

Editorial

Editorial for the special issue on heterogeneous sensors–based object identification and information fusion

With the fast development of computing, communication, and control technologies, the proliferation of heterogeneous sensors with data communication capability can provide a wide variety of data for our daily life, such as road monitoring, health-care systems, structure health checking, military applications, etc. However, there are still many interesting open research problems left to be explored as well as many issues to be addressed. In this special issue, we plan to focus on various research and application issues in heterogeneous sensors–based object identification and information fusion.

The first paper, “A novel distributed air index for efficient spatial query processing in road sensor networks on the air” by Yanhong Li et al, explores the problem of spatial query processing in road sensor networks by means of wireless data broadcast. In addition, it presents an efficient method to partition the record-keeping information about the underlying road sensor network and its associated objects, by which develops a fully distributed air index, called integrated exponential index, based on an extended version of the Hilbert curve. Besides, this paper also proposes efficient client-side algorithms to facilitate the processing of several kinds of spatial queries, including kNN query, CkNN query, and range query.

The problem of enforcing the integrity of the outsourced data remotely is addressed in the paper, “Parallel checking of content integrity in multi-cloud storage of heterogeneous sensor systems” by Jian Mao et al. They propose a parallel cloud data possession checking scheme for the multicloud environment, which utilizes the homomorphic verification tag created by the Paillier cryptosystem to support unlimited query challenges and introduces the error-correction encoding method to ensure error localization and data correction.

The paper, “Subscribing to fuzzy temporal aggregation of heterogeneous sensor streams in real-time distributed environments” by J. Medina et al, presents an approach for distributing and processing heterogeneous data based on a representation with fuzzy linguistic terms, to solve the problems of the data fusion of sensors and the design of processing information. What is more, to illustrate the usefulness and effectiveness of this proposal, the authors present the results of the fuzzy temporal aggregation of sensor streams with alpha-cut subscriptions in a case study where an inhabitant performs an daily activities in an intelligent environment.

A comparison between algorithms (Oriented FAST and Rotated BRIEF [ORB] and Aruco) has been present in the paper, “Comparison of fiducial marker detection and object interaction in activities of daily living utilising a wearable vision sensor” by C. Shewell et al, for the detection of fiducial markers placed throughout a smart environment. This paper presents the results from an investigation, detailing performance measure for each object detected under various lighting conditions, motion blur, and distance from the objects. Furthermore, an intelligent system was developed to specifically consider distance estimation to aid with the filtering out of false interactions.

The paper in “Adaptive time delay estimation algorithm for indoor near-field electromagnetic ranging” by Peng Wang et al proposes a new adaptive time-delay estimation algorithm based on maximum correntropy criterion (MCC) and received signal strength indication (RSSI), abbreviated as RSSIMCC. Simulation results show that the proposed RSSIMCC algorithm can estimate the time

delay with small steady-state error in near-field electromagnetic ranging application. Then, the time delay estimated by RSSIMCC algorithm can be exploited based on the near-field behavior of radio signals for ranging in an indoor environment.

In the paper, “A universal QoS scheme for web applications” by Hangxing Wu et al, a good universal QoS scheme named E^2 FXCP was proposed by extending EFXCP, which needs to change the standard IP protocol. Moreover, simulations in network simulator 2 (NS2) have validated that E^2 FXCP is a universal QoS scheme, which can simultaneously satisfy multiple common QoS metrics for various web applications while maintaining good network performance.

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