ADA 2024 Thursday Scientific Program

This is the Thursday Scientific Program of ADA 2024. Note that the program may still change slightly.

The presenter(s) are underlined, and the other authors are in plain text. View abstracts below or by clicking the presenter's name.

The discussants of the PhD Incubator presentations are indicated with parentheses. Blitz PhD incubator presentation are indicated with (Blitz).

The session IDs are formatted followingly: <Day>.<Session Number>.<Lecture Hall>.
For example, Wed.4.D refers to the 4th session of Wednesday and is arranged in lecture hall D.

The Poster Session Thu.3.X is arranged outside lecture hall B.

Time \ Day	Thursday 11 July 2024		
	Lecture Hall B	Lecture Hall D	Lecture Hall E
08:30 - 09:00		**Registration & Coffee**	
09:00 - 10:00		**Thu.1.B** **Keynote (Lecture Hall B)** **PD Dr. Judit Lienert:** Bridging Theory and Practice When Involving Stakeholders in Public Environmental Decisions	
10:00 - 10:15		**Break**	
10:15 - 11:45		**Parallel Sessions**	
	Thu.2.B **Environmental Applications** Session Chair: Kyle Eyvindson	**Thu.2.D** **Game Theory and Dynamics** Session Chair: Topi Miettinen	**Thu.2.E** **PhD Incubator I** Session Chair: Sasa Zorc
	Kyle Eyvindson Anna Repo, Katharina Albrich, Juha Honkaniemi	Jun Zhuang	Peyman Kor (Spyros Zoumpoulis) Reidar Brumer Bratvold, Aojie Hong
	Shane Flinn Kelly Robinson	Sasa Zorc Bhavani Shanker Uppari	Junnan Wang (Blitz) Long Zhao, Zhi Chen
	Kaili Gregory Kelly Robinson, Dana Infante, Randall Claramunt, Justin Miller, Jared Ross	Mathieu Dahan Bobak McCann	Xinyu Hou (Ilia Tsetlin) Zhi Chen, Long Zhao
	Kyle Eyvindson Juha Honkaniemi, Katharina Albrich, Anna Repo	Topi Miettinen Christoph Vanberg	Junnan Wang (Yael Grushka-Cockayne) Ville Satopaa
11:45 - 12:30	**Lunch**	**jointly with the Poster Session (outside hall B)**	
12:30 - 14:00		**Parallel Sessions**	
	Thu.3.B **Judgment and Dec. Making I** Session Chair: Konstantinos Katsikopoulos	**Thu.3.X (outside hall B)** **Poster Session**	**Thu.3.E** **PhD Incubator II** Session Chair: Sasa Zorc
		Andy Wu	
	Onesun Yoo Chia-Jung Tsay	Liang Hong Xiufeng Xu	Guanrou Deng (Juuso Liesiö) Maurizio Fiaschetti
		Ling-Jing Kao Bing-Lun Su, Hung-Jui Wang, Ruby Lin, Chih-Chou Chiu	
		Michael Maiko Matonya László Pusztai, István Budai	
	Hagai Rabinovitch David V. Budescu, Yoella Bereby-Meyer	Christine Huttin	Stefanos Poulidis (Blitz) Georgina Hall, Spyros Zoumpoulis
		Nan Li Chen Wang	
		Risto Heikkinen Juha Karvanen, Kaisa Miettinen	
		Vijay Chiluveru Renee Obringer	
	Rupert Freeman Stefano Balietti	Ahsan Muneer, Jyrki Savolainen Esa Viljamaa	Joseph Rilling (Asa Palley)
		Jonathan Roberts	

		Lily Popova Zhuhadar Maryam Roudneshin Amanda Sosa	
	Konstantinos Katsikopoulos Luis Fuentes Garcia, Martin Egozcue	Aws Hamo Younes Konstantinos Nikolopoulos, Michel Phan Donghun Yoon Behzad Mosalla Nezhad Mostafa Hajiaghaei-Keshteli, Neale R. Smith, Fatemeh Gholian-Jouybari	Daniel Corrales (Jun Zhuang) David Ríos Insua
14:00 - 14:15		**Break**	
		Parallel Sessions	
	Thu.4.B **Applications in Business** Session Chair: Sanjith Gopalakrishnan	**Thu.4.D** **Computational Approaches** Session Chair: Topias Terho	**Thu.4.E** **PhD Incubator III** Session Chair: Sasa Zorc
	Isabella Sanders	Martial Ndtoungou Pfouga	Qiong Xia (Aurelien Baillon) Ahmed Gueciloueur, Enrico Diecidue
14:15 - 15:45	Gilberto Montibeller Milena Janjevic, Jarrod Goentzel	David Brown Cagin Uru	Leevi Olander (Blitz) Ahti Salo
	Yiting Deng Richard Staelin	Flávio Araújo Lim-Apo Leonardo Bastos, Fabricio Oliveira, Silvio Hamacher	Julian Berger (Ville Satopaa) Frederik Andersen, Diana Verdes, Kristian P. Lorenzen, Pantelis P. Analytis, Ralf H.J.M. Kurvers
	Sanjith Gopalakrishnan Rim Hariss	Topias Terho Olli Herrala, Fabricio Oliveira	Erik Kommol (Jack Soll) Christopher Lettl
15:45 - 16:00		**Break**	
16:00 - 17:05		**Thu.5.B (previously Fri.1.B)** **Keynote (Lecture Hall B)** **D.Sc. (Tech.) h.c. Kari Renko:** A Case Study on Applying Decision Analysis in Defence Procurement	

Oral Presentations

Thu.2.B: Environmental Applications

Session Chair: Kyle Eyvindson

How to manage forests to meet climate and biodiversity goals? -reflections on the use of systems analysis in forestry

Submission ID-106

Anna Repo [1], Katharina Albrich [1], Juha Honkaniemi [1], Kyle Eyvindson [1, 2]

[1] *Natural Resources Institute Finland LUKE*
[2] *Norwegian University of Life Sciences NMBU*

The stewardship of forests offers solutions to mitigate climate change, halt biodiversity loss, and secure the provision of vital ecosystem services. To achieve international climate and biodiversity goals, it is necessary to adopt more integrated approaches to land-use planning that cover both natural and managed forests, in order to conserve biodiversity, mitigate climate change, and ensure that societal needs for fiber, timber, and energy are met. From a decision-making and policy development perspective, this is a complex problem involving dynamic interactions and multiple decision-makers. The issue is further complicated by uncertainty related to climate change and forest disturbances. This presentation reflects on the challenges and lessons learned from our research on forest planning using a simulation and optimization approach. This presentation discusses the impact of modelling choices, planning horizons, and problem formulations when constructing future forest scenarios, as well as the value provided by decision-support tools. It also considers the concepts of risk and risk management in forest planning in a changing environment. The presentation discusses challenges and possibilities in systems analysis methods for supporting decision-making on biodiversity conservation and climate change mitigation efforts that aim to maximize multiple benefits and enhance forest resilience under a changing climate.

The Consequences Of Connectivity: Using Structured Decision Making To Inform Fish Passage Decisions

Submission ID-032

Shane Flinn [1], Kelly Robinson [2]

[1] *Quantitative Fisheries Center, Department of Fisheries and Wildlife, Michigan State University*
[2] *U.S. Geological Survey, Georgia Cooperative Fish and Wildlife Research Unit, Warnell School of Forestry and Natural Resources, University of Georgia*

Dams have dramatically altered riverine systems and are a major contributor to native fish population declines. However, many dams serve important ecological, social, and economic functions, such as flood control, invasive species control, and provision of recreational opportunities. Therefore, dam removal is often contentious among stakeholders and involves making tradeoffs among multiple competing objectives. This research uses Structured Decision Making to evaluate the ecological, social, and economic consequences and tradeoffs of enhancing connectivity for migratory fishes in the Laurentian Great Lakes (North America). We describe our efforts to engage a diverse group of stakeholders to elicit their objectives under various fish passage alternatives. We developed predictive models to help stakeholders weigh the costs and benefits of enhancing connectivity for several fish species with varying life history traits and distributions. We evaluated four scenarios of stakeholder weights to understand how stakeholder values affect the decision. We found that the optimal management alternative was passage of native fishes only; however, the optimal alternative varied based on the weight stakeholders place on each objective. The results of this research will help inform decision-makers on fish passage alternatives that are preferred by stakeholders and that are likely to achieve their objectives.

Decision analysis for building resilience, capacity, and understanding in riverine systems facing climate change

Submission ID-055

Kaili Gregory [1], Kelly Robinson [2], Dana Infante [3], Randall Claramunt [4], Justin Miller [3], Jared Ross [3]

[1] *Warnell School of Forestry and Natural Resources, University of Georgia*
[2] *U.S. Geological Survey, Georgia Cooperative Fish and Wildlife Research Unit*
[3] *Department of Fisheries and Wildlife, Michigan State University*
[4] *Michigan Department of Natural Resources*

Cold-water rivers and streams are at the forefront of climate change impacts, with shifting precipitation patterns and air temperatures posing a significant threat to the resilience of these ecologically, socially, and economically valuable systems. The Au Sable River, Michigan, USA, known for its scenic waterways and rich angling history, is experiencing diverse stressors including habitat degradation and invasive species, the effects of which are only expected to worsen with climate change. There are multiple interest groups in the system with capacity for on the ground implementation of habitat management projects, data collection, and outreach efforts each year. Coordination of these efforts is difficult, and disagreements exist regarding management decision making among these active, involved groups. In a highly participatory decision process, we co-developed an adaptive management framework to identify key uncertainties, strategically acquire new knowledge, and facilitate more effective decision making for multiple ecological, economic, and social objectives. Spatial prioritization of management actions is leading to more coordinated experimental management strategies to reduce uncertainty, while building trust and communication pathways between individuals and organizations. Broadly, the work presented here serves as an example for how decision analysis can be applied to a complex riverine system undergoing significant change.

Exploring optimal forest management strategies – adapting optimization approaches to enable use of process-based landscape simulators

Submission ID-099

Kyle Eyvindson [1, 2], Juha Honkaniemi [2], Katharina Albrich [2], Anna Repo [2]

[1] *Norwegian University of Life Sciences, Faculty of Environmental Sciences and Natural Resource Management*
[2] *Natural Resource Institute Finland (LUKE)*

Traditional forest management planning tools utilize deterministic, empirically based models to forecast the development of the forest across a wide range of management alternatives. These models provide guidance on how to best manage the forest stand, often focused on economic objectives. However, this approach can fail to accurately mimic real forest ecosystem landscapes, due to the interaction between forest stands and external forces on the landscape. However, it is well-suited for mathematical optimization, as decisions are related to the forest stand. Innovative ecological approaches to model forest landscapes have been developed to assess predefined management strategies. These models are process based, operating at the tree level, and spatially explicitly integrating neighborhood impacts to the landscape-scale dynamics. To appropriately reflect the forested landscape, these models integrate a variety of disturbances (biotic and abiotic), utilizing a stochastic approach to estimate the ecological impacts on the landscape. These stochastic elements increase the complexity of the decision system. To address this, we propose a stochastic programming approach to incorporate such simulations of a case study area in Finland in an optimization framework. We identify the key challenges and highlight adaptions required to enable the use of spatially explicit process-based models for optimization scenario analyses.

Thu.2.D: Game Theory and Dynamics

Session Chair: Topi Miettinen

Game Theory, Data Analytics, and Homeland Security

Submission ID-064

Jun Zhuang

University at Buffalo

Society is faced with a growing amount of property damage and casualties from man-made and natural disasters. Developing societal resilience to those disasters is critical but challenging. In particular, societal resilience is jointly determined by multiple stakeholders such as

federal and local governments, private and non-profit sectors, private citizens, and adversaries. The tradeoffs between protecting against man-made and natural disasters, between preparedness and relief, between efficiency and equity, and between private and public investment, will be studied using a game-theoretical framework. Recent research on social media misinformation management, fire management, and supply chain resilience, and homeland security, will also be discussed.

Designing Payment Models for the Poor

Submission ID-122

Sasa Zorc [1], Bhavani Shanker Uppari [2]

[1] *University of Virginia, Darden School of Business*
[2] *Singapore Management University*

Several basic services, such as energy, clean water, and cooking gas, are out of reach for millions of people living in poverty. There has been an emergence of firms that offer these services by, for example, selling solar home systems. These firms deploy a pay-as-you-go (PAYGo) model in which consumers can manage the amount and frequency of their payments based on their own erratic cash flows. However, because a firm under this model cannot observe how much money the consumers have, they can pay less to the firm and turn their income to other needs.

We employ a dynamic mechanism design approach, which allows us to reduce the problem of finding the best possible contract with the consumers to a dynamic program.

The optimal contract summarizes a consumer's payment history with a single score (the v-score). The contract allows the consumer to chose any amount to pay, and adjusts the v-score dynamically. The v-score also determines the level of technology access granted to the consumer and whether the contract is terminated or continued. We discuss how the optimal contract can be implemented in the field and how it can solve some of the practical problems currently.

Coordination of Heterogeneous Resources in Inspection Games

Submission ID-134

Bobak McCann , Mathieu Dahan

Georgia Institute of Technology

We consider an inspection game, in which a security agency positions heterogeneous detectors according to a probability distribution in order to detect multiple illegal commodities hidden by a strategic adversary within a critical system. We assume the defender has access to multiple types of detectors that can potentially differ in their accuracy and cost, and that the adversary has multiple types of illegal commodities that can potentially differ in their value. The objective of the security agency (resp. adversary) is to maximize (resp. minimize) the expected value of detected commodities. We provide a polynomial algorithm to compute Nash Equilibria for this inspection game. We then leverage our equilibrium analysis to determine the optimal detector investment for the security agency given the partial information regarding the adversary's illegal commodities.

Commitment and conflict in multilateral bargaining

Submission ID-088

Topi Miettinen [1], Christoph Vanberg [2]

[1] *Hanken School of Economics*
[2] *University of Heidelberg*

We theoretically investigate the eects of strategic pre-commitment in multilateral dynamic bargaining. Each round features a commitment stage in which players can declare that they will reject any proposal giving them less than a self-imposed threshold. Such declarations bind in the ensuing voting stage with an exogenously given probability. We characterize the set of Markov perfect equilibria under all q-majority rules. Under unanimity rule, an ine-cient equilibrium always exists, and e-cient equilibria exist only if the probability that commitments bind is su-ciently large and the number of players is su-ciently small. Under any (super)majority rule, every equilibrium is effi-cient.

Thu.2.E: PhD Incubator I

Session Chair: Sasa Zorc

Can Reinforcement Learning Be Used for the Valuation of American Option?

Submission ID-022

Peyman Kor , Reidar Brumer Bratvold , Aojie Hong

Energy Resources Department, University of Stavanger, Stavanger, Norway

Discussant: Spyros Zoumpoulis

American Option Valuation is essentially a sequential decision-making problem with two binary actions (Stop or Continue) at each decision point in time and thereby can be transformed into an optimal stopping time problem. Various methods can be utilized to solve for the (near-)optimal policy and, hence, the fair value of the American Put Option.

This research aims to investigate, compare, and discuss the performances of the approximate dynamic programming method – Least-Squares Monte Carlo (LSM) – and Reinforcement Learning (RL) based methods for identifying the optimal policy for pricing American

options. In addition, two price models – the classical Geometric Brownian Motion and a calibrated Stochastic Volatility model (GARCH) are implemented to represent the underlying uncertain assets.

The novelty of this work lies in two aspects: (1) applying LSM and RL to determine option prices with a specific focus on analyzing the dynamics of decisions and identifying any differences in the proposed policies resulting from the two methods, and (2) studying and shedding light on how “learning” in RL contributes to updating/optimizing decisions at each batch, revealing the evolution of the decisions, during the learning process, leading to the optimal policies.

Predicting Tail Quantiles Through Aggregation of Medians: Model and Analysis

Submission ID-056

Long Zhao [1], Zhi Chen [1], Junnan Wang [2]

[1] *NUS Business School, National University of Singapore*
[2] *INSEAD*

Discussant: Blitz

Quantile forecasts are essential inputs for decision-making under uncertainty. The most useful quantiles are from the tails since tails provide rich information about the underlying uncertainty. However, directly predicting tail quantiles is challenging for human experts and even for quantitative models. On the other hand, non-tail quantiles such as medians are easier to predict directly but are less useful in uncertainty assessment. Motivated by this mismatch, we study how a decision maker can predict tail quantiles through aggregation of non-tail quantile forecasts (such as medians). Intuitively, we want to shift the median forecasts by the true difference between median and tail quantiles. However, this task is challenging because the underlying randomness is unknown, and the median forecasts are subject to biases and noises. Our method involves aggregation of median forecasts to achieve a substantial reduction of noises, and leveraging past data to correct the biases and to estimate the shift. We evaluate our proposed method using the M5 uncertainty competition submissions and find that our method outperforms established benchmarks in the literature. We also offer a theoretical understanding of why our method performs well empirically.

Identifying Experts with Small Contributions in Forecast Aggregation

Submission ID-057

Xinyu Hou [1], Zhi Chen [2], Long Zhao [2]

[1] *National University of Singapore, Institute of Operations Research and Analytics*
[2] *National University of Singapore, NUS Business School*

Discussant: Ilia Tsetlin

Forecast aggregation, particularly through the linear opinion pool method, is widely adopted in practice, showcasing superior accuracy over individual forecasts—the wisdom of crowds phenomenon. In many business contexts (i.e., demand forecasts), experts providing forecasts are internal employees of a firm, involving even senior executives. For a resource-constrained firm, how can it identify experts whose contributions to the consensus forecast accuracy are minimal? This not only leads to cost savings but also improves the operational efficiency of resource-constrained firms.

We begin by examining the scenario where one expert's contribution to the consensus forecast accuracy is zero. We prove that this occurs if and only if the forecast error of this expert can be expressed as an affine combination of other experts' forecast errors, along with an independent noise. This affine combination can be conceptualized as a hypothetical expert who dominates the focal expert. In a broader context, we demonstrate that the expert who contributes the least may not necessarily have the lowest optimal weight in the linear opinion pool. Instead, the minimal contributing expert performs the worst in the part that cannot be replicated by combination of others. Empirically, we validate our insights in a case study.

Regularized Aggregation of Point Predictions From Experts With Different Amounts of Past Performance Data

Submission ID-067

Junnan Wang , Ville Satopaa

INSEAD

Discussant: Yael Grushka-Cockayne

Aggregating multiple experts’ point forecasts is a critical challenge, especially in the common context where experts have made different numbers of predictions in the past. For instance, suppose one expert has made only two predictions in the past but with 100% accuracy, while another has made 100 predictions but with lower accuracy. One is more accurate but riskier than the other. In this work, we introduce a new aggregator that makes such considerations precise and balances risk with statistical evidence of skill. Specifically, our aggregator uses Bayesian regularization, estimates each expert’s expected level of bias and noise, takes into account their individual-specific prediction histories, and appropriately shrinks each expert's weight toward equal weight, depending on the expert’s skill and how reliably that skill can be estimated. In our empirical study, we apply our aggregator to the data from the European Central Bank's Survey of Professional Forecasters and observe that it outperforms traditional aggregation methods, including the simple average and the performance-based weighted average methods.

Thu.3.B: Judgment and Dec. Making I

Session Chair: Konstantinos Katsikopoulos

Role of gender on start-up investors' perception of uncertainty and risk

Submission ID-046

Onesun Yoo [1], Chia-Jung Tsay [2]

[1] *UCL School of Management, University College London*
[2] *Wisconsin School of Business, University of Wisconsin-Madison*

There has been a surge of interest in the role of gender in entrepreneurship, including work that documents how female-led ventures are perceived by investment communities. Such findings suggest that female-led ventures tend to be considered riskier and thus are discounted relative to male-led ventures. However, there is a relative lack of studies considering behavior of female investors and their impact on investment teams.

Given existing literature from management to psychology suggesting that women may be more risk averse than men, female-led investment teams may be less willing to invest in female-led startups, due to their perception such companies pose more risk, compared to those led by men. Yet, other factors (e.g., homophily, familiarity) suggest that female-led teams could be more willing to do so.

We examine a novel, comprehensive dataset covering investment transactions of SaaS start-ups in the UK between 2015 to 2023. Using the gender information of both the startup's founding team and the lead investors, our analyses disentangle the contradicting hypotheses and present insights regarding the role of gender in the start-up ecosystem. We complement these analyses with a series of experiments to the causal relationship between the gender of evaluators and perceptions of uncertainty and risk.

Learning to Suppress: Decision Makers Can Learn to Treat Irrelevant Information as Suppressor Variables Using the MCPL Paradigm

Submission ID-012

Hagai Rabinovitch [1, 2], David V. Budescu [3], Yoella Bereby-Meyer [2]

[1] *University of Amsterdam*
[2] *Ben-Gurion University*
[3] *Fordham University*

When selecting candidates for a position, the selection process may be affected by irrelevant factors, unrelated to job performance, such as age, appearance, etc. This can give unjustified advantage to candidates who are high on these factors. To correct this bias, the decision-maker (DM) needs to recognize these factors and weigh them negatively, namely, treating them as suppressor variables. Rabinovitch, Bereby-Meyer, and Budescu (2020) showed that people struggle to do so intuitively.
In four experiments (N = 471), we examined whether DMs can learn to do so using the Multiple-Cue Learning paradigm. In 100 trials, we showed DMs interview scores and information on a potential suppressor (e.g., candidates' height) and asked them to predict future success. Individual multiple regression equations (separately for each DM) showed they learned to consider the irrelevant attribute as a suppressor (assigned it a negative coefficient), albeit to a lesser extent than the normative model. This effect was found when we provided (Exp. 1-2) or didn't provide (Exp. 3) information about the correlations between the variables but almost disappeared when we presented two irrelevant attributes simultaneously (Exp. 4). The results demonstrate that DMs can learn to consider irrelevant information as suppressors and illustrate their adaptive ability.

Preferences for Wealth Distributions in the Presence of Group Structure

Submission ID-093

Stefano Balietti [1], Rupert Freeman [2]

[1] *University of Mannheim*
[2] *University of Virginia Darden School of Business*

We examine individual preferences for wealth inequality in a population that is endowed with group structure. We conduct an online experiment in which we assume that each individual in the population is associated with a single group identity. Using a custom Distribution Builder tool, participants are asked to build their preferred distribution of wealth for various group structures, including the case of separated and well-mixed groups. In the former case, all members of one group are disadvantaged relative to the other, and in the latter, the distribution of wealth is roughly equal across each group. Preliminary results based on n=243 participants indicate that preferences for inequality differ significantly when group structures are present relative to a baseline case with no group fairness considerations. Our work is relevant to any setting where group fairness considerations are relevant (e.g., hiring, civic participation, public policy, college admissions), and stands in contrast to existing literature on preferences for inequality that does not simultaneously consider inequality at both the individual and group levels.

A simple model for mixing intuition and analysis

Submission ID-043

Konstantinos Katsikopoulos [1], Luis Fuentes Garcia [2], Martin Egozcue [3]

[1] *University of Southampton*
[2] *University of Coruña*
[3] *University of Montevideo*

Firefighters, emergency paramedics, and airplane pilots can make correct judgments and decisions in challenging situations. Experts often attribute such successes to intuition and report that they avoid analysis. Decision analysis should ideally respect human intuition while supporting and improving it with analytical modelling. We utilize psychological theories of intuition to build a model of mixing intuition and analysis over a set of interrelated tasks. In this model, people may use any analytical method such as multi-attribute utility, or a single-cue heuristic such as availability or recognition. We make two contributions. First, we study the model and derive a necessary and sufficient condition for the optimality of using a positive proportion of intuition (i.e., using intuition for some tasks): Intuition is more frequently accurate than analysis to a larger extent than analysis is more frequently accurate than guessing. Second, we apply the model to synthetic data and natural data from a forecasting competition for a Wimbledon tennis tournament and a King's Fund study on how patients choose a London

hospital: The optimal proportion of intuition is estimated to range from 25% to 53%, and the accuracy benefit of using the optimal mix over analysis alone is estimated between 3% and 27%.

Thu.3.E: PhD Incubator II

Session Chair: Sasa Zorc

Optimizing Investment Period Length and Strategies for Later Stage Venture Capital Staged Financing Portfolio

Submission ID-082

Guanrou Deng , Maurizio Fiaschetti

Institute of Finance and Technology, University College London, London, WC1E 6BT, UK

Discussant: Juuso Liesiö

This paper proposes the Sequential Investment Allocation Model (SIAM) to address the gap in existing literature regarding the modelling of the Venture Capital (VC) later-stage financing investment period. SIAM aims to minimize investment period length while considering constraints on fund payoff and investment strategies. It incorporates distribution and stochastic process models to explain parameters such as investment timing, amount, and company performance. Validation is conducted using Pitchbook data covering a broad range of VC later stage (after rounds C) rounds of financing deals. Analyzing investment period length under different strategies reveals an "S"-shaped relationship between payoff and period, emphasizing timely termination for higher payoffs. The optimal investment period aligns with market averages, approximately 4-6 years, supported by Pitchbook data. Exit conditions based on exit multiples for each portfolio company lead to more stable payoffs than predefined exit times. Investing in higher-performing companies yields enhanced payoffs for portfolio managers. However, excessive selectivity results in limited exits, thereby impeding both the desired payoff and investment period length. These insights contribute to understanding VC fund portfolio dynamics, offering guidance for informed decision-making on optimal investment strategies in the private sector.

Optimal Experimentation for Learning Personalized Policies Across Locations

Submission ID-087

Georgina Hall , Stefanos Poulidis , Spyros Zoumpoulis

INSEAD

Discussant: Blitz

Firms wish to learn personalized policies for customers in heterogeneous yet related locations to maximize their monetary gains. To do this, they conduct experiments at each location to estimate the parameters of a customer response function. A crucial decision is which action to assign to each participant in the experiment, especially when a participant can only be assigned one action or there are budget constraints. The existing experimentation methodology considers locations and experiments individually. In this work, we leverage the relationship between locations in the experimentation problem to learn more profitable policies by proposing novel estimators and a semidefinite programming approach.

Neutral Pivoting: Strong Bias Correction for Shared Information

Submission ID-091

Joseph Rilling

Temple University

Discussant: Asa Palley

In the absence of historical data for use as forecasting inputs, decision makers often ask a panel of judges to predict the outcome of interest, leveraging the wisdom of the crowd (Surowiecki, 2005). Even if the crowd is large and skilled, shared information can bias the simple mean of judges' estimates. Addressing the issue of bias, Palley and Soll (2019) introduces a novel approach called pivoting. Pivoting can take several forms, most notably the powerful and reliable minimal pivot. We build on the intuition of the minimal pivot and propose a more aggressive bias correction known as the neutral pivot. The neutral pivot achieves the largest bias correction of its class that both avoids the need to directly estimate crowd composition or skill and maintains a smaller expected squared error than the simple mean for all considered settings. Empirical assessments on real datasets confirm the effectiveness of the neutral pivot when compared to alternative methods.

A decision analysis model for colorectal cancer screening

Submission ID-103

Daniel Corrales , David Ríos Insua

Institute of Mathematical Sciences, ICMAT-CSIC

Discussant: Jun Zhuang

Colorectal cancer (CRC) is the third most common type of cancer worldwide, making up for about 10% of all cases and being accountable for around 12% of all deaths due to cancer. Despite this, as an example, only about 14% of susceptible European Union citizens participate in screening programmes. Hence, there is an urgent need for accurate, non-invasive, cost-effective screening tests based on novel technologies and raise further awareness on the disease and its detection. Moreover, personalized screening approaches are required to consider socioeconomic variables as well as environmental stressors that can lead to different onsets of the disease.

This presentation outlines one such approach within the ONCOSCREEN Horizon Europe project. First, we develop a Bayesian network

model to facilitate CRC predictions drawing on expert judgement and a large database from an observational study. This network is used to map CRC risks depending on numerous factors. We then embed such network in an influence diagram model aimed at advising about personalised screening strategies depending on patient information and cost-effectiveness of the methods. We also discuss incentives in relation to promoting the uptake of screening in the population.

Thu.4.B: Applications in Business

Session Chair: Sanjith Gopalakrishnan

Machine Learning Methods Are Not Always Better: Predicting Bankruptcy In US Public Companies

Submission ID-135

Isabella Sanders

United States Military Academy at West Point

Several bankruptcy models exist in literature. However, few have been tested outside of the context of the paper in which they are introduced. In this paper, we test five existing bankruptcy models including three of the most cited bankruptcy models (Altman, Ohlson and Godfrey) with three new data sets. In addition, we create three new models using the three most accepted methods, logistic regression, linear discriminant anlaysis and machine learning. We test these models as well. Based on our analysis we find that an updated model using linear discriminant analysis outperforms all historical models along with models using more "modern" approaches like machine learning. Particularly, we test the models using three data sets, a matched sample of United States Department of Defense suppliers, a non-matched sample of United States Deparment of Defense suppliers and a large sample of publically held companies of US origin. This work demonstrates the importance of "traditional" methods in bankruptcy predition. Sometimes the simple model is the best model.

On designing patient-centric distribution channels in pharmaceutical supply chains with multi-attribute value analysis and network optimization

Submission ID-125

Milena Janjevic [1], Gilberto Montibeller [2, 3], Jarrod Goentzel [1]

[1] *MIT Center for Transportation and Logistics, Massachusetts Institute of Technology, USA.*
[2] *Loughborough Business School, Loughborough University, UK.*
[3] *Center for Risk and Economic Analysis of Threats and Emergencies (CREATE), University of Southern California, USA.*

Abstract: Recent developments in pharmaceutical technologies have opened up new avenues for personalized medicine. Two important developments were brought about by this technological innovation. First, pharmaceutical companies are experiencing a change of scope in their supply chains, with a requirement to move from a distributor model toward a direct-to-consumer model. Second, patient-centric distribution services may create sources of competitive advantage by further increasing customer satisfaction and by promoting high-quality healthcare. In this paper, we argue that the designing of patient-centric distribution channels requires a novel perspective. Specifically, the designing process must take into account patients' preferences, consider the competing objectives of relevant stakeholders, engage these stakeholders in the co-design of such systems, and facilitate learning and a shared understanding that promotes agreement on a suitable supply chain solution. We suggest an emerging framework that can guide the design of patient-centric distribution channels in pharma supply chains and discuss possible choices that supply chain designers may contemplate. We tested the use of this designing framework in two in-depth interventions, in which interactive decision support systems were developed to support stakeholders in co-designing patient-centric distribution channels in supply chains for a large pharmaceutical manufacturer. We describe the main outcomes of these interventions.

Modeling Misinformation Spread for Policy Evaluation: A Parsimonious Framework

Submission ID-029

Yiting Deng [1], Richard Staelin [2]

[1] *UCL School of Management, University College London*
[2] *Fuqua School of Business, Duke University*

We develop a parsimonious framework for evaluating the efficacy of different approaches for limiting the spread of misinformation. We use this framework and simulation studies to determine the evolution of truthful and fake messages on social media platforms and then investigate the following policy interventions: 1) our suggested approach of having the platform require senders of messages to also state their perceived (possibly incorrect) veracity of the message; 2) provide some accuracy nudge to increase the number of potential readers who can identify fake messages; 3) have the platform flag fake messages; and 4) have the platform demote or down-rank fake messages. We find when a significant number of senders are able to correctly identify the veracity of the message, the market can self-regulate under our suggested approach. If this is not the case, we find the other approaches are effective in reducing the spread of misinformation.

Optimal Pricing Across Markets with Deal Seekers

Submission ID-042

Sanjith Gopalakrishnan , Rim Hariss

McGill University, Desautels Faculty of Management

Deal seeking is a prevalent consumer behavior entailing a deliberate effort by customers to hunt for cost-saving opportunities across markets. Global tourism, for example, presents ample deal-seeking opportunities, particularly in the luxury retail market, and accounts for a significant portion of revenue for brands. While deal-seeking behavior can be explained as a rational utility-maximizing response, it is observed in practice that it is also influenced by cognitive biases, especially an anchoring effect where consumers fixate on the anchor price

in their home market, and perceive a greater value in discounts. This can lead to irrational purchasing decisions based on perceived value. It is therefore useful to distinguish two types of deal-seekers: optimal deal seekers whose decisions are explainable via rational utility maximization and anchored deal seekers who derive value due to the extent of discounts on the price in their home market. The presence of cross-market deal-seeking customers necessitates a pricing strategy that explicitly accounts for such behaviour. That is, from the brands' perspectives, deal seekers introduce opportunities for cross-market price optimization. This work contributes to an emerging stream of literature that argues for a careful consideration of the implications of behavioral biases on firm pricing strategies.

Thu.4.D: Computational Approaches

Session Chair: Topias Terho

A CEO-BASED BEHAVIORAL FRAMEWORK PREDICTING ESG RISK: A MACHINE LEARNING APPROACH.

Submission ID-083

Martial Ndtoungou Pfouga

Manchester Metropolitan University

The ESG rating of firms is increasingly taken into consideration when making decisions such as purchasing stock or offering green bonds. As such, stakeholders of a firm have a common interest in avoiding a downgrade of their focal firm's ESG ratings to maintain its attractiveness. This study uses a machine learning approach to develop a decision tree, which provides rules describing how CEOs' personality traits interacts to predict a downgrade in the future ESG rating of their firms. Based on CEOs' rhetoric during earnings calls, the author computed numerical measures of CEOs' personality traits that were subsequently used as features in the decision tree model. Furthermore, the author used the change in the ESG rating of firms between the current and the following year as the outcome of the decision tree model.
The result of the study reveals one primary decision path from the decision tree, which is that if CEOs display a low level of moral awareness through their rhetoric with investors during earnings calls in the current year, then if they also show an inclination for pursuing pleasures and gains (promotion focus), then the ESG rating of their firm is likely to be downgraded in the following year.

Data-driven Sequential Search

Submission ID-138

David Brown , Cagin Uru

Duke University, Fuqua School of Business

In this paper, we study a sequential search problem with an unknown distribution of alternative values. The goal is to find a stopping rule that maximizes the worst-case ratio of reward compared with an oracle with full knowledge of the value distribution. We consider simple policies that select the highest valued alternative if and only if its value is below a threshold. In each period, the decision maker elevates the threshold, provided that the search continues. We show that by randomizing over these threshold rules, we can design policies that perform well. Furthermore, we develop an upper bound on the performance of feasible policies. Our approach is based on formulating and solving a linear program to optimize the first period decision to select the first explored alternative while approximating the continuation value with the oracle performance. The resulting upper bound suggests that our randomized threshold policies perform close to the optimal.

Decision Trees: Fitting Continuous Features without Preprocessing

Submission ID-143

Flávio Araújo Lim-Apo [1], Leonardo Bastos [1, 2], Fabricio Oliveira [3], Silvio Hamacher [1, 2]

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In data mining, decision trees are an off-the-shelf procedure that creates interpretable splits for classification or prediction problems. They may quickly construct and produce models with numerical and categorical variables. On the other hand, a dataset with continuous variables requires an exhausting search to achieve the best split, resulting in a time-consuming activity. Discretization or bucketization reduces the number of values used as splits and sacrifices optimality accuracy since it excludes a portion of the values that could be used as a split. This study provides a new heuristic for training the decision tree. The proposed method focuses on predicting continuous features without pre-processing, such as discretization, and minimizing misclassification to improve accuracy. We tested on 53 UCI Machine Learning Repository datasets. The heuristic demonstrated superior performance compared to CART by 1.4% in-sample data and 2.8% out-of-sample data. Therefore, the model performs better than CART with a slight increase in model training time, which may be a trade-off for a better solution, and its training time for shallow depth trees is similar to CART.

Risk-averse decision strategies for influence diagrams using rooted junction trees

Submission ID-075

Olli Herrala , Topias Terho , Fabricio Oliveira

Aalto University

Influence diagrams intuitively represent decision problems under uncertainty and with interdependencies between random events, decisions, and consequences. Recently two frameworks have emerged that formulate the influence diagram as mixed-integer-(non)linear-programs (MI(N)LP). Decision programming (Salo et al., EJOR 299/2, 2022) offers enormous modeling flexibility by exposing the full utility distribution of the consequences and thus allowing CVaR and other risk metrics to be used in the model. The drawback of decision programming is that the complexity of the resulting MILP grows exponentially with the size of the influence diagram. Alternative MINLP formulation for influence diagram (Parmentier et al., Informs Journal on Optimization, 2/3, 2020) based on an intermediate step of transforming the diagram into a

rooted junction tree offers superior computational performance. However, the flexibility of the MINLP formulation is limited since risk cannot be straightforwardly represented in the model. We present a formulation combining the modeling flexibility of decision programming and the superior computational performance of the rooted junction tree approach. We illustrate the effectiveness and flexibility of the formulation with numerical examples.

Thu.4.E: PhD Incubator III

Session Chair: Sasa Zorc

Trusting the Algorithm: A Decision Under Ambiguity

Submission ID-031

Qiong Xia , Ahmed Guecioueur , Enrico Diecidue

INSEAD

Discussant: Aurelien Baillon

We show that ambiguity attitudes influence decision-makers' (DMs) choices to trust the forecasts of both human and machine learning (ML) financial analysts. Using a lab experiment to measure DMs' ambiguity attitudes and beliefs, we show that DMs exhibit similar patterns of ambiguity-seeking and ambiguity-generated insensitivity (a-insensitivity) toward changes in the likelihood of prediction accuracy, regardless of the analyst type. DMs hold more optimistic beliefs in the accuracy of ML analysts over human analysts, which significantly predicts higher trust in ML analysts. DMs with greater a-insensitivity regarding the prediction accuracy of either type of analyst are less likely to incorporate their own beliefs into their trust decisions. A-insensitivity tends to increase with greater financial literacy, suggesting that more financially literate DMs perceive greater ambiguity in prediction accuracy rates.

Computing Stochastically Non-Dominated Solutions for Risk-Informed Maintenance Decisions in the Management of Transport Infrastructure Assets

Submission ID-120

Leevi Olander , Ahti Salo

Aalto University

Discussant: Blitz

Stochastic dominance helps screen decision alternatives when the decision maker's risk preferences are not completely known. In this talk, we employ stochastic dominance to guide risk-informed maintenance decisions in transport infrastructure asset management. More generally, we present an exact algorithm to identify all first-order stochastically non-dominated solutions in discrete multi-criteria decision problems. Our algorithm exploits the properties of the cumulative probability distribution to reduce the size of the solution search space and to improve the performance of the algorithm. We illustrate the algorithm by solving representative optimization models for the yearly maintenance decisions of railway switches at the Finnish Transport Infrastructure Agency.

Confirmation trees – creating hybrid intelligence when humans and algorithms disagree

Submission ID-123

Julian Berger [1, 2], Frederik Andersen [4], Diana Verdes [4], Kristian P. Lorenzen [3], Pantelis P. Analytis [4], Ralf H.J.M. Kurvers [1, 5]

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[5] *Science of Intelligence, Research Cluster of Excellence*

Discussant: Ville Satopaa

We study hybrid confirmation trees, a simple heuristic for creating hybrid intelligence, in high-stakes decisions within criminal justice, deepfake identification and cancer detection. Hybrid confirmation trees work by leveraging independent decisions of humans and algorithms. Whenever a human and an algorithm agree on an option, said option is chosen as the final answer. In case of disagreement, a second human breaks the tie. Our approach proves to be a powerful alternative to human-only decision making strategies as it performs similar, if not better, at reduced costs. Compared to humans on their own, hybrid confirmation trees also allow to more flexible trade-off true and false positives. We find that hybrid confirmation trees benefit from uncorrelated errors between the humans and the algorithms, which allows to further boost performance by pairing algorithms and high-performing humans. We posit hybrid confirmation trees as a complement to the well studied algorithm-as-advisor setting and discuss future improvements as well as critical considerations to bring hybrid systems into the real world.

Advice Taking under Time Pressure

Submission ID-026

Erik Kommol , Christopher Lettl

Vienna University of Economics and Business

Discussant: Jack Soll

Many decisions are not made alone, but decision-makers seek advice from others. In increasingly hypercompetitive markets, management teams are often under pressure to make strategic decisions fast. Therefore, decision-making and advice taking often takes place in environments that are associated with time pressure. We study the influence of time manipulations on advice taking in two pre-registered experiments (n = 593). In experiment one, we employ a judge-advisor system, where advice is presented unsolicited and not associated with costs, to study the effect of time pressure on advice utilization. Results indicate that confidence mediates the influence of time manipulations on advice utilization leading to a positive indirect effect. To provide a more nuanced understanding of the effect of time pressure on advice taking, we then investigate how time pressure influences advice seeking in environments where advice is optional and associated with costs. Results indicate that confidence moderates the effect of time pressure on advice seeking: less confident individuals spent proportionally more time seeking advice compared to highly confident individuals when under time pressure. Our study emphasizes the importance of considering the environments individuals are embedded in when taking advice while distinguishing between different advice taking scenarios prevalent in the organizational context.

Thu.3.X: Poster Session

Support a Capital-Constrained Supplier with Purchase Order Financing and Refundable/Non-refundable Cash in Advances

Submission ID-007

Andy Wu

Department of Marketing, National Chung Hsing University

This study considers a supply chain in which a credit-worthy buyer purchases goods from a capital-constrained supplier to satisfy her deterministic demand. The buyer implements *cash in advance* (CIA) and *purchase order financing* (POF) simultaneously to fund the supplier's operation. This research contributes toward proposing guidelines for coordinating the two main pre-shipment financing plans with purchasing decisions, which will facilitate the buyer on supplier development. We reveal that whether or not a CIA agreement includes so-called refundability strongly affects buyer preferences for CIA and POF.
Specifically, we summarize our findings as follows: (1) Pure CIA financing strategy is optimal when CIA is refundable, which implies refundable CIA dominates POF. (2) When CIA is non-refundable, POF is preferred over CIA because POF allows a buyer to share the financing risk with a bank, whereas non-refundable CIA involves high risk. (3) When CIA is non-refundable, we recommend the buyer implementing mixed financing strategy, with POF and CIA as primary and backup financing options, respectively.

Instantaneous and limiting behavior of an n-node blockchain with random resetting times under cyber attacks

Submission ID-008

Liang Hong , Xiufeng Xu

Department of Mathematical Sciences University of Texas at Dallas

We investigate the instantaneous and limiting behavior of an n-node blockchain which is under continuous monitoring of the IT department of a company but faces non-stop cyber attacks from a single hacker. The blockchain is functional as far as no data stored on it has been changed, deleted, or locked. Once the IT department detects the attack from the hacker, it will re-set the blockchain using a random amount of time, rendering all previous efforts of the hacker in vain. The hacker will not stop until the blockchain is dysfunctional. When the hacking times, resetting times, and detecting times all follow arbitrary distributions, we derive the limiting functional probability, instantaneous functional probability, and mean functional time of the blockchain. We also show that all these quantities are increasing functions of the number of nodes, substantiating the intuition that the more nodes a blockchain has, the harder it is for a hacker to succeed in a cyber attack.

Utilizing Deep Learning Models for Analyzing Consumer Store Preferences

Submission ID-037

Bing-Lun Su [1], Hung-Jui Wang [2], Ruby Lin [2], Ling-Jing Kao [1], Chih-Chou Chiu [1]

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[2] *Digital Transformation Research Institute, Institute for Information Industry*

Unlike mobile GPS and single-channel sales records, Taiwan's electronic invoices offer unique value by providing extensive cross-channel information, geographic details, and specific shopping item data. This study aims to leverage geographical information to understand consumer channel choice behavior, analyze channel competition, and assess whether integrating feature selection and geographic data can improve the predictive accuracy of deep learning models—specifically, recurrent neural networks (RNN), long short-term memory networks (LSTM), and gated recurrent units (GRU). The empirical findings demonstrate that incorporating geographic information into LSTM can enhance prediction accuracy. This research promises nuanced insights into cross-channel consumer behavior, facilitating data-driven decisions in marketing technology (MarTech) for enterprises and fostering the creation of more personalized consumer experiences.

OPTIMIZING HEALTHCARE BUSINESS PROCESSES WITH PROCESS MINING SOFTWARE: A COMPARATIVE AHP-GRA-TOPSIS ANALYSIS

Submission ID-054

Michael Maiko Matonya [1], László Pusztai [2], István Budai [2]

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This study addresses the challenge of selecting process-mining software for healthcare business processes, employing the Analytic Hierarchy Process (AHP) and Grey Relational Analysis with Technique for Order of Preference by Similarity to the Ideal Solution (GRA-TOPSIS) for decision-making enhancement. Criteria like functionality, user-friendliness, technical support, cost, scalability, and security are evaluated, emphasizing the reduction of cycle time, waiting time, and operational costs for patients and hospitals.

In the AHP analysis, Disco is prioritized at 12.9%, followed by ProM and Celonis at 11.6% each, indicating Disco as the top choice. GRA-TOPSIS ranks ProM and Celonis as the closest alternatives to the ideal solution, with ProM leading. Combining AHP and GRA-TOPSIS yields consolidated scores, ranking ProM as the top choice (8.03), followed by Celonis (5.51) and Aprome (5.45). Sensitivity analysis highlights the disco/celonis ratio as the most critical variable (72.5%).

Integrating AHP and GRA-TOPSIS offers a robust healthcare software selection framework, with ProM, Celonis, and Aprome prioritized by AHP, and ProM leading according to GRA-TOPSIS. Combining both methods refines rankings for informed decisions. Future research should explore real-world applicability and dynamic adaptation in evolving healthcare contexts.

Comparative approaches for economic modeling in healthcare markets , relevance of random price generators

Submission ID-061

Christine Huttin

Aix Marseille university and Endepusresearch

OBJECTIVES: this communication discusses how and in which context a random price generator for health care markets can be useful in comparison with other approaches for economic modeling of medical markets.
METHODS: a comparison of different approaches is presented with their statistical limitations: nested logit models, cumulative logit models, latent model of choices , shrinkable estimators with Hierarchical Bayesian approach, multinomial logit choice models with random price generators; an application of the BLP model on genomic medicine is also presented.
RESULTS: random generators are useful but do not fit any kind of structural conditions to adjust supply and demand of health care markets, especially in more regulated health and economic systems. An approach by sets of alternatives for choice models allows to adjust for heterogeneity of demand but lack of price data in some markets makes it useful to rely on shrinkable estimators with HB approaches. In duopoly cases, the BLP model may help investigation of antitrust policies.
CONCLUSIONS: complexity of health care markets lead to consider various combinations of models and even participatory modeling to reach growing consensus between decision makers on the payer side and economic actors, with more use of data driven models for drug and vaccines.

Context-based Complex System Risk Identification and Inspection Decision Auto-generation

Submission ID-062

Nan Li , Chen Wang

Tsinghua University

Complex machinery in production and service systems is valuable and has a long-life cycle. The strict risk requirements and complex maintenance procedures impose high costs due to labor, material, and idle time. Most of them are equipped with intensive sensors for condition-based maintenance (CBM). Most CBM strategies are based on thresholds that neglect the dynamic context. Deep learning methods achieve high prediction accuracy while the application is not credible because of the black-box property.
We propose a flexible data-driven CBM framework that can infer the hidden machine conditions under dynamic contexts and provide sensor baselines. This framework integrates sensor data and domain knowledge, such as the principles of machine mechanisms, into the Conditional Variational Autoencoder (CVAE). CVAE can learn a probabilistic latent space indicating the machine's health. To enhance the usability of learning results, we propose the concept of fault influence to capture the interaction of physical structures. We improve the multi-type anomaly recognition capability by incorporating a Gaussian mixture model. We prove that the loss function can distinguish between different anomalies. Furthermore, it outputs the probability of each fault type and a joint probability about the health condition of multiple components which helps the maintenance decision making.

Selective Bayesian Expert Debiasing Model: Application with Portfolio Decisions guided by Regularized Expert Predictions

Submission ID-081

Risto Heikkinen [1], Juha Karvanen [2], Kaisa Miettinen [1]

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[2] *Department of Mathematics and Statistics, University of Jyvaskyla*

Expert predictions are one source of information for educated decision-making. Many models for the mathematical aggregation of expert predictions assume unbiased predictions, but in reality, human predictions tend to include biases, and experts' competence may vary. We propose a Bayesian aggregation model that consists of a regularization process to eliminate the influence of experts who have not yet shown competence. The model also includes a debiasing process for systematic biases and considers correlations between experts.

We applied the proposed model to a stock portfolio decision problem with real experts' return predictions in different industries. We assumed that the decision-maker allocates capital between the industry index and the most promising stock within the industry with the Kelly criterion. We repeated the process in 37 industries, including 177 companies in the S&P500 index. The decisions, guided by the proposed model, generated higher capital growth than a benchmark model that ignores differences between experts, which indicates the usefulness of regularizing incompetent experts. Compared to an index investor, the capital growth was only slightly higher, but the difference increased when applied only to industries estimated to have multiple competent experts.

Geo-agnostic, Open-sourced data pipeline to study spatiotemporal effects of climate variables on operational generation of renewable plants

Submission ID-090

Vijay Chiluveru , Renee Obringer

Energy and Mineral Engineering, Pennsylvania State University

Renewable energy systems have the best potential to reconcile our collective energy needs with worsening climate change. The key piece of understanding is that these systems are very much dependent on suitable ambient surroundings. Although much of the work has been by looking from either a supply-demand or a systems-modeling lens, there is a rising trend of using a climate data-driven decision making approach. The aim here is to build sound empirical models of renewable systems. For this, we need robust datasets that are large, multidimensional and standardized enough to give the trained models significant predictive power. We propose an open-source and geo-agnostic data access framework that is built using the USA's Energy Information Agency (EIA) power plant portfolio combined with North American Regional Reanalysis (NARR) climate variables. Currently, the dataset is pan USA with a size of 306,576 rows X 30 climate features and work is in progress to extend the same framework to include Germany too. This rich data is already used in developing tree-based regression models (R2 = 0.94) capturing non-linear influence of hyperlocal climate on renewable plant generation. The proposed pipeline is modular, scalable and transparent to encourage active collaboration.

Automated Design of Indoor Positioning Systems using Floor Plan Images

Submission ID-112

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Designing base station locations for indoor positioning systems (IPSs) based on customer floor plans is a time-consuming task reliant on human expertise. This paper addresses this issue by introducing a data analysis pipeline for the automated deployment of base stations on floor plans. The proposed methodology involves processing the initial customer floor plan image through a Convolutional Neural Network (CNN)-based algorithm, specifically *CubiCasa5k*. The algorithm's output is transformed into a binary image, and the number of required stations is estimated using techniques of rectangular area detection.

Preliminary results are presented and compared with manually crafted expert plans. The findings demonstrate promising accuracy suggesting that a notable reduction in both time and costs associated with IPS design could be achieved. Particularly, this is the case when dealing with complex floorplans with numerous small rooms such as healthcare facilities and nursing homes.

Harmonizing Bounded Rationality and AI: A New Paradigm for Organizational Decision-Making in Uncertain Times

Submission ID-128

Jonathan Roberts , Lily Popova Zhuhadar

Western Kentucky University

In the age of uncertainty, the intersection of human cognition and the rapidly advancing realm of Artificial Intelligence (AI) presents novel opportunities and challenges in organizational decision-making. As the principles of bounded rationality elucidate constraints related to cognition, time, and information during decision processes, contemporary developments in AI are paving the way to attenuate these very constraints.

Particularly, Automated Machine Learning (AutoML) heralds a transformative shift in healthcare, emphasizing its application in the diagnosis of chronic diseases such as diabetes. By adeptly combining human expertise with AI capabilities, AutoML's approach in predictive modeling not only underscores the significance of key variables but also prioritizes efficiency and sustainability. Such AI-augmented processes promise a reduction in decision-making times, and potentially transcend human cognitive limits, particularly in data-intensive fields.

However, the core question remains: **In this AI era, does bounded rationality become a historical relic or continue to play a pivotal role in behavioral approaches to organizational dynamics and human judgment?**

The overarching aim of this research is to architect a model that melds the precision of AI with the depth of human insight, ultimately enhancing both efficiency and sustainability in organizational decision-making processes.

Optimal Decision Strategies for Bioenergy: Circular Economy-Driven Supply Chain Design for Agricultural Waste

Submission ID-150

Maryam Roudneshin , Amanda Sosa

University College Dublin

In alignment with the United Nations' Sustainable Development Goals, particularly the objective to secure clean, affordable, and sustainable energy" for all, this study embarks on a crucial exploration of alternative energy solutions amidst the global push for energy diversification and climate change mitigation. The utilization of agricultural waste as a bioenergy source stands out as a strategic opportunity to enhance environmental sustainability and foster renewable energy production within the framework of a circular bioeconomy. The core of this initiative's success hinges on informed decision-making in designing supply chains that are robust, efficient, and sustainable. This research introduces an innovative decision-making framework aimed at optimizing the supply chain network for agricultural waste-to-bioenergy conversion, with a particular focus on the decision analysis for selecting biorefinery locations. Employing an integrated approach that combines Geographic Information System (GIS) with Multi-Criteria Decision Making (MCDM), the study delineates optimal sites for biorefineries. This decision-making process meticulously considers both economic and environmental factors to propose a model that aligns with the principles of sustainability. Through this approach, the study seeks to influence stakeholders and investors by demonstrating the feasibility and attractiveness of bioenergy projects.

Forecasting the success of International Joint Ventures

Submission ID-151

Konstantinos Nikolopoulos [1], Aws Hamo Younes [1, 2], Michel Phan [2]

[1] *Durham University*
[2] *emlyon*

A joint venture is a business partnership where two or more companies work together on a specific project, sharing resources and risks. Each company keeps its own identity while collaborating to achieve a common goal. Partner selection can be defined as the process of seeking, evaluating, and finally choosing the right partner to achieve the firm's strategic growth objectives in a specific host country. Country Governance is defined as the traditions and institutions by which authority in a country is exercised. There are six dimensions of governance are constructed based on this definition; Voice and Accountability (VA), Political Stability (PV), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL) and Control of Corruption (CC).
In an increasingly globalized world, firms aiming to stay competitive in international business must explore foreign markets and many multinational enterprises (MNEs) from developed countries use
Ventures (IJVs) with local partners rather than wholly-owned subsidiaries (WOSs) to enhance the success of their international endeavours and reduce the risk of failure. This study focuses on analysing how weak country governance influences the criteria MNEs use to select local partners and develops a forecasting model for Forecasting the success of International Joint Ventures.

R&D innovation and decision-making strategy to advance science and technology

Submission ID-152

Donghun Yoon

Kyonggi University

In this study, we analyze decision-making strategies to advance science and technology and discuss the direction of R&D innovation. We present a science and technology roadmap, the optimization of R&D portfolio, and securing the financial soundness of R&D as decision-making strategies. We discuss the contribution of three decision-making strategies to advance science and technology. It is very important to establish an optimal decision-making strategy for R&D innovation. R&D innovation play an important role in the economic growth, strengthening the global competitiveness, and the technology innovation. In this study, we present and discuss optimal decision-making strategies for R&D innovation and advance in science and technology.

Developing a Resilient Humanitarian Supply Chain Framework for Managing Pandemics, with an Emphasis on Supporting the Elderly Community

Submission ID-153

Behzad Mosalla Nezhad [1], Mostafa Hajiaghaei-Keshteli [1], Neale R. Smith [2], Fatemeh Gholian-Jouybari [1]

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As a detrimental phenomenon, the pandemic can significantly impact supply chains, particularly the supply of medical relief. Additionally, the recent pandemic severely affected the elderly population. To mitigate these disruptions, this study proposes a multi-objective mathematical model for a humanitarian supply chain network focusing on the elderly population. The model not only manages the direct flow of relief supplies and the reverse flow of waste but also aligns with sustainable development goals. To deal with the computational complexity of the model, metaheuristic optimizers are used to obtain effective solutions. A suite of well-tuned metaheuristic optimizers is used to ensure that the model can be applied to various circumstances and the performance of the optimizers is evaluated using several metrics.