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# PREDICTIVE ANALYTICS OF TECHNOLOGICAL CONVERGENCE IN THE SMART HEALTH INDUSTRY

## Abstract:

The rising healthcare costs and aging population have underscored the need for efficient healthcare systems. Recent technological advancements in computing and networking paradigms such as the Internet of Things (IoT), Artificial Intelligence (AI), and Implantable and Wearable Medical Devices (IWMD) have given rise to the concept of smart health. Smart health refers to the integration of Information and Communication Technologies (ICT) in healthcare delivery and management. It aims to reduce healthcare costs, improve patients' quality of life, and enhance early illness detection.

Smart health has emerged as a result of technological convergence that integrates various technologies such as wireless communication, embedded systems, data analytics, medical technologies, and information security. Technological convergence is a growing innovation pattern where at least two or more existing technologies are integrated into hybrid technologies or create a new technological domain. Given that smart health is in its early stages, it is important for technology managers to understand technological convergence patterns, identify emerging convergent technologies early in the technology lifecycle, and predict converging patterns for exploiting potential technological opportunities.

In this paper, a novel machine learning methodology is proposed for predicting and evaluating the changing patterns of technological convergence from patent data, using network analysis. First, a technological knowledge interaction (TKI) network is constructed based on the co-occurrence of patent classification codes, which captures the interacting relationships between different technological fields. Then, a machine learning-based link prediction method is developed to build a prediction model for forecasting convergent technologies, using important prediction features extracted from the TKI network data. The results indicate that convergent innovation is a growing trend in the smart health industry, revealing emerging patterns that could play important roles in the future. Smart health technologies are not only targeting patients and the elderly to support their health but also non-patients to monitor their health conditions. Several research findings can assist firms in developing proactive technology strategies by understanding and analyzing prospective convergent technology landscapes.

## Keywords:

technological convergence, machine learning, network analysis, technological opportunities, smart health

**JEL Classification:** C00, C55, I11