Improving Network Performance and Security in WSN using Decentralized Hypothesis Testing

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ABSTRACT

Wireless sensor networks (WSN) due to its wireless dynamic nature and open medium the network is vulnerable to hub bad conduct emerging from altering by an unauthorized user otherwise required to some other component like conjunction down. Its results are software or hardware degradation. In this consider that a fragment of the supervise detector are encompass by an adversary. Hypothesis compromised sensors are captured and reprogrammed to transmit duplicate data in order to confuse the fusion centre. The binary hypothesis testing is used in the fusion centre. In Binary hypothesis testing, honest nodes are transmit their binary decisions and the deviate nodes are transmit fictitious messages. The aim of the fusion centre is to identify the presence of misbehaving nodes and also identify the position of nature. Then the fusion centre estimates the nodes utilize points on the receiver operating characteristic (ROC) curve. The evaluation of the interchange operating point is solved by using the expectation maximization (EM) algorithm. The result of the Expectation Maximization algorithm is used to categorize the nodes and also to find the byzantine node down. The proposed weighted majority algorithm is used to identify the reliable path for the data transmission thereby improving the network performance and security.

KEY WORDS: ROC, EM, Byzantine attack, Binary hypothesis testing, Expectation Maximization.

1. INTRODUCTION

It contains number of sensor nodes, in that the nodes are report the information to a fusion center over wireless links. Detectors have restricted storage, processing and communication potential due to its size and power conditions. Due to environmental effects or hardware degradation the sensor nodes may fail in a large network. In this situation, few situations a fault node halt its performance and in few other situations sensor nodes are misbehaving and reporting false data to the fusion center.

Furthermore, the wireless transmission medium is makes possible for the aggressor to concentrate data from sensor transmissions because it is more vulnerable to eavesdropping. As a result, the adversary [3] can additionally place its own detector convergence aimed at jamming the honest nodes transmissions or in order to confuse the fusion center transmit false data.

**Byzantine Attack:** These networks are more danger to influence. The networks are visualized to be speeded over a region, the fraction of detector nodes are compromised by an opponent. Then these compromised nodes are captured and modified by an adversary and also in order to confuse the combination focus opponents place its own nodes to transfer incorrect messages. In this consider the wireless sensor network is designed which undergoes a Byzantine attack in that a fraction of sensor nodes cooperatively transmit fictitious messages in order to impair the capability of the fusion center. Thus in the network, the sensor nodes which is under a visualize control are mention as fault tolerant. This type of attack is named as a byzantine attack

2. METHODS

**Binary hypothesis testing:** Binary hypothesis testing is used in the fusion center. The binary hypothesis testing is identified the presence of misbehaving nodes, where the correct nodes transfer their binary decisions and the vulnerable nodes transmit imaginary information to the fusion center. In binary hypothesis testing, the sensor nodes frequently make a neighborhood decision regarding the state of the hypothesis in order to lower their frequencies requirement and energy expenditures and then only send their binary decision to the fusion center. Then the integration center will identify the presence of misbehaving nodes from the received messages of all the nodes in the network. The binary decision may be zero or one. The binary decision zero indicates the node is in inactive state and binary decision one indicates the node is in active state. The goal of the integration center is to identify the presence of illegal/wrong nodes and also to identify the status.

**Receiver Operating Characteristic (ROC) curve:** It is used to estimate the operating points of the nodes. In this demonstration that each portion of nodes can be discover with an operating point on the receiver operating characteristic curve from the point of view of the fusion center that corresponds to the sensor nodes decision in that class [1].

**Expectation Maximization (EM) Algorithm:** This algorithm is used to solve the difficulties of byzantine attack in the existence of misbehaving conjunctions. In the network, estimate the maximum likelihood of the nodes operating points is formulated and then solved using the expectation maximization algorithm.
The result of the expectation maximization algorithm is then used to classify the nodes and to solve the byzantine node problem. Then the results are compared with the reputation based schemes. It shows a significant improvement in both hypothesis testing results and classification of the nodes. Algorithm shown is guaranteed to increase the log-likelihood function for every update. Thus using the expectation maximization algorithm solved the byzantine attack problem thereby improves the security in the wireless sensor networks. Evaluate the performance of the expectation maximization algorithm that show this proposed algorithm significantly outperforms than the reputation based methods in detection of the hypotheses and classification of the nodes. Moreover the proposed algorithm is faster than the reputation based method.

**Weighted Majority (WM) Algorithm:** The weighted majority algorithm is used to find the reliable path in the network. The reliable path is identified for the information between the nodes. Thus it improves the network performance in the wireless networks.

**System model:** It is consisting of number of nodes which undergoes byzantine attack. Therefore the network is in the presence of number of byzantine nodes. Thus in the wireless sensor network the honest nodes are transmit their binary decision while the byzantine node are transmit the fictitious messages to the fusion center. Then implement the binary hypothesis testing in the combination in order to identify presence of misbehaving nodes in the network. Then estimate the operating points of the nodes on the receiver operating attribute curve. The expectation maximization algorithm is used to categorize the detector and find the byzantine node failure and then using the weighted majority algorithm identifies the reliable path for the data transmissions. There by increase the network execution and protect in the wireless sensor networks.

3. CONCLUSION

In this research work, examine the difficulties of byzantine attack in the existence of number of misbehaving nodes in the result of the binary hypothesis method. It is used to solve the byzantine attack problem arise in the wireless sensor networks. Weighted Majority algorithm is used to identify the reliable path for the message conveyance between the theyferences. Thereby improves performance and security in the wireless sensor network.

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