

Applying Machine Learning Techniques to Consumer Behavior Research in the Senior Fitness Market

Tian-Shyug Lee

University Distinguished Research Professor
Graduate Institute of Business Administration
Fu Jen Catholic University
New Taipei City, Taiwan
036665@mail.fju.edu.tw

Ming-Chih Chen

University Distinguished Research Professor & Dean of Research and Development
Fu Jen Catholic University
New Taipei City, Taiwan
081438@mail.fju.edu.tw

Wei-Cheng Chen

Graduate Institute of Business Administration
Fu Jen Catholic University
New Taipei City, Taiwan
413088150@m365.fju.edu.tw

Chia Hsiang Hsu

Graduate Institute of Business Administration
Fu Jen Catholic University
New Taipei City, Taiwan
410088161@m365.fju.edu.tw

Abstract

Taiwan and many countries are rapidly entering an aging and super-aged society, posing significant challenges to healthcare and elderly welfare systems. In Taiwan, the population aged 65 and above is projected to exceed 20% by 2025. In response, both government and private sectors are promoting health promotion and senior-oriented service models. Lohas Company focuses on senior fitness services with a “one Lohas center in every township” strategy, where effective recruitment of new members is a key operational challenge. This study applies artificial intelligence and data science techniques to analyze member and potential customer data. By integrating demographic information, purchasing behavior, equipment usage frequency, and health improvement indicators, a potential customer classification model is developed using machine learning and neural network methods. The study further explores the relationship between consumption patterns and health promotion outcomes to identify high-value customer segments. The results aim to enhance conversion rates, improve recruitment effectiveness, and provide data-driven recommendations to support precision marketing and strengthen confidence in senior health promotion services.

Keywords

Aging society, Health promotion, Machine learning, Customer classification, Big data analytics

Biographies

Tian-Shyug Lee is a University Distinguished Research Professor at Fu Jen Catholic University, Taiwan. He earned his Ph.D. in Operations Research and Industrial Engineering from The University of Texas at Austin, U.S.A. His academic and research interests focus on operations research and industrial engineering, including quantitative modeling, decision analysis, and the application of analytical methods to management and industrial problems. Professor Lee has extensive experience in teaching and research and has contributed significantly to the development of quantitative approaches in business and industrial applications.

Ming-Chih Chen is a University Distinguished Research Professor and Dean of Research and Development at Fu Jen Catholic University, Taiwan. He received his Ph.D. in Industrial Engineering from Texas A&M University, U.S.A. His research interests focus on Production and Operations Management and Total Quality Management. Professor Chen's work emphasizes the application of industrial engineering principles to enhance operational efficiency, quality improvement, and organizational performance, contributing to both academic research and practical management innovation.

Wei-Cheng Chen is a Ph.D. student at the Graduate Institute of Business Administration, Fu Jen Catholic University, Taiwan. He has over 20 years of experience in financial management, business strategy, and the medical technology startup ecosystem, including participation in Berkeley SkyDeck and the Berkeley Health Innovation Accelerator. He currently serves as Co-founder and COO of Neurobit Technologies, focusing on AI-enabled medical devices for neurological screening. His research interests include artificial intelligence in medical triage, intellectual property strategy, and biomedical business model innovation.

Chia Hsiang Hsu is a Ph.D. candidate at the Graduate Institute of Business Administration, Fu Jen Catholic University, Taiwan. He has over 20 years of experience in telecommunications, networking, and system integration, including more than six years in the United States. He is currently Deputy Director of Marketing and Sales at TransNet Corporation, focusing on smart building Passive Optical LAN (POL), private 5G, public safety communication systems, and smart factory solutions. His research interests include artificial intelligence applications, data analytics, customer behavior analysis, and data-driven decision-making for smart infrastructure and service innovation.