An Improved Method for creating Shared Belief in Communication Constrained Sensor Networks

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1   Abstract

Many application domains, such as public safety, traffic management, crisis management and defense are examples where networked systems are used for gathering sensor data. In general these networked systems are faced with a growing need for adaptive behavior in observing and acting in dynamically changing environments.

Designing a system which is adaptive to dynamically changing environments becomes difficult, particularly a decentralized networked system that is appropriate for multi-platform situation awareness. We have chosen to design the sensor network following the Networked Adaptive Interactive Hybrid Systems (NAIHS) model [1]. Using this model the data processing chain is decomposed into functional components. These functional components interact by requesting information they need and fulfilling requests received from other components. Local evaluation of the available data with respect to the different requests and available resources is a key process in each component. An improved evaluation method is presented which is capable of locally balancing the information value against the resource costs of data.

The experiments show that the evaluation method with the same amount of communication costs, results in a higher common picture quality with multiple objects and overlapping detection ranges, in comparison to the benchmark method.

References

[1] L.J.H.M. Kester, "Model for Networked Adaptive Interactive Hybrid Systems," in *Proceedings of COGIS 2006: COGnitive systems with Interactive Sensors*, Paris, France, March 15–17 2006.