

Guest Editorial Preface

Special Issue on Back Stage Techniques in Servitization

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Contemporary world is dominated by service oriented economy. Service sector in developed economies accounts for over 80% of economic activities. The industrial sector amounts to approximately 15% of economic activities and the agrarian sector to around 5%. The dominance of the service economic sector is associated with a broad spectrum and complexity of services. They pose significant difficulties in creating encompassing foundations with rigorous concepts, well-defined methods, and practical applications. Service science – an emerging discipline – attempts to bridge the gap by embracing an interdisciplinary approach to study of services (Geczy et al., 2010). Interdisciplinarity in service science has been prominent in linking and analyzing seemingly disparate services across a range of domains. Interdisciplinary elucidation of services fueled the growth of symbiotic approaches in service science.

Front-and-back stage methodology is a symbiotic approach to study of services. It challenges the conventional distinctions in economic activities. Organizations are perceived as two-part entities having a front stage and a back stage (Levitt, 1972). The front stage is where the interactions with customers take place—the conventional service side of a business. The backstage activities support the front stage. They are the production side of a business. This framework provides a different perspective on services. Formerly ‘pure service’ organizations now have service and production components. It has been argued that sectoral divisions are artificial and irrelevant based on this framework. Organizations are distinguishable only by proportions of their service components (Teboul, 2006).

Front-and-back stage approach has been gaining attention in the light of recent technological and economic developments—notably in data economy (Geczy, 2015). Explosion of data, its acquisitions, analysis, and servitization have been presenting challenges to segmenting and commonality-based approaches. Digital data in its intangible form has an inherent service value. Information and actionable knowledge derived from raw data has been a driving force behind numerous information technology businesses. Extraction of information and actionable knowledge represents the back stage. This special issue aims at exploring back stage techniques in selected domains ranging from social network and genome analysis to asset characterization and management.

Social network analysis technique has been explored by Truta et al. Their work focuses on efficiently finding dominating sets in social networks. It targets the classical dominating set problem and two other related problems: partial dominating sets and d-hop dominating sets. They introduce algorithms for determining a suitable approximation for the social network minimum dominating sets. Experimental study on several data sets has evaluated the performance of algorithms on both real and synthetic networks. The real networks are provided by the Stanford Network Analysis Project. The synthetic networks are generated in order to follow the power-law and random distribution models. The experiments show that the selection of the best performing algorithm for determining the dominating set is dependent on network characteristics and the order of importance between the size of the dominating set and its required determination time.

Genome analysis technique has been presented by Hao et al. They address the problem of determining which genes are responsible for the process of Age-related Macular Degeneration. In their approach, four feature selection algorithms have been applied: Naïve Bayes with feature selection, Random Forest, Logistic Regression with Random Lasso and Ensemble Feature Selection. Previous studies have not been able to clearly determine the genes accountable for Age-related Macular Degeneration. The proposed ensemble of feature selection methods presents enhanced knowledge extraction capabilities—in addition to beneficial perspective on the problem. The results suggest that Pten/PI3K/Akt pathway, NF-kappaB pathway, JNK cascade, Non-canonical Wnt pathway, and two biological processes of cilia play a crucial role in Age-related Macular Degeneration.

A novel convergence concept for self-organizing maps has been explored by TATOIAN and Hamel. Their work introduces the so-called convergence index for self-organizing maps. It is a quality measure composed of a linear combination of map embedding accuracy and estimated topographic accuracy. It delivers a single statistically meaningful number that underlies a convergence quality of a self-organizing map. Furthermore, it is more intuitive than other quality measures. They have studied the convergence index in the context of clustering problems. It has been demonstrated that the convergence index captures the notion that a self-organizing map has adapted to the multivariate distribution of a training data set. This is done by observing the convergence of the marginals. Additional relationships between the convergence index and learning parameters of self-organizing maps have also been explored.

A suitable methodological approach to extract the best practices in measurements for asset characterization in complex engineering systems has been presented by D'Emilia et al. They address a methodology supporting actions for the decision reliability improvements. It is based on the evaluation of the measurement uncertainty. The proposed methodology enables suggestions for possible improvement paths and decisions. The approach identifies tasks that should be fulfilled in a recursive way. It has been applied to identification of vibration and acoustic emission signatures of machining tools. The results allowed determination of future actions for a proper management of the information provided by measurements.

Potential of Internet of Things (IoT) technologies in asset management has been elucidated by Kinnunen et al. They explore a research potential of specific IoT technologies for maintenance and asset management. The work describes a preliminary study and highlights further research related to smart factories of the future. The study is based on the literature review and panel of experts. The results suggest that IoT technologies have significant potential to be applied widely in the management of various industrial asset groups. Radio Frequency Identification (RFID) technologies have been recognized to have a notable potential in the management of inventories. Sensor technologies have been applicable in the management of machinery, equipment and buildings. The naming technologies have been considered promising in the management of spare parts.

The special issue targets selected back stage techniques in servitization, and the future potential of Internet of Things technologies. This provides the exposition of the state-of-the-art in selected servitization domains, as well as potential future trends in applicability of Internet of Things. Although the Internet of Things technologies are in relatively early stages of adoption, they are expected to

have a significant impact on service sector and related economic activities. It is therefore useful to be familiar with such technologies. We sincerely hope that the academic audience in service science, management, engineering, and technology will find this special issue informative and beneficial to their professional interests. Last but not least, we would like to thank the editors-in-chief, editorial, and publisher for their valuable support.

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