurer). Please consider running for one of these positions to help shape the future of JFIG.

Lastly, I would like to congratulate Ruiwei on his appointment as the incoming JFIG president. I sincerely wish him and the JFIG board the very best for with their planned endeavors for the coming year.

President-Elect's Column



by RUIWEI JIANG
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Industrial and
Operations Engineering Department,
University of Michigan, Ann Arbor

It is my great honor to be elected by the JFIG members to serve as the incoming JFIG president. Even though 2021 was a challenging year for everyone both personally and professionally, I am very pleased that under the leadership of Manish, our JFIG continued to grow both in terms of membership and participation in activities during INFORMS Annual Meeting. The JFIG paper competition observed 20% increment in the participation in comparison to the past year. Moreover, we successfully organized virtual sessions in collaboration with WORMS, HAS, and NSF on topics that are of interest to our junior faculty. 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.

As we are heading to the normal state, I (along with other JFIG officers) plan to sustain and build upon existing activities in the upcoming year. More specifically, I plan to coordinate with heads of various OR/MS related

academic departments along with existing JFIG member to seek their help in encouraging their colleagues (non-member junior faculty) to participate in our forum's activities. I will continue to collaborate with other INFORMS societies and organizations, including Minority Issues Forum (MIF) and Diversity, Equity, and Inclusion (DEI) program, to organize sessions that will benefit our members and INFORMS community in general. In addition to our signature event at the INFORMS Annual Meeting – the JFIG Luncheon, we will plan junior-senior faculty networking events both on virtual platforms and during OR/MS related conferences. The success of JFIG activities cannot be possible without JFIG members' participation and feedback. If you have any suggestion or would like to get involved in organizing any activity, please do not hesitate to contact us. We will really appreciate your involvement.

2021 JFIG Paper Competition Results

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 32 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 Optimization, Stochastics/Applied Probability, Game Theory/Mechanism Design, Empirical, Machine Learning/Data Analytics, Inventory Theory, Statistics, and Simulation.

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

- Dorit Hochbaum (Department of Industrial Engineering and Operations Research, University of California, Berkeley)
- Alice Smith (Industrial and Systems Engineering Department, Auburn University)



JFIG Paper Competition Co-chairs: Dorit Hochbaum (left) and Alice Smith (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.

Round 1: each paper was reviewed by 2-3 judges, and eight papers went to Round 2. Round 1 judges were:

Ron Askin	George Lan	Jay Sethuraman
Amitabh Basu	Larry Leemis	David Shmoys
Saif Benjaafar	Erick Moreno-Centeno	Barry Nelson
David Bergman	Barry Nelson	Greys Sosic
Ebru Bish	Georgia Perakis	Aurelie Thiele
Bill Cook	Subhash Sarin	Alex Vinel
Guillermo Gallego	Andrew Shaefer	Teresa Wu
Daniel Kuhn	Siqian Sen	

Round 2: each paper was reviewed by one committee (Department Editor at a top journal) and co-chairs. Round 2 committee were:

- Stephen Chick
- Panos Kouvelis
- Daniel Kuhn
- David Simchi-Levi
- Cole Smith (Lead of Round 2)

Final round: all reviews were shared and voted by the 5 committee members (not including co-chairs). Five finalists were selected by the review committee and invited to present at the JFIG sponsored sessions at the 2021 INFORMS Virtual Annual Meeting and the winners were announced at the JFIG Business Meeting.



Winners of 2021 JFIG Paper Competition: Rajan Udvani (top left), Bradley Stuart (top right), and Karthyek Murthy (bottom)

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

First place: *Submodular Order Functions and Assortment Optimization*

by RAJAN UDWANI (UNIVERSITY OF CALIFORNIA, BERKELEY)

Abstract: We define a new class of set functions that in addition to being monotone and subadditive, also admit a very limited form of submodularity that exists over a permutation of elements of the ground set. We refer to this permutation as a submodular order. That this class of functions includes monotone submodular functions as sub-family. To understand the importance of this structure in optimization problems we consider the problem of maximizing function value under various types of constraints.

First, for the classic problem of maximizing function value subject to cardinality constraint, we give a 0.5ϵ approximation algorithm with query complexity $O(\frac{n}{\epsilon} \log n)$, where n is the size of the ground set and one may choose any $\epsilon > 0$. Further, we show that 0.5 is essentially the best achievable guarantee for this problem i.e., any algorithm that makes polynomial number of queries to function value oracle can not have guarantee better than $0.5 + \epsilon$ for any $\epsilon > 0$. In stark contrast, the problem does not admit any constant factor approximation in the absence of

submodular order. We also show the best possible guarantee more generally under a budget constraint, where we give a 0.5ϵ algorithm with query complexity that scales as $O(n^{\frac{1}{\epsilon}})$, as well as, a $1/3\epsilon$ approximation with near linear complexity. Finally, we give a 0.25 approximation algorithm for matroid constrained optimization with query complexity $O(nd)$ (where d is the matroid rank).

To demonstrate the modeling power of submodular order functions we show applications in two different settings. First, we apply our results to the extensively studied problem of assortment optimization. While the objectives in assortment optimization are known to be non-submodular (and non-monotone) even for simple choice models, we show that they are compatible with the notion of submodular order. Consequently, we obtain new and in some cases, the first constant factor guarantee, for constrained assortment optimization in fundamental choice models such as Multinomial Logit (MNL) and Markov choice. As a second (different) application of submodular order functions, we show an intriguing algorithmic connection to the maximization of monotone submodular functions in the streaming model. We recover some best known guarantees for this problem as a corollary of our results.

Second place: *A nonparametric algorithm for optimal stopping based on robust optimization*

by BRADLEY STURT (UNIVERSITY OF ILLINOIS AT CHICAGO)

Abstract: Optimal stopping is a class of stochastic dynamic optimization problems with applications in finance and operations management. In this paper, we introduce a new method for solving stochastic optimal stopping problems with known probability distributions. First, we use simulation to construct a robust optimization problem that approximates the stochastic optimal stopping problem to any arbitrary accuracy. Second, we characterize the structure of optimal policies for the robust optimization problem, which turn out to be simple and finite-dimensional. Harnessing this characterization, we develop exact and approximation algorithms for solving the robust optimization problem, which in turn yield policies for the stochastic optimal stopping problem. Numerical experiments show that this novel combination of robust optimization and simulation can find policies that match, and in some cases significantly outperform, those from state-of-the-art algorithms on low-dimensional, non-Markovian optimal stopping problems from options pricing.

Third place: Achieving Efficiency in Black-box Estimation of Distribution Tails with Self-structuring Importance Samplers

by ANAND DEO (PHD STUDENT) AND KARTHYEK MURTHY (SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN)

Abstract: Motivated by the increasing adoption of models which utilize contextual information in risk management and decision-making, this paper presents a novel Importance Sampling (IS) scheme for measuring distribution tails of objectives modeled with enabling tools such as feature-based decision rules, mixed integer linear programs, deep neural networks, etc. Conventional efficient IS approaches suffer from feasibility and scalability concerns due to the need to intricately tailor the sampler to the underlying probability distribution and the objective. This challenge is overcome in the proposed black-box scheme by automating the selection of an effective IS distribution with a transformation that implicitly learns and replicates the concentration properties observed in less rare samples. This novel approach is guided by a large deviations principle that brings out the phenomenon of self-similarity of optimal IS distributions. The proposed sampler is the first to attain asymptotically optimal variance reduction across a spectrum of multivariate distributions despite being oblivious to the underlying structure. The large deviations principle additionally results in new distribution tail asymptotics capable of yielding operational insights. The applicability is illustrated by considering contextual routing and portfolio credit risk models informed by neural networks as examples.

Honorable mention: Theory of FinTech and Trade Finance

by XIAOYU WANG (PHD STUDENT, WASHINGTON UNIVERSITY) AND FASHENG XU (SYRACUSE UNIVERSITY)

Abstract: Smart contract improves the supply chain efficiency by enabling the supplier's commitment to post-shipment financing that mitigates the bank's lending risk exposure and thereby reduces the financing cost. Invoice trading offers better liquidity and faster transaction speed, which allow the supplier to make the post-shipment financing decision upon liquidity shock in contrast to factoring market. This paper investigates how these two types of FinTech adoptions could facilitate the trade finance activities and create value for supply chain firms. As the emerging FinTechs could potentially reshape the trade financing landscape, understanding the impact of FinTech adoption and its interaction with trade finance activities is practically relevant and of great importance. We develop a two-stage game-theoretic model and adopt supply chain finance theory to characterize firms' operations and financing strategies in the presence of various FinTech applications. We find that the value of FinTech

adoption depends critically on the trade financing structures, including both pre-shipment and post-shipment financing schemes. Under the baseline trade finance model (with purchase order financing and traditional factoring), smart contract leads to win-win outcome for the supplier and the retailer. When buyer direct financing is adopted for pre-shipment financing, smart contract might demotivate the retailer to offer buyer direct financing, which benefits the retailer but significantly hurts the supplier and therefore reduces the supply chain profit. When on-demand invoice trading is adopted for post-shipment financing, the supplier's and the retailer's profits are increased due to its flexibility. However, it completely wipes out the value of smart contract since there exists no commitment issue. Lastly, though supply chain digitalization facilitated by FinTech helps lower the financing cost, it might either hurt the supplier or the retailer. Our findings provide guidelines for and insights into when smart contract and invoice trading should be adopted and their interactions with different trade finance schemes. In particular, such FinTechs do not always enhance the supply chain value.

Honorable mention: Optimal Algorithms for Differentially Private Monotone Stochastic Variational Inequalities and Saddle-point Problems

by DIGVIJAY BOOB (SOUTHERN METHODIST UNIVERSITY) AND CRISTOBAL GUZMAN (UNIVERSITY OF TWENTE)

Abstract: In this work, we conduct the first systematic study of monotone stochastic variational inequality (SVI) and stochastic saddle point (SSP) problems under the constraint of differential privacy-(DP). We propose two algorithms: Noisy Stochastic Extragradient (NSEG) and Noisy Inexact Stochastic Proximal Point (NISPP). We show that sampling with replacement variants of these algorithms attain the optimal risk for DP-SVI and DP-SSP. Key to our analysis is the investigation of algorithmic stability bounds, both of which are new even in the non-private case, together with a novel "stability implies generalization" result for the gap functions for SVI and SSP problems. The dependence of the running time of these algorithms, with respect to the dataset size n , is n^2 for NSEG and $(n^{\frac{3}{2}})$ for NISPP.

Honorable mention: Optimal Unlabeled Set Partitioning with Application to Risk-based Quarantine Policies

by JIAYI LIN (PHD STUDENT, TEXAS AM UNIVERSITY), HRAYER APRAHAMIAN (TEXAS AM UNIVERSITY) AND HADI EL-AMINE (GEORGE MASON UNIVERSITY)

Abstract: We consider the problem of partitioning a set of items into unlabeled subsets so as to optimize an additive objective. We study this problem under a broad family of objective functions characterized by elementary symmetric polynomials, which are “building blocks” to symmetric functions. By analyzing a continuous relaxation of the problem, we identify conditions that enable the use of a reformulation technique in which the set partitioning problem is cast as a more tractable shortest path problem solvable in polynomial-time. We show that a number of results from the literature arise as special cases of our framework, highlighting its generality. We demonstrate the usefulness of the developed methodology through a novel and timely application of quarantining heterogeneous populations in an optimal manner. Our case study on real COVID-19 data reveals significant benefits over conventional measures in terms of both spread mitigation and economic impact, underscoring the importance of data-driven policies.

JFIG Sponsored Virtual Panel Discussions

In 2021, JFIG organized three virtual panel discussions sessions throughout the year.

Monday, June 7, 2021

Industry Funded Research Projects: A Guide for Junior Faculty

Panelists:

- Pascal Van Hentenryck (Georgia Institute of Technology)
- Karla Hoffman (George Mason University)
- Mohsen Jafari (Rutgers University)
- Julie Swann (North Carolina State University)

Link to Recording:

Thursday, October 7, 2021

Medical Clinical Collaborations in Healthcare: A Guide for Junior Faculty

Panelists:

- Oguzhan Alagoz (University of Wisconsin-Madison)
- Brian Denton (University of Michigan)
- Maria Mayorga (North Carolina State University)
- Steven Shechter (UBC Sauder School of Business)

Link to Recording:

<https://www.youtube.com/watch?v=fffYATqrNKU>

Friday, November 5, 2021

The Impact of Race/Culture Related Issues on Career of Junior Faculty

Panelists:

- Christopher S. Tang (University of California, Los Angeles)
- Illya Hicks (Rice University)
- Michele Samorani (Santa Clara University)
- Karen Hicklin (University of Florida)

Link to Recording:

<https://www.youtube.com/watch?v=8lYgQaWJGjQ>

Tuesday, March 1, 2022

From Finding Funding Opportunities to CAREER Awards: A Guide for Junior Faculty

Panelists:

- Irina Dolinskaya (Program Director, National Science Foundation)
- Lawrence Seiford (University of Michigan, Ann Arbor)
- Eunhye Song (Penn State University)
- Divya Srinivasan (Clemson University)

Link to Recording:

JFIG Sponsored Events at 2021 Virtual Annual Meeting



In 2021, JFIG organized three sessions during the Virtual INFORMS Annual Meeting. The two paper competition sessions include talks by the six finalists of the 2021 JFIG paper competition. The one panel session attracted panelists from various institutions who had valuable experience serving on editorial boards on some of the most prestigious Operations Research and Management Science journals. The panel discussed topics related to publications and the overall review process of papers. Topics included best practices for junior faculty to adopt, what journals to target and when to target them, and how to effectively respond to reviewers.

Monday, October 25, 2021

ME04. JFIG Paper Competition Session I

Session Co-chairs: Dorit Simona Hochbaum, Alice E Smith, and Manish Bansal

Presenters:

- Xiaoyu Wang (Washington University) and Fasheng Xu (Syracuse University)
- Anand Deo and Karthyek Murthy (Singapore University of Technology and Design)
- Bradley Sturt (University of Illinois at Chicago)
- Jiayi Lin, Hrayr Aprahamian (Texas AM University) and Hadi El-Amine (George Mason University)

Tuesday, October 26, 2021

TC04. Publications and the Review Process: A Guide for Junior Faculty

Panelists:

- John R. Birge, OR Editor-in-Chief (University of Chicago)
- Ozlem Ergun, OR Area Editor (Northeastern University)
- Douglas R. Shier, Networks co-Editor-in-Chief (Clemson University)
- David Simchi-Levi, MS Editor-in-Chief (Massachusetts Institute of Technology)
- Cole Smith, IISE Focused Issue Editor (Syracuse University)

TB04. JFIG Paper Competition Session II

Session Co-chairs: Dorit Simona Hochbaum, Alice E Smith, and Manish Bansal

Presenters:

- Rajan Udmani (University of California, Berkeley)
- Digvijay Boob (Southern Methodist University) and Cristobal Guzman (University of Twente)

Social Media Platforms

JFIG provides an email listserv where announcements regarding job postings, workshops and conferences are disseminated. For timely updates, follow us on Twitter (@informsjfig) and join our LinkedIn Group.

- LinkedIn: <https://www.linkedin.com/groups/13968217>
- Twitter: <https://twitter.com/informsjfig>
- INFORMS JFIG: <https://connect.informs.org/jfig/about-us/aboutjfig>

Financial and Membership Status Update



by RUOMENG CUI
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Goizueta Business School,
Emory University

JFIG received a total sponsorship of \$3,000 in 2021. The total revenue in 2021 is \$2,721, and the total expense is \$1,248. The fund balance is \$9,895 as of November, 2021.

We have seen a healthy growth of JFIG membership over the past few years. The number of JFIG members has increased to 179 as of November, 2021.

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:

Open Officer Positions - Call for Nominations

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

- Vice-president/President-elect (two-year term, transition to President after one year)
- Secretary (two-year term)
- Treasurer (two-year term)



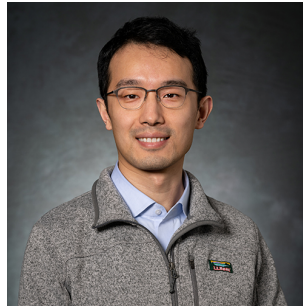
President: Manish Bansal,
✉ hbansal@vt.edu



President-Elect: Ruiwei Jiang,
✉ ruiwei@umich.edu



Treasurer: Ruomeng Cui,
✉ ruomeng.cui@emory.edu



Secretary: Peter Y. Zhang,
✉ pyzhang@cmu.edu



Media Coordinator: Stanley Lim,
✉ slim@msu.edu

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, email address, and a short biographical note. If you are interested in a position, you can self-nominate and send us the same information. The deadline for nominations is **March 18, 2022**. After the nomination deadline, JFIG will reach out to all candidates in order to arrange for the voting process. The positions are effective **April 1, 2022**.

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.

THE UNIVERSITY OF ARIZONA



Sponsorship from the Department of Systems and Industrial Engineering at The University of Arizona



Sponsorship from the Grado Department of Industrial and Systems Engineering at Virginia Tech



Sponsorship from the Industrial Operations Engineering Department at University of Michigan



Sponsorship from the Department of Operations Management and Statistics at University of Toronto

Thank you!

Would your department/school like to sponsor us and help JFIG with our activities? If so, please contact our treasurer, Ruomeng Cui at ruomeng.cui@emory.edu.