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Bypassing Performance Optimizers of Real Time Bidding Systems in Display Ad Valuation (p. 399)

Ranjit M. Christopher, Sungho Park, Sang Pil Han, Min-Kyu Kim

A vast majority of digital display advertisers rely on large digital ad platforms to run their ad campaigns. Although ad platforms managing real-time bidding systems offer state-of-the-art services to enhance the performance of ad campaigns, their inner workings are largely opaque to customers. As a result, advertisers who seek to value their campaigns in collaboration with third-party platforms must necessarily contend with the problem of estimation bias attributable to these algorithms in addition to the high cost of implementation. We propose an alternative approach to valuation for advertisers who choose to bypass automated performance optimizers of ad platforms. We show that external frequency caps that set upper limits on the number of ad impressions outside the purview of bidding algorithms can serve this purpose effectively. Eliminating performance optimizers allows the advertiser to value ads without relying on the support services of the DSP, with the added benefit of a broader customer reach and a markedly lower cost.

Developing a Composite Measure to Represent Information Flows in Networks: Evidence from a Stock Market (p. 413)

Wuyue (Phoebe) Shangguan, Alvin Chung Man Leung, Ashish Agarwal, Prabhudev Konana, Xi Chen

This paper employs a design science approach and proposes a new composite metric, eigen attention centrality (EAC), as a proxy for information flows associated with a node that considers both attention to a node and coattention with other nodes in a network. We apply the EAC metric in the context of a financial market where nodes are individual stocks and edges are based on coattention relationships among stocks. Composite information from different channels is used to measure attention and coattention. We evaluate the effectiveness of the EAC metric on predicting abnormal returns of stocks by (1) using multiple prediction methods and (2) comparing EAC with a set of alternative network metrics. Our analysis shows that EAC significantly outperforms alternative models in predicting the direction and

magnitude of abnormal returns of stocks. Using the EAC metric, we derive a stock portfolio and develop a trading strategy that provides significant and positive excess returns. Lastly, we find that composite information has significantly better predictive performance than separate information sources, and such superior performance owes to information from social media instead of traditional media.

Predicting Stages in Omnichannel Path to Purchase: A Deep Learning Model (p. 429)

Chenshuo Sun, Panagiotis Adamopoulos, Anindya Ghose, Xueming Luo

The proliferation of omnichannel practices and emerging technologies opens up new opportunities for companies to collect voluminous data across multiple channels. This study examines whether leveraging omnichannel data can lead to, statistically and economically, significantly better predictions on consumers' online path-to-purchase journeys, given the intrinsic fluidity in and heterogeneity brought forth by digital transformation of traditional marketing. Using an omnichannel data set that captures consumers' online behavior in terms of their website browsing trajectories and their offline behavior in terms of physical location trajectories, we predict consumers' future path-to-purchase journeys based on their historical omnichannel behaviors. Using a state-of-the-art deep-learning algorithm, we find that using omnichannel data can significantly improve our model's predictive power. This enhanced predictive power benefits various heterogeneous online firms, regardless of their size, offline presence, mobile app availability, or whether they are selling single- or multi-category products. Using an illustrative example of targeted marketing, we further quantify the economic value of the improved predictive power and the value of data.

Configuring the Enterprise Systems Portfolio: The Role of Information Risk (p. 446)

Chaitanya Sambhara, Arun Rai, Sean Xin Xu

Information risk, the likelihood that corporate financial information is of poor quality, adversely impacts investor confidence regarding a firm's financial health, making it an economically important problem. Viewing a firm's enterprise systems (ES) portfolio as made up of

operational modules (customer relationship management and supply chain management) and functional modules (accounting and finance, and human resource management), we examine how firms configure their ES portfolio by changing the balance in the implementation of two types of modules in response to information risk. We find internal controls to be an important contingency in determining how firms change their ES portfolio balance when information risk increases. When there is no weakness in internal controls, firms change their ES portfolio balance more toward operational modules. However, when internal controls are afflicted with material weakness, firms change their ES portfolio balance more toward functional modules instead. When evaluating the link between ES portfolio configuration and information processing requirements in the context of financial processes, managers should assess both information risk and internal controls to decide how to change the balance between operational and functional modules that are implemented.

Identifying Perverse Incentives in Buyer Profiling on Online Trading Platforms (p. 464)

Karthik Kannan, Rajib L. Saha, Warut Khern-am-nuai

With advance machine learning and artificial intelligence models, the capability of online trading platforms to profile consumers to identify and understand their needs has substantially increased. In this study, we use an analytical model to study whether these platforms have an incentive to profile their customers as accurately as possible. We find that “payment-for-transaction” platforms (i.e., platforms that charge for transactions that occur on the platform) indeed have such incentives to accurately profile the customers. However, surprisingly, “payment-for-discovery” platform (i.e., platforms that charge customers for discoveries) have a perverse incentive to deviate from accurate consumer profiling. Our study provides insights into underlying mechanisms that drive this perverse incentive and discuss circumstances that lead to such a perverse incentive.

Overcoming the Single-IS Paradigm in Individual-Level IS Research (p. 476)

Jin P. Gerlach, Ronald T. Cenfetelli

Over the years, the number of digital technologies that individuals use in their work and nonwork lives has increased significantly. These different technologies are often subject to interactions and interdependencies among them, which creates new challenges and opportunities for individuals. For instance, multiple digital technologies might be incompatible or offer redundant information to individuals. In this research, we offer a framework that can help scholars to study phenomena that involve multiple digital technologies

and can assist designers and developers in making design decisions that facilitate beneficial interactions between technologies and mitigate undesirable ones.

Trial-Period Technostress: A Conceptual Definition and Mixed-Methods Investigation (p. 489)

Christian Maier, Sven Laumer, Jason Bennett Thatcher, Jakob Wirth, Tim Weitzel

A large number of electronic devices are rejected and returned to the seller in the first weeks of trial use, which costs organizations millions of dollars. We aimed to identify the causes behind those returns and find that stress during the trial period is a major contributing factor. Users are stressed as they need to learn how to use the electronic device, integrate it into their daily life, and take care of privacy issues. All that creates stress and makes users feel unhappy with using the electronic device so that they will send it back to the seller. In particular, we see in our results that individuals who are not innovative in using IT in general and have a low willingness to learn using the new electronic device tend to send back electronic devices in the first weeks of the trial period. When discussing those results with individuals who had sent back tablet devices, we see that stress in the trial period can even overwhelm positive thoughts. So, with our results, we conclude that stress in the trial period has many causes that are often responsible for returning electronic devices.

Delivering Healthcare Through Teleconsultations: Implications for Offline Healthcare Disparity (p. 515)

Elina H. Hwang, Xitong Guo, Yong Tan, Yuanyuan Dang

In this study, we focus on the largely overlooked but important topic: *social value created by teleconsultations*. Many countries suffer from the geographic imbalance of their medical professionals: there are abundant resources in urban cities but too few in rural areas. Teleconsultations have emerged as a promising solution to reduce this disparity because they can remotely deliver healthcare without relocating medical professionals. Yet it is unclear whether teleconsultations actually mobilize healthcare to underserved areas. To answer this question, we collaborate with a large online healthcare platform and analyze its teleconsulting data together with offline healthcare and regional data. Our results indicate that teleconsultations tend to connect physicians in resourceful regions with patients in underserved areas—a desirable pattern that alleviates the geographic healthcare disparity. However, we also find that social, information, and geography frictions persist. For instance, teleconsultations are less likely to occur as regions become farther apart, and financial and information constraints limit rural patients’ access to teleconsultations. We uncover the underlying mechanisms that

drive such frictions and provide recommendations to reduce the frictions that hinder teleconsultations.

Social Media Marketing, Quality Signaling, and the Goldilocks Principle (p. 540)

Tingting Nian, Arun Sundararajan

Embraced by a rapidly increasing number of companies, social media marketing has become an integral part of companies' business strategies. However, not all the firms plan on a big spend on social media marketing. Our stylized model investigates the strategic effects of social media marketing spending (SMM spending) with the presence of exogenous quality revelation through sources over which firms have no direct control. Unlike traditional advertising, social media marketing has two roles: awareness enhancement and information revelation. Consumers are heterogeneous in their awareness of the product (e.g., whether they know the existence of the product). Our results suggest that the high-quality firm gets enough quality transparency from background user-generated discussions, and the cost of maintaining a social presence outweighs the benefits. The low-quality firm avoids social media marketing because quality transparency is broadly detrimental, whereas the mid-tier firm is "just right" to benefit from social media discussions they encourage. Our model provides a first step toward framing social media marketing spending as a strategic investment. We recognize that social media marketing, although capable of increasing consumer awareness and improving the realized perceptions of a firm's true quality, also has strategic signaling effects.

Sprint Zeal or Sprint Fatigue? The Benefits and Burdens of Agile ISD Practices Use for Developer Well-Being (p. 557)

Alexander Benlian

Are agile information systems development practices (AISDPs), such as pair programming or daily stand-ups, universally beneficial to developer well-being? Given that agile information systems development project success is only as good as its developers' productiveness, taking care of developer well-being is of utmost importance to organizations. Using daily survey responses of 131 agile developers spread over two workweeks, we show that the daily use of AISDP is a double-edged sword rather than a silver bullet. Although AISDPs can be motivating and activate energy resources on some days, they can be disturbing and deplete energy on others—two stress responses with opposing effects on developer well-being. As a potential antidote to the detrimental effects of AISDP, we investigate the moderating role of information technology (IT) mindfulness, a dynamic trait that captures the mindful usage of IT. We find that IT mindfulness can serve as a facilitator of positive stress responses

and as a buffer against negative stress responses. A key takeaway of this study is in finding ways to influence developers (via awareness programs, time-sensitive recovery interventions, or mindfulness practices) to increase the functional and decrease the dysfunctional stress responses from daily AISDP use.

Deep Learning of Spatiotemporal Patterns for Urban Mobility Prediction Using Big Data (p. 579)

Yun Wang, Faiz Currim, Sudha Ram

Timely and accurate prediction of human movement in urban areas is important for travelers, officials and corporations involved in transportation management, public safety and location-based services, to name a few. Yet, modeling urban mobility is challenging and complex due to the spatiotemporal dynamics of movement behavior and the influence of exogenous factors such as weather, holidays and local events. In this paper, we examine spatiotemporal travel patterns for bus transportation. We take a macro view to understand patterns of passenger mobility between spatial regions over time. Such patterns are very important to urban planning and transportation policymakers and practitioners to understand commute flows and density. We develop a novel deep-learning approach that combines multiple techniques, including network embeddings, convolutional neural networks (CNNs), long short-term memory networks (LSTMs), and attention mechanisms. Our proposed architecture is flexible enough to support different deep-learning techniques and is adaptable to other modes of transport and in general to research questions that can be framed as sequential graph data prediction problems. Our proposed model is implemented and evaluated using a large-scale transportation dataset of more than 200 million bus trips and achieves significant improvements in urban mobility prediction.

Competitive Poaching in Search Advertising: Two Randomized Field Experiments (p. 599)

Siddharth Bhattacharya, Jing Gong, Sunil Wattal

Keyword searches with brand names enable firms to generate traffic from search advertising by bidding not only on their own keywords but also on competitors' keywords. The strategy of bidding on competitors' keywords, known as competitive poaching, presents unique opportunities for practitioners. This study examines factors that influence the effectiveness of competitive poaching. We collected data from two randomized field experiments, one with a business school in the Northeastern United States and the other one with a leading automobile dealership company, where these firms bid on keywords of competing brands and randomly display different types of ad copies in the sponsored search listings. We find that, when poaching on keywords of high-quality brands, ad copies that feature vertical differentiation through quality signals are more effective than the

control ad copies that do not convey any differentiation or prescriptive messages. We also find that when poaching from low-quality brands, ad copies featuring horizontal differentiation through nonquality attributes perform better than the control ad copies. Finally, the presence of the poached brand's own ad has a positive association with the ad effectiveness of the poaching brand when that poached brand is high quality and a negative association when the poached brand is low quality.

How Do Recommender Systems Lead to Consumer Purchases? A Causal Mediation Analysis of a Field Experiment (p. 620)

Xitong Li, Jörn Grahl, Oliver Hinz

The findings underscore the important role of consumers' consideration sets in mediating the positive effects of recommender systems on consumer purchases. Practical strategies can be developed to facilitate the formation of the consideration sets. For example, to reduce consumers' search costs and cognitive efforts, online retailers can display the recommended products in a descending order according to the predicted closeness of consumers' preferences. Online retailers can further indicate the predicted closeness scores of consumers' preferences for the recommended products. Given such a placement arrangement, consumers can quickly screen the recommended products and add the most relevant alternatives to their consideration sets, which should facilitate consumers' shopping process and increase the shopping satisfaction. The findings also suggest that a larger consideration set due to the use of recommender systems could induce consumers to buy. Yet, it is difficult for consumers to manage many alternatives when the consideration set is very large. To facilitate consumers' shopping process, online retailers need to consider strategies and tools that help consumers manage the alternatives in the consideration set in a better-organized manner and facilitate the comparison across the alternatives.

Shared Prosperity (or Lack Thereof) in the Sharing Economy (p. 638)

Mohammed Alyakoob, Mohammad S. Rahman

This paper examines the potential economic spillover effects of a home sharing platform—Airbnb—on the growth of a complimentary local service—restaurants. By circumventing traditional land-use regulations and providing access to underutilized inventory, Airbnb attracts visitors to outlets that are not traditional tourist destinations. Although visitors generally bring significant spending power, it is unclear whether visitors use Airbnb only primarily for lodging and thus do not contribute to the adjacent economy. To evaluate this, we focus on the impact of Airbnb on restaurant employment growth across locales in New York City (NYC). Specifically, we focus on areas in NYC that did not attract a significant tourist volume prior to the emergence of a

home-sharing service. Our results indicate a salient and economically significant positive spillover effect on restaurant job growth in an average NYC locality. A one-percentage-point increase in the intensity of Airbnb activity (Airbnb reviews per household) leads to approximately 1.7% restaurant employment growth. Since home-sharing visitors are lodging in areas that are not accustomed to tourists, we also investigate the demographic and market-structure-related heterogeneity of our results. Notably, restaurants in areas with a relatively high number of White residents disproportionately benefit from the economic spillover of Airbnb activity, whereas the impact in majority-Black areas is not statistically significant. Thus, policy makers must consider the heterogeneity in the potential economic benefits as they look to regulate home-sharing activities.

Evaluating the Effectiveness of Marketing Campaigns for Malls Using a Novel Interpretable Machine Learning Model (p. 659)

Tong Wang, Cheng He, Fujie Jin, Yu Jeffrey Hu

We develop a novel interpretable machine learning model, GANNM, and use newly available data to evaluate how different types of marketing campaigns and budget allocations influence malls' customer traffic. We observe that the response curves that measure the impact of campaign budget on customer traffic differ for different categories of campaigns, with sales incentives or experience incentives, during peak periods, off-peak periods, or online promotion periods. Based on such accurate response curves from GANNM, the optimized budget allocation is estimated to yield a 11.2% increase in customer traffic compared with the original allocation. Our findings provide novel insights on managing mall campaigns. Mall managers should increase marketing spending to areas that were likely overlooked before and avoid over-crowding budget to campaigns during times with high levels of competition and are likely already over-marketed. We provide empirical evidence showing that the recent trend of employing novel approaches for enhancing customer experience in physical stores can effectively encourage customers to visit malls. Furthermore, we show that online promotions could also create opportunities for offline businesses—investing in campaigns in the major online promotion periods could significantly increase customer traffic for malls, given sufficient investment in the campaigns to raise customer awareness.

Cognitive Challenges in Human–Artificial Intelligence Collaboration: Investigating the Path Toward Productive Delegation (p. 678)

Andreas Fügener, Jörn Grahl, Alok Gupta, Wolfgang Ketter

A consensus is beginning to emerge that the next phase of artificial intelligence (AI) induction in business

organizations will require humans to work with AI in a variety of work arrangements. This article explores the issues related to human capabilities to work with AI. A key to working in many work arrangements is the ability to delegate work to entities that can do them most efficiently. Modern AI can do a remarkable job of efficient delegation to humans because it knows what it knows well and what it does not. Humans, on the other hand, are poor judges of their metaknowledge and are not good at delegating knowledge work to AI—this might prove to be a big stumbling block to create work environments where humans and AI work together. Humans have often created machines to serve them. The sentiment is perhaps exemplified by Oscar Wilde's statement that "civilization requires slaves Human slavery is wrong, insecure and demoralizing. On mechanical slavery, on the slavery of the machine, the future of the world depends." However, the time has come when humans might switch roles with machines. Our study highlights capabilities that humans need to effectively work with AI and still be in control rather than just being directed.

Performance of Accountable Care Organizations: Health Information Technology and Quality–Efficiency Trade-Offs (p. 697)

Chenzhang Bao, Indranil R. Bardhan

Under a traditional fee-for-service payment model, healthcare providers typically compromise the quality of care in order to reduce costs. Drawing on data from a national sample of accountable care organizations (ACOs), we study whether financial incentives offered under the Affordable Care Act led to fundamental changes in care delivery. Our research suggests that effective use of health information technology (IT) by ACO providers is critical in balancing competing goals of quality and efficiency. Unlike hospitals that did not participate in value-based care initiatives, ACOs were able to generate better quality outcomes while also improving overall efficiency. Furthermore, ACO providers that used health IT effectively demonstrated better patient health outcomes due to greater information integration with other providers. In other words, ACOs created value by not only reducing the cost of care but also improving patient outcomes simultaneously. Our research provides a roadmap for practitioners to succeed in a value-based healthcare environment and for policy makers to design better incentives to promote interorganizational information sharing across providers. Our findings suggest that healthcare policy needs to incorporate appropriate incentives to foster effective IT use for care coordination between healthcare providers.

Gamified Challenges in Online Weight-Loss Communities (p. 718)

Behnaz Bojd, Xiaolong Song, Yong Tan, Xiangbin Yan

Gamified challenges, one of the most popular features of online weight-loss communities, enable users to set weight-loss goals and compete with other challenge participants via leaderboards. Using the data from a leading online weight-loss community, we study the effect of gamified challenges on the weight-loss outcome. Our findings indicate that participation in gamified challenges has a positive and significant effect on weight loss. We found that, on average, the participants achieved a weight loss of 0.742 kg by participating in at least one challenge a month. We found that effective challenges do not include a numeric weight goal (e.g., lose 5 kg), focus on exercise-only behavioral goals, and have a large active group size. Further, the results show that the absence (presence) of a numeric weight goal benefits users in exercise (diet) challenges. Moreover, a small active group size can help (hurt) users in exercise (diet) challenges. Our results suggest that gamification elements that induce competition should be used with caution in goal-setting environments, especially when gamifying dietary goals. Online weight-loss communities can recommend a useful combination of numeric weight goals, behavioral goals, and an optimal number of participants in each challenge to induce an encouraging level of social comparison.

Save Face or Save Life: Physicians' Dilemma in Using Clinical Decision Support Systems (p. 737)

Huigang Liang, Yajiong Xue

Humans think both rationally and heuristically. So do physicians. Clinical decision support systems (CDSSs) provide advice to physicians that could save patients' lives, but they could also make physicians feel face loss because of submission to machine intelligence, leading to a perplexing dilemma. Thinking rationally, physicians focus on fulfilling their professional duty to save patients and should follow advice from CDSS to improve care quality. Thinking heuristically, they focus on protecting their authoritative image to maintain face and are inclined to avoid embarrassment by resisting CDSS. Through a longitudinal survey and follow-up interviews with a group of Chinese physicians, we find that the dilemma does exist. Moreover, face loss has a stronger effect on CDSS resistance when physicians have high autonomy. When time pressure is high, perceived usefulness more strongly reduces, whereas face loss more strongly increases CDSS resistance, worsening the dilemma. As face is a universal social concern existing in both Eastern and Western cultures, this research generates insights regarding why physicians are slow in adopting information technology innovations.