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Editorial

Artificial Intelligence Trends and Applications in Service Systems

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1. Introduction

Artificial intelligence (AI) has been increasingly adopted in service production systems. Many aspects of modern service delivery are progressively being automated, opening up opportunities for experimentation with new AI applications technologies across multiple industries. AI technologies are driving the service industry and have had promising results in reducing the service costs and error occurrences, as well as reducing service lead times. Future studies should contribute to strengthening the theoretical production. With increased availability of virtual channels, new approaches to resource management are required for effective service delivery. The Special Issue on "Artificial Intelligence Trends and Applications in Service Systems" features recent research paper submissions in this promising application area for artificial intelligence. The Special Issue includes a wide range of papers covering recent AI applications and new technologies across service companies. The papers cover managerial and customer challenges, technologies, service robotics, and research trends. Overall, the Special Issue offers insights to broaden the adoption of AI in services and inspire management decision and innovation in the field.

2. Service Application Use of Advanced Technologies and Artificial Intelligence

A seminal paper on AI in service [1] defines four intelligences required for service tasks: mechanical, analytical, intuitive, and empathetic. Currently, AI integration primarily involves mechanical and analytical intelligences, and is mainly performed at the task level rather than the job level. Eventually, the progression of technology will lead to the inclusion of more intelligences and AI capabilities to replace more sophisticated tasks and, ultimately, to some job replacements [1]. Robots are good example for the use of mechanical intelligence and are used in service for simple and homogeneous tasks, compared to human tasks [2]. A good literature review on the use of AI in services could be found in Reis et al. [3]. A more recent review [4,5] focuses on the use of AI in tourism and hospitality services. In addition, it is becoming common to find articles corroborating the fact that, for environments with high customer contact, service robots tend to outperform humans in standardized tasks [6]. However, in most cases, service robots have not yet reached the technological maturity that allows them to adequately replace humans [6], which justifies the need for further scientific research. Therefore, managers facing difficult decisions about whether AI-enabled service robots are capable of replacing human labor or whether to invest in mixed options such as human–robot systems should have scientific studies to back them up. Other articles, beyond hospitality and tourism, are dealing with chatbots for healthcare and oncology [7,8], for online marketing and sales [9,10], finance and banking [11] and more. Therefore, it can be easily inferred that the combination of AI and services is rapidly evolving. In light of the above, this Special Issue is presented to collect the latest research on relevant

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topics and, more importantly, to address current challenging issues with AI integration and service delivery.

3. The Special Issue Contributions

In this section, we briefly present the papers of the Special Issue and their contributions.

The first paper [12] deals with serving the elderly population. It develops automatic recognition of elders and seniors' activities of daily living as the first step to solve the healthcare issues faced by seniors in an efficient way. The paper describes a deep neural network (DNN)-based recognition system aimed at facilitating smart care, which combines activities of daily living (ADL) recognition, image/video processing, motion calculation and DNN.

The second paper [13] uses natural language processing to serve as a communication bridge between different parties or subcontractors to solve communication interaction problems in large projects. Communication problems often arise between different organizations, different organizational units, or different parties. These problems are rampant and often lead to litigation. The solution uses an interactive concept of natural language processing technology embedded in a common project management platform.

The third paper [14] deals with a large hospital in the health sector. The research aims at increasing the reliability of an electrical power system in a large European hospital through the use of Petri nets and fuzzy inference system modelling. Inference provides solutions for places where poor reliability has been detected.

The fourth paper [15] deals with increasing the reliability of industrial and service systems by integrating predictive maintenance (PdM) and condition-based maintenance (CBM) into business process management (BPM) and business process model and notation (BPMN) methodologies. A case study in Renault illustrates how the concepts are applied in real-life cases.

The fifth paper [16] proposes a task assistant model based on a deep learning neural network. A YOLOv5 network is used to recognize some of the new parts as part of a maintenance assistant's augmented reality system.

The sixth paper [17] characterizes the activities of autonomous intelligent systems development in high-tech defense industries. Three categories are discovered: fully autonomous operations, partially autonomous operations, and smart autonomous decision-making. It was also found that autonomous systems are more related to tactical rather than strategic issues.

The seventh paper [18] deals with a systematic approach for semantic data specification of AI-based smart service systems. The paper presents the developed and proposed SemDaServ system. SemDaServ provides a three-step process and five accompanying artifacts. Using domain knowledge to specify data is critical and creates additional challenges. Therefore, the SemDaServ approach systematically captures and semantically formalizes domain knowledge in SysML-based models for information and data.

The eighth paper [19] deals with the predictive maintenance of an industrial press. It uses neural networks to anticipate future behavior of the industrial press. Data are pre-processed and neural networks are optimized to minimize prediction errors. The results show the effective prediction of up to a month ahead of time.

The ninth paper [20] adopts an environmental and social perspective in a proposed conceptual model to evaluate the effectiveness of IoT in guiding towards sustainability in the manufacturing industry.

The tenth paper [21] examines and discusses synergetic opportunities for integrating different AI capabilities into conversational systems in services: two case studies of service systems are presented to illustrate the importance of synergy. A special focus is given to the conversation part of these service systems: the first case presents an application with high potential to integrate new AI technologies into its AI portfolio, while the second case illustrates the advantages of a mature application that has already integrated many technologies into its AI portfolio.

The eleventh paper [22] explored factors affecting E-service delivery in smart cities. In particular, it examined the significance of innovation as a mediator between knowledge management and e-service delivery. It also investigated the moderating impact of e-governance on the relationship between innovation and e-service delivery. Both innovation and E-governance were found to be powerful factors affecting service delivery in smart cities.

4. Conclusions

While this Special Issue is now closed, more in-depth research into the use of AI in services is expected. It can be anticipated that more advanced AI and new technologies will be available in the future for enhanced service delivery. This Special Issue covers current advances in the next generation of AI technologies that are revolutionizing the service delivery systems (SDS). The scalability of digital AI (e.g., chatbots) allows us to dramatically increase its availability to the public. Thus, the motivation to develop and test Service AI capabilities and to integrate AI in the delivery of digital services grows.

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