Yi-Yun Chu

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Research Interest

My research focuses on the transformative role of AI-driven personalization and credentialing in digital platforms, exploring their impact on technology, policy, and society. By applying advanced econometric and machine learning techniques to large-scale, multimodal data, I aim to uncover how digitization influences user engagement, guides decision-making, and impacts equity. My work particularly delves into how AI and personalization technologies are reshaping educational delivery, credentialing, and content recommendations — providing insights for more inclusive and adaptive approaches to skill development and media consumption. I also examine the regulatory dimensions of these advancements, contributing to strategies that enhance platform design while ensuring diverse and accessible digital environments that serve all users.

Research Keywords:

- Economics of Digitization
- Regulatory Impacts on Online Consumer Behavior
- Educational Technology and Credentialing
- AI-driven Personalization

Education

Carnegie Mellon University, Pittsburgh, PA
Fourth-year Ph.D. Candidate in Information Systems — Aug 2021 - Present

- *Committee*: Michael D. Smith (Chair), Pedro Ferreira, Uttara Ananthakrishnan
- *Selected Coursework*: Econometrics, Microeconomics, Machine Learning, Causal Inference, Seminar in Business Technologies: Human-AI Team, Human and Algorithmic Bias, Advanced Natural Language Processing

The London School of Economics and Politics (LSE), London, UK
M.S.c. in Management of Information Systems — Sep 2018 - Sep 2019

National Chengchi University (NCCU), Taipei, Taiwan
B.A. in Advertising — Sep 2014 - June 2018

- Double Major: B.B.A. in International Business
- GPA: 4.05/4.3

Work in Progress

Personalized Political Messaging in the Age of GenAI: Experimental Evidence from the 2024 US Elections — Sep 2024 - Now
Yi-Yun Chu, Uttara M. Ananthakrishnan, Ananya Sen, and Ramayya Krishnan
By simulating over 4,000 autonomous agent personas representing diverse demographic and behavioral profiles and developing a telemetry infrastructure, this study investigates how political campaigns utilize personalization, tracking technologies, and machine learning models to optimize outreach strategies. Key findings reveal substantial differences between Democratic and Republican campaigns, with Democrats showcasing more advanced personalization and adaptive content strategies informed by engagement signals. Using longitudinal measurements from the telemetry infrastructure, the study delves into content generation, distribution, and evolution, highlighting how clicking behavior signals interest and drives dynamic, focused messaging, with validated topics expanded into sustained subtopics. This research offers critical insights into the transformative role of AI in personalized voter engagement, and establishes a robust framework for analyzing campaign messaging dynamics.

Yelp Me If You Can: The Impact of Occupational Licensing on Service Quality and Market Dynamics in the Personal Care Sector — Aug 2023 - April 2024
Yi-Yun Chu, Uttara M. Ananthakrishnan and Michael D. Smith

In the United States, occupational licensing has steadily increased since the 1970s, requiring government-issued licenses for various professions. Supporters argue it safeguards consumers, while critics contend it erects barriers to entry. Our study focuses on how occupational licensing effects service quality in the market for personal care services, where approximately 90% of the workforce is female. Analyzing over 7,600 personal care businesses and 244,000 Yelp reviews, we explore how state-level licensing changes influence service quality. Leveraging advanced natural language processing techniques, we track shifts in consumer sentiment toward six distinct aspects of service. Our findings show that removing licensing enhances service quality and significantly benefits businesses in Black-majority communities, highlighting how licensing practices can disproportionately burden minority business owners while introducing licensing appears to reduce service quality and drive qualified workers out of the market. Our research sheds light on the complex relationship between occupational licensing, quality, and economic opportunity, suggesting a need for careful reevaluation of licensing practices to balance consumer protection with fostering female-owned and operated business growth and equity.

Program-Ad Congruence in Advertising: A Multi-Genre Analysis of Thematic and Emotional Alignment Using Deep Learning Measures Aug 2024 - Now
Yi-Yun Chu, Liye Ma, Uttara M. Ananthakrishnan and Michael D. Smith
This study investigates the relationship between program-ad congruence and viewer attention across different media genres, focusing on two key dimensions: information congruence and emotion congruence. Leveraging advanced deep learning models, we develop a multi-dimensional framework to objectively assess these congruence dimensions and their impact on viewer engagement. Our findings reveal genre-specific effects, with higher information congruence enhancing attention in news programs but reducing engagement in entertainment, sports, and drama genres. Emotion congruence, on the other hand, positively influences attention in immersive genres like drama and entertainment but detracts from engagement in news and sports. These results highlight the nuanced role of congruence, and suggest that advertisers could optimize ad effectiveness by tailoring congruence strategies to specific program genres. This research contributes to the literature by providing a new measurement framework that offers a scalable approach for understanding program-ad congruence and its practical implications for media planning.

Multimodal Video Learning in Online Education: Managing Cognitive Load Patterns using Guided Attention Graphs Nov 2023 - Now
Yi-Yun Chu, Zhe Deng, Wen Wang, and Pedro Ferreira
This study examines the impact of structured guidance in video-based learning environments, with a focus on how attention-guiding mechanisms affect cognitive load and learning outcomes. Our findings show that targeted guidance effectively directs learners to critical content segments, extending their engagement spans and modifying their interaction patterns, while make effective use of cognitive efforts. A longer engagement span, combined with a moderate cognitive load, enhances learning outcomes, with prior knowledge playing a pivotal role in maximizing these benefits. In contrast, randomly applied guidance has minimal impact on engagement and learning outcomes, underscoring the importance of purposeful and contextually relevant cues. This research highlights the interplay between structured guidance, cognitive load management, and online learning in digital environments.

Optimizing Student Engagement and Learning: Insights from Video Delivery and Cognitive Load Analysis from Outlier.org April 2024 - Now
Yi-Yun Chu, Mi Zhou, Pedro Ferreira and Michael D. Smith
This study explores the impact of video delivery on student engagement and learning outcomes in online educational courseware, using data from over 11,000 students engaging with Outlier.org courses from 2021 to 2023. Our results show that higher video engagement is positively correlated with improved learning outcomes, and that design features such

as shorter videos and optimized cognitive load significantly enhance student retention and performance. We develop a novel multimodal framework to measure cognitive load from educational videos, and identify an inverted U-shaped relationship between cognitive load and engagement, suggesting an optimal level of challenge for effective learning. This study highlights the critical role of instructional design and behavioral analytics in enhancing online education.

Enhancing or Homogenizing? The Dual Impact of Large Language Models on Collective Intelligence and Learning Diversity Nov 2024 - Now

Yi-Yun Chu and Pedro Ferreira

The significant and rapid adoption of Large Language Models (LLMs) has revolutionized how teams collaborate and learn in diverse settings. These models, with their ability to generate human-like text and provide expansive knowledge, have introduced transformative possibilities for enhancing team learning dynamics. However, their impact on learning and collective intelligence presents a dual effect: while LLMs can foster creativity and diversity by introducing alternative perspectives and expanding the knowledge pool, they may also hinder these processes by encouraging homogenization and premature convergence on AI-suggested ideas. Grounded in collective intelligence theory, this research investigates LLMs' influence on inclusivity, knowledge construction, and problem-solving in group dynamics. By addressing critical questions about how AI integration shapes idea generation, participation equity, and learning outcomes, the study aims to provide insights into the design of AI tools that promote equitable and diverse collaboration, while mitigating the risks of viewpoint uniformity and overreliance on AI-generated content.

Dissertation in Progress

Potential Dissertation Title: *Reimagining Quality: AI's Role in Credentialing and Engagement across Media and Market Systems (tentative)*

This dissertation investigates the intersection of artificial intelligence, credentialing mechanisms, and engagement dynamics across different media communication channels and market systems. It explores how AI-driven strategies reshape inclusivity and interaction in key societal domains and investigates how credentialing, the establishment of authority, expertise, or quality, interacts with technologies to influence behavior and outcomes.