

Title: Statistical methods to generate artificial slot floor data for the advancement of casino related research

Abstract:

A common difficulty when researching gambling topics is the availability of high-quality data sets for development and testing. Due to the high level of secrecy within the gambling industry, if data is obtained for research purposes it is often prohibitively obfuscated, incomplete, or aggregated. Although these data have allowed for advancement in academic work, it leaves both the researchers and readers left wondering about what would be possible if more detailed data sets were available. To mitigate the paucity of data available to researchers, we present a Markov chain-based statistical process for producing artificial event data for a simulated slot floor, which is realistic and statistically similar to the real source data used to generate it. Methods based on a transition probability matrix estimation are introduced and tested on an anonymous source data set. The process can accurately replicate event data and resultant session data distributions well, producing a robust artificial data set that can be used for research purposes.

Implication Statement:

Lack of detailed gambling data impedes both research and the rapid development of new gambling technologies by students, researchers, and entrepreneurs. The methods presented offer a solution by creating complete, statistically robust artificial slot data that can be used for research and development.

Bios:

Courtney Bonner received a BSc. Hon. from the University of Manitoba in 2017 and an interdisciplinary MSc. in statistics, mathematics, and computer science in 2022. She has worked with nQube Data Science Inc. to design their casino data pipelines and on data model implementation. She currently works as a consultant in the financial industry.

Dr. Anastasia (Stasi) Baran is a Co-founder and COO of nQube Data Science Inc. She received her PhD in Electrical and Computer Engineering from the University of Manitoba in 2016, where she specialized in applications of non-linear optimization methods. Her combined interests in large-scale data modeling problems and the gaming industry have helped to develop nQube's AI-based slot floor optimization and player segmentation solutions.

Dr. Jason Fiege is CEO/Founder of nQube Data Science Inc. and Associate Professor of astrophysics at the University of Manitoba. He is a scientific computing, data modelling, optimization, and simulation expert with over 20 years of experience. He is the inventor of nQube's AI-guided evolutionary optimization and data modelling platform, and leads their research in slot floor optimization, AI-based player segmentation, optimization of slot segmentation, and other predictive AI systems.

Saman Muthukumarana is a Professor in Statistics and Director of Data Science Nexus and acting Head of the Department of Statistics at the University of Manitoba. He received his M.Sc. and PhD in Statistics from Simon Fraser University in 2007 and 2010 respectively. His current research interests lie broadly in Data Science, Bayesian methods and Markov Chain Monte Carlo simulation methods for complex models with applications.