An Algorithm for Automatic Location of Multi-Source Data in Wireless Sensor Networks

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Abstract: Wireless sensor network is regarded as one of the top ten new technologies in the world. It has been widely concerned from every step of life. Sound source location is one of the important applications of disaster relief, including sound source location, gas pollution source location, fire and earthquake disaster. At present, the research at home and abroad mainly focuses on single source localization, and the source and target are mainly in the form of multi-source. Therefore, the implementation of multi-source localization research is very practical and important. Multi source localization is a difficult problem. This paper focuses on energy based multi-source, fire localization algorithm, sensor node deployment and node selection strategy.

1. Introduction

Wireless sensor networks have great interest in other research. It will have a great impact on your production and life[1]. A comment from one country said. It will bring great help and influence to people's work, life and even social environment in the future.

2. Introduction to Wireless Sensor Network

In recent years, due to the rapid development of wireless communication, integrated circuit, sensor and micro electronic system, the cheap, low consumption and multi-functional small wireless sensors have been put into the market in batches. Processing, coordination and wireless sensor networks are formed by so many sensor nodes[2]. Wireless sensor networks are widely used in military, ecological, environmental monitoring, high-level manufacturing, logistics management, medical, health industry, intelligent transportation management and intelligent energy. Wireless sensor network consists of sensor nodes, nodes, communication satellites and task management nodes. Sensor nodes are scattered in the designated sensing area, each node can collect data and transmit data to the node through "multi hop" route. Nodes can also send messages to each node. In a representative wireless sensor network, nodes are scattered in the whole random monitoring area[3]. This process is completed by aircraft, artificial burial and rocket injection. Of course, some wireless sensor networks are manually configured. The nodes form a self-organized network, and the monitoring data is transmitted to the nodes through multi hop routing. Finally, data from all areas is transmitted to the remote center through a remote or temporarily established link. The satellite link can be used as a link and is a method of obtaining nodes from the monitoring area on the monitoring area using data from the UAV. I used this method in the field test of indoor football. The general form of wireless sensor network is described in the attached figure. Wireless sensor network is composed of many sensor nodes, as one of the basic components of wireless sensor network. Sensor nodes usually include energy unit, processor unit, communication unit and storage device. Sensor nodes include integrated chips and microelectronic components. Small and light, good at discovery and guidance, strong data processing and communication skills. The location of nodes can be arranged and pre arranged randomly according to specific application requirements. Then, they are assigned to the interior or nearby of the measured object to achieve the purpose of detection and monitoring[4]. Because the sensor has some new functions, it can be used to complete

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various difficult tasks, such as monitoring and collecting information in the inaccessible places of human beings and dangerous places. This is their help. People can do many things that were impossible before.

3. Division of Wireless Sensor Network Research Field

The research of wireless sensor network technology involves many fields, such as network communication field, embedded system field, signal processing, sensor field, MEMS field and so on. According to the technology, characteristics and requirements of wireless sensor networks, researchers in different research fields combine specific research topics and directions to study specific goals. This research direction and process makes us have a clearer understanding of wireless sensor network technology[5]. This paper proposes data intensive application protocol, location and modified side tracking algorithm, time synchronization algorithm in node design and programming including filtering and system design.

4. Direction of Wireless Sensor Network

4.1. Military Direction

As for wireless sensor networks, military applications must be mentioned first. Due to some characteristics of wireless sensor networks, such as high self-assembly, miniaturization of nodes, low cost of node production, flexibility of node use and other advantages. Therefore, in addition to environmental science, health management, space exploration, commercial applications and other fields, it also has a wide range of military applications. Wireless sensor network technology is a technology that integrates information collection, transmission and processing of sensing measurement object area information[6]. It plays a very important role in perceiving the information of the future battlefield. The traditional methods used in large-scale battlefield intelligent reconnaissance are affected by various factors. The integration of intelligent system affects the accuracy and precision. In response, wireless sensor network nodes directly scatter to the enemy's location in a more secret and faster way. This node helps to establish and apply wireless sensor networks to obtain enemy information.

Table 1 Network positioning table

	Demographic characteristics	Number	Number of mental disorders	Incidence rate	x^2	P
Gender	Male	792	197	24.87	1.455	0.217
	Female	923	218	23.63		
Nation	Han nationality	1614	390	24.16	0.438	0.792
	Ethnic minority	101	25	24.17		
Account type	Town	1183	312	26.37	5.142	0.018
	Non town	532	103	19.36		
Children's condition	Only child	1263	317	25.10	6.378	0.025
	Non only child	452	98	21.68		

4.2. Environmental Observation and Prediction Direction of Wireless Sensor

People are more and more concerned about the degraded natural environment and living environment. The scope of environmental science is also expanding. In the field of environmental research, wireless sensor network nodes can be used to monitor crop irrigation, soil and air conditions around crops, living environment of livestock and poultry[7]. At the same time, it can complete large-scale surface monitoring and other work, and be used in planetary exploration, meteorology and geography research. It can also be used to track the complexity of birds, small animals and insects and monitor floods. Typical applications are environment monitoring and fire report based on sensor network. Wireless sensor network nodes can be randomly distributed in the

forest. Under normal conditions, sensor nodes can report data related to forest environment on a regular basis. In case of fire, these wireless sensor nodes will send out the specific location of the fire source and the size of the fire in the shortest time by cooperating with relevant departments.

4.3. Medical Direction

Wireless sensor network nodes are also widely used in the field of medical system and health management[8]. This includes monitoring various real-time physiological data of human body. For example, real-time tracking and monitoring the behaviors of doctors and patients in hospitals, and drug management in hospital pharmacies. There are special wireless devices such as the number of heartbeat and blood pressure monitoring devices for inpatients. Doctors can use wireless devices to deploy independently according to different kinds of drugs. According to the medicine prescribed by the doctor, it can be identified through the computer system, which is helpful for identification. This reduces the possibility of patients taking the wrong drugs. At the same time, you can use wireless sensor networks to collect all kinds of physiological data of your body[9]. These data are helpful to understand the mechanism of human physiological activities and provide convenience for the development of new drugs.

5. Methods of Localization of Multiple Sources

The multi-source position measurement of micro acoustic array means that a special microphone array is used to collect the source signal of the measured area. Microphone arrays are multiple microphone arrays arranged in a certain geometry. The traditional multi-source localization method usually uses microphone array to achieve low brightness. As mentioned above, the position estimation of multiple sound sources has a strong spatial selectivity, so the sound source signal of the determined target area can be obtained without moving the array. In addition, through the analysis and processing of the obtained multiple sound source signals, the position of multiple sound sources is finally determined. In order to locate multiple sound sources, multiple sensor nodes with simple structure are used in this paper. The traditional multi-source localization can be divided into three categories.

5.1. High Resolution Spectral Estimation

High resolution spectrum estimation algorithm is used to calculate the position of multiple sound sources. The classic ones are AR model, MV and music algorithm. These classical acquisition methods are based on measurement. The correlation matrix of spatial spectrum is determined by the source signal of microphone array and the region is calculated. At this time, the matrix is unknown. If necessary, the sound source signal must be used to obtain data. At this time, the sound source and noise to be measured shall be stable and stable. However, it is very important to the sound source signal in the actual environment. That's hard to achieve. At the same time, there are many hypotheses according to the source location method based on high-resolution spectral estimation. Under these conditions, it is difficult to use the spectrum to calculate the position of the sound source. In addition, the calculation of spectrum estimation method is large, and the most correct result is wrong. Therefore, it is rarely used in sound source location. "

5.2. Temporal

There are two stages of sound source localization technology. The arrival delay TDOA of the sound between the array elements of the micronoise array can be obtained from the test area. Then, the position and time difference of the micro noise array in the target area are measured by using the obtained sound, and the position of the sound source is calculated. This method takes a large proportion in the real-time processing of the sound source location method with less calculation.

5.3. Calculation of Controllable Beamforming Using Maximum Output Power

The basic idea of this calculation method is as follows. Then, search the position of the sound source, guide the beam, and change the weight of the sound source sensor array to maximize the

output signal power. The traditional simple beam diamond not only depends on the phase delay of the signal in each sound source, but also depends on the phase delay and arrival time delay DOA, so it is also called delay time and beam diamond. In the more complex beamforming system, in addition to filtering the signal, we must also correct the time. Different filters form different algorithms.

6. Direction of Time Synchronization Algorithm for Multi-Source Position Estimation System

The research of time synchronization technology is the foundation of various application technologies of wireless sensor network. The effectiveness of time synchronization directly determines the quality of other applications. Sensor array is often used to locate multiple sound sources. The sensor array is a centralized system. Any module in the system can get time from the unique global clock of the system. The multi-source localization system we are going to build is a multi-sensor node with a simple structure. The time difference between the arrival of each source and each sensor node is used to calculate the location of the source. Because of this physical dispersion, the positioning system can not provide a uniform time for each node directly. Each node maintains only its own local clock. It is assumed that even if the positioning system is used to synchronize the time correction within a certain period of time, synchronization will be lost within a certain period of time, because the nodes used are timed by a cheap crystal oscillator.

7. Conclusion

Wireless sensor network integrates sensor, embedded system and communication technology, which develops rapidly and is widely used. It has practical value in military field.

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