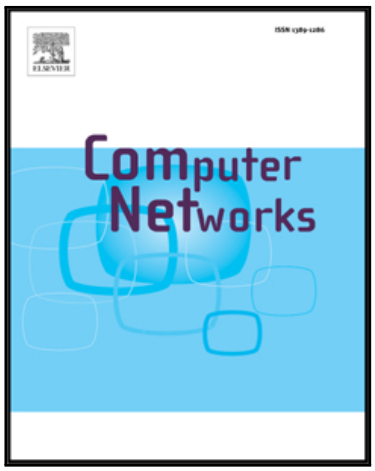

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A Bayesian Network Model for Data Losses and Faults in Medical Body Sensor Networks

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Abstract

Medical body sensor network (BSN) is a promising and flexible platform for person monitoring under natural physiological status. Due to limited resources, noise and unreliable links, sensor faults and data losses are common in BSNs. Most available works adopted schemes originated from traditional wireless sensor networks (WSNs) to detect faults and reconstruct data. However, these works either focused only on fault detection or failed to achieve a satisfactory reconstruction accuracy due to the lack of information redundancy in BSNs. In light of this, a Bayesian network based data reconstruction scheme is proposed in this paper, which rebuilds data using conditional probabilities of body sensor readings to recover missing data and sensor faults, rather than the redundant information collected from a large number of sensors. Note that the limited number of sensors in BSNs significantly reduces the complexity of Bayesian learning and thus enables efficient structure and parameter estimation of Bayesian network. Experiments on extensive online data sets have been conducted and our results show that the performance of our scheme outperforms all available data reconstruction schemes.

Keywords: Reliability, Bayesian methods, fault detection, body sensor

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