

Guest Editorial Preface

Special Issue on Storage, Process, and Intelligent Systems

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Ambient computing is actually an ecosystem of Internet-connected things that can intelligently interconnect in real time system for fulfilling the need of the system. With this, mankind can take the Internet of Things beyond the novelty and start making use of the system more robustly. The Internet of Things (IoT) is taking alongside the cloud and big data technologies as contemporary ICT movement that awaits simple, compelling scenarios to justify its potential. And here it comes “ambient computing, and intelligence” in which an ecosystem of related things interconnects in real time to what’s actually requiring in that environment, rather than relying on static, pre-planned architectures, and operating procedures.

The need of Ambient Computing is technological reason that is today’s Wireless communications, Short distance wireless, communications and embedded systems. The use of mobile phones, access of web from everywhere all the time makes the requirement of ambient computing more clearly in the current users’ behaviour. Other reasons are highly hardware integrations in small size, design of contemporary embedded operating systems which is the solutions for critical resources management like in case of energy utilization which dynamically update of the processor speed in order to reduce the energy consumption, particularly in multi-processor architecture.

It is a new paradigm in Information Technology that has potential for great impact for the future. The vision of this technology is that the people will be surrounded by intelligent objects that can sense the context and respond according to the need of the people. It is also highly multidisciplinary research area, since it combines the features of various areas in Computer Science and Information Technology.

The objective of this publication is to enlighten the researcher, scholars, students and engineers about the state-of-the-art scenario regarding ambient techniques and intelligence paradigm, the latest tools and techniques which is applicable to almost all leading fields of current research. The diverse and innovative ideas based on real world ambient intelligence in various fields for novel and future-oriented research are incorporated in this special issue. The themes are illustrated in various papers to encourage researchers to adopt it in multidisciplinary research and engineering design. We hope that promising ideas and outstanding research results of this issue will in still further development of research and will enhance technologies in terms of methodologies and applications of ambient computing.

This special issue entitled “Storage, Process and Intelligent Systems” is a collection of six papers which are post conference publications as extended version papers from the First International Conference on Computational Intelligence, Communications, and Business Analytics (CICBA 2017), held at Calcutta Business School, Kolkata, during 24-25 March 2017 under the publication house of

Springer Nature Singapore in CCIS series. The papers were initially peer reviewed by the Editorial Review Board members, and reviewers who themselves span over many countries. A brief description of each of the papers are as follows.

Paper one analyses the performance of Structured, Un-structured & Cloud Storage Systems to meet storage requirement as per organization's demands. The paper focuses on different kinds of storage systems, their architecture and implementations. At the beginning it describes different examples of structured (PostgreSQL) and unstructured databases (MongoDB, OrientDB and Neo4j) along with data models and comparative performance analysis between them. Secondly it focuses on cloud storage systems. As an example of cloud storage, Google Cloud Storage and mainly its implementation details have been discussed there. The aim of the paper is to clearly point out that every storage has a role to play in the industry. The enterprise has the role to identify the requirements and deploy the storage systems.

In paper two, a new approach for conceptual ETL process modelling is proposed. The erroneous or incomplete data generated from various sources impacts in decision making in business analysis. The data from various sources need to be loaded into data warehouse after pre-processing to reduce error and minimize data loss. This is known as ETL (Extraction-Transformation-Loading). Authors have shown that the High-level view of any system activities can be visualized by conceptual modelling of ETL process. It provides the advantage of pre-identification of system error, cost minimization, scope and risk assessment etc. In this context the authors have given a new modelling approach for conceptualization ETL process by using a standard Systems Modelling Language (SysML). For handling the increasing complexity of any system model, they preferred to go through verification and validation process in early stage of system development. In this paper, the authors' presents a MBSE based approach to automate the SysML model's validation by using No Magic simulator. Here, the main objective of this is to overcome the gap between modelling and simulation and to examine the performance of the proposed SysML model. The usefulness of this approach is exhibited by using a use case scenario in the paper.

In paper three, a proposal on load balancing on unbalanced assignment problem has been given. The authors said that the cloud computing system requires a class of assignments and systems that occupy distributed resources to execute a role in a decentralized way. They also said that the cloud computing system operates the computing systems on the web to assist the implementation of complicated assignments that need huge-scale computation. It was said with the intention of in this living world; it is challenging to balance workloads of cloud computing among assignments (jobs or tasks) and systems (machines or nodes), so the majority of the time is spent to promote a condition to unbalanced assignment problems (unequal task allocations). In this paper authors have proposed a new technique to solve the unequal task allocation problems. The technique is offered in an algorithmic model and put into practice on the several groups of input to investigate the presentation and usefulness of the works.

In paper four, a safe driving assistance system is modelled for automotive and prediction of accident rates. This research attempts to analytically determine the factors, significant for safety, in connection with driving of automotive as well as to develop a conceptual model of the driving assistance system, using the knowledge about such factors. Millions of casualties, due to road accidents, happen worldwide every year and the annual average of lives lost in India alone is about hundred and fifty thousand. The causes of such accidents are attributed to road characteristic and condition, driving faults, driving conditions or traffic environmental factors and defects or functional failure in vehicle mechanism. Studies have focused primarily on these factors without associating the 'weather' which has been reported as in a work but as an isolated factor without including the above three. This work includes all the four stated factors in modelling the driver assistance system for automatic speed control with warning system module. Further, to predict accident rates in a particular region a model using an adaptive neuro fuzzy inference system (ANFIS) is proposed in this work, which may be used by the vehicle manufactures to select the right product variant to minimise accidents.

In paper five, a storage and bandwidth optimized reliable distributed data allocation algorithm is presented. In this paper, the authors present a simulation-based study of the network characteristics of a distributed storage network in the light of several allocation patterns. By varying the allocation patterns authors have demonstrated the interdependence between network bandwidth, defined in terms from the motivation of observing the importance of network resource as an important cost metric. Here a hybrid meta heuristic algorithm is employed that solves this optimization problem by allocating data in a distributed storage system. The experimental results shown in this paper validate the efficacy of the algorithm.

In paper six, authors have presented a secure remote user authentication protocol for healthcare monitoring using wireless medical sensor networks. In this regard, the authors propose here a secure and robust two-factor based remote user authentication protocol for health-care monitoring. The authentication proof has done with the help of BAN logic, which ensures that the proposed scheme provides mutual authentication and session key agreement securely. The informal security verification proves that the developed protocol is secure from various security attacks. The simulation of the proposed scheme has been done using AVISPA tool, whose simulation results confirm that the proposed scheme is secure from active and passive attacks. Performance evaluation shows that the proposed protocol is efficient in terms of computation cost, communication cost and execution time.

The special issue is intended to be a reference to the researchers and professionals. The spectrum of ambient computing and intelligence areas where the concepts of ambient computing could be put into use effectively has been elaborated, which in our opinion, would help the researchers, especially the new entrants in research programme to appreciate the strength of the ingredients of ambient computing for real time applications of various types.

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