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Determination of Mobile Sink Path in Wireless Sensor Networks using Learning Techniques

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Abstract: ***This paper describes the network data transmission path finding techniques with mobile sink in wireless sensor networks. It also explores the ways to minimize energy consumption with sink due to communication with other sensor nodes. Congestion prevails in the Sensor nodes near to sink due to enormous data transfers from neighboring sensor nodes. Due to the heavy forwarding of data packets may led to a hotspot problem. By using mobile sink, it assimilates data by moving within the sensing region and balance the load of traffic to all sensor nodes in the network. To recede the delay due to the visit of more number of sensor nodes, some sensor nodes are considered as rendezvous points (RPs) and Mobile sink visits these points only. Source nodes forward their data to adjacent RPs. But it is more difficult to find the finest set of RPs and travelling path of mobile sink. This paper showcases the attempt to explore the ways to discover RPs and getting optimization in network data communication of sensor nodes through mobile sink. Social algorithms and Machine Learning techniques are the highly established efficient approaches to solve many complex optimization problems. The aim of this survey is to present a comprehensive study of applying Social algorithms in selecting finest set of RPs, to mitigate the challenges in Mobile sink path determination to extend network lifetime and exploring Machine Learning towards the energy conservation in WSN.***

Index Terms: ***Wireless Sensor Networks, Mobile sink, Rendezvous points,Social algorithms, Machine Learning.***

I. INTRODUCTION

A Wireless sensor network consists of many sensor nodes that are deployed in a certain region according to real world application areas. These sensors can sense physical phenomena like temperature, humidity, vibrations and so on. These sensors are tiny devices having limited processing and computing resources. Smart sensor nodes made up of one or more sensors, processor, memory, a power supply, a radio and an actuator.

Base stations or sinks are located inside or near to the sensing region for data communication between sensor nodes. The sink sends queries to sensor nodes and these sensor nodes are connected to send data about sensing task. Sensor nodes forward data which they have processed and relaying data from other nodes that are on circumference to the base station (Sink). The data that has reached the sink can be used for mining purposes and interpretation will be forwarded to external network. A radio used for wireless communication to forward the data to the sink and Battery is the central power source in a sensor node.[1]

A Sensor consists of sensing module, computation module, communication module and battery-based devices. Sensor nodes gather information from device which are scattered around. This raw information would be refined further by processing and mining. This information is transformed into electrical signals. These signals further distributed among other required nodes in the network.

Sensing module

The sensing module consists of physical sensors and analog to digital converters. A physical sensor contains a transducer which can transforms physical occurrences such as heat, light, sound or motion into electrical energy. It generates resulting analog signal as output.

An analog to digital converter (ADC) acts as an interface between sensing module and a digital processer. ADC uses sampling process to convert analog signal into uniform discrete time signal. Then it can decide number of acceptable discrete values needed to allocate for above samples.

Processing module:

Processing module contains a Microcontroller, memory, operating system and internal clock,storing and it process data received from sensing device. This module performs executionof algorithms to forward data in WSN.

There are different types of processors available to construct wireless sensor nodes.

Microcontroller is a processor on an integrated circuit, consists of simple central processing unit, high speed bus, memory unit, external clock. A microcontroller is a computer on a single integrated circuit, consisting of a comparatively simple central processing unit and additional components such as high-speed buses, a memory unit, a watchdog timer, and an external clock.

Because of having compact construction and low power consumption, these are useful for computationally standalone applications.

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Digital signal processor (DSP) can process discrete signals with digital filters. These are having simple adders, multipliers and delay components. These are used for mathematical operations at greater effectiveness and processing highly huge number of samples every second with real-time performance.DSP is valuable when signal transmission is bearing corruption because of noise and interference and in multimedia WSN applications during audio and video processing where compress or aggregate large size data.

An Application specific integrated circuit (ASIC) is designed for a specific tailored application. Transistors are interconnected by the Meta interconnects. According to the functionality final logical structure has been configured. An ASIC allows designer with greater ease of Design and optimization to satisfy customer need.

Communication module:

It deals with the way in which subcomponents are interconnected with processor module. It provides different types of interfaces for communication purpose.

Serial peripheral Interface (SPI) is a synchronous circuit and it is used for short distance contact. These devices communicate in full duplex mode and designed with master slave architecture having a single master. The Master device is developed for reading and writing. Several peripherals support as slaves.

Inter Integrated Circuit (IIC) is a serial interface half duplex bus. It has addressing facility for MultiMate which can enable more devices to initiate communication.

General purpose input output (GPIO) is a digital signal interface present on an IC. It provides access to the devices exist internally and its operation is implemented by user at run time. It is having secure data input output, Universal service bus.

Mobile Sink

Sensor nodes are capable to gather data and route it back to the sink or gateway through self configuration and multi hop routing. The sink communicates with end user through internet or satellite or mobile network. Source nodes with physical event facts perform communication functions in order to transmit their packets to the sink. Sensor nodes contribute in forwarding other node's packets to the next destination in the multi hop path to the sink.

In the beginning period of WSN, static sink to be found with static sensor nodes in the environment region. This causes more energy consumption needed for communication.

Multi hop communication is needed in most cases with source to sink node data transfer. So multiple sinks are used to reduce communication distance and it stimulates the Sensor node to route data for the closest sink. These static sinks separate the WSN into a sub parts where each one has a static sink.

Finding deployment position for multiple sinks is a major problem which is called as facility location problem. Even If multiple sinks are deployed at best locations, the nodes near to the sink will drain their energy quickly. This is called energy hole problem. Partitioning of the observed area into clusters is needed to avoid draining of nodes which are close to sink. Each cluster has a cluster head to which local nodes send their data. Cluster heads have the tendency of containing higher ability than regular nodes which are more responsible for sending and gathering data to sink.

All the approaches available for WSN with a static sink vary mainly in methods used in the partition a sensor field and in the cluster head selection. In recent years Mobile sink is the main approach to prevent energy hole problem and increasing life time of nodes nearer to sink. The limitations experienced in static sink will be overcome by using different mobility patterns in mobile sink. They are random mobility, fixed path mobility, and controlled mobility.

In random mobility the mobile sink applies pull or push method. Following pull method sensor node sends data as per request of the sink. But in push method sensor node proactively forwards its data towards sink.

In fixed mobility the sink can pursue a predefined fixed path. This method also follows pull method where sensor node sends data as per request of the sink.

In controlled mobility, the sink is managed by predefined events, objective function or residual energy of sensor nodes. The communication needed to regain the residual energies of nodes become overburden.

In case of large wireless sensor network with more number of sensor nodes,can increase tour length and it may not reached within delay bound of applications. To avoid this delay happened by visiting all the sensor nodes, a mobile sink permits visiting only a few number of sensor nodes called as rendezvous points and all other nodes send their data to the nearest RP. Best RPs will enhance the data collection of sink and minimize forwarding load of source nodes.

II. SENSOR NET WORK ARCHITECTURE

In Sensor Networks usually large numbers of nodes are densely deployed in a region of interest and data sinks are located near to or within sensing region. The data sink transmits queries to the sensor nodes in the sensing region. Sensor nodes carry out sensing task and communicate data to data sink. The Sink also works as a gateway to other networks. It gathers data from sensor nodes and processes the data. Finally, it can send results to end consumer. Sensor nodes use either single hop long transmission or multi hop short transmission. Single hop transmission uses more energy for communication task and it is very higher than power consumed by sending and processing tasks. Single hop communication can be used for networks where sensor nodes are densely deployed and neighbor nodes are near. It is necessary to reduce transmission distance to get better network lifetime. So in multi hop communication a sensor node transmits its sensed data toward the sink via one or more intermediate nodes.Multi hop networks can be structured in two categories. Those are namely flat and hierarchical.In a flat network, all the nodes have same priority in executing a sensing task and each sensor node will have high rank. In case of large number of nodes assigning global identifier to each node is not possible. Sensor nodes use centric routing to gather the data. In this routing, data sink broadcasts a query to all nodes in the sensing area through flooding and necessary sensor nodes, which have data identical to query, will react to the sink. Each sensor node communicates with the sink through multi hop path and utilizes its high rank nodes as relays.

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In a hierarchical network, sensor nodes are structured into clusters and cluster members transmit data to the cluster heads. These cluster heads act as relays for transmitting the data to the sink. Nodes having less energy are utilized for executing the sensing task and it transmits the sensing data to its nearby cluster head. Nodes which are maintaining higher energy can be chosen as a cluster head. These are responsible for processing the data from its cluster members and transmit the same data to the sink.
Clustering can balance the traffic load and improve scalability. It decreases energy consumption for communication. Data aggregation has been implemented at cluster heads to decrease the amount of data transmitted to the sink. Clustering architecture has organized in three types. These are Single hop clustering, Multi hop clustering and Multi-tier clustering.

III. SOCIAL ALGORITHMS

[19] Swarm based nature-inspired algorithms are categorised as Social algorithms. These are developed based on characteristics of social swarms and their reproduction plans.This swarm intelligence is the promising performance of compound agent organization in which multiple agents work together and exchange information. Below algorithms are based on swarms such as Ants, Birds, Bats, Bees, Fireflies andCuckoos.

Ant Colony Optimization Algorithm

This algorithmacts as a probability based technique and used to solve computational problems by finding optimised paths. While searching for food the ants move from nest to a place where food is located.Along the path they can depart a chemical substance called pheromone in some places.This helps the following ants to obtain the means for their team as they discover pheromone and choose, in probability; paths contain greater concentration of pheromone. Artificial ants inspired by real ants works as multi agent system.The algorithm is based on adaptively regulate the pheromone on paths at each mode. Node selection is directed according to a probability based selection approach.
The algorithm is as follows:
Initialize ACO Parameters.

Generate initial regions and evaluate objective function.
Initialize the pheromone concentration for each region. When the region is not visited already, mark the region as eligible of being selected. Use the pheromone information and select a region from eligible list. Evaluate objective function and Update pheromone regions Continue iteration until execute for All ants Pheromone evaporation process. Continue until local Optimization reached.

Particle swarm optimization Algorithm

This is a population based criteria used for data processing. It can enhance a problem iteratively until getting a best solution from possible entities. It has been designed based on the social behavior of bird flocking. During food searching birds don't have any knowledge about the food location. Also food available may limit to one bird. The birds know at what distance the food is from their present location. The approach for shortest path is to follow the bird nearest to food.
The algorithm is as follows:

Initialize the Parameters.
Evaluate fitness for all particles and Compare all values
Select the best fitness from particles and assign it as global fitness.
Preserve both individual and global performance
Calculate the velocity for each particle.
Change the velocity by comparing above values and give the next position.
Continue until maximum epoch is reached.

BAT Algorithm

Bat algorithm (BA) was motivated by echolocation conduct of micro bats.Bats utilize echolocation to identify prey, hunts, and to keep away from obstacles. Bats can sense distance and also distinguish both prey and obstacle by using echolocation.
The algorithm is as follows:

Initialize bat populations with positions and velocities
Define the Bat pulse frequency and loudness.
Evaluate the objective function for all Bats and find the Fitness.
Rank the Bats and select the best value.
Continue below steps until reach Maximum limit.
Generate new bat positions by adjusting velocities.
Generate solution which is close to best according to pulse rate.
Generate new bats by flying and Evaluate objective function Find new fitness and update the new solution, loudness and pulse rate. Rank the bats and find the current best.

ArtificialBee ColonyAlgorithm

This algorithm mainly derived from bees foraging and waggle dancing. Bees in environment find the food by exploring the meadow and the vicinity of their hive. These can collect and store the food for later on utilization by others. Scout Bees search the area and return to hive and let the hive mates know about place, size, and quality of available food through a waggle dance in hive floor. Employed bees make changes on position in memory based on nectar quantity of new position. They can compare both positions and overlook old positions. Onlooker bees take the nectar positions from employed bees and select a food place with probability of nectar amount.Onlooker bees follow the dancing scout bee to load nectar. Forging is the solution generation phase and waggle dance is to inspect the existing solutions and generate the new ones.
The algorithm is as follows:

1. Initialize the population and bees can distributed randomly
2. Calculate the nectar amount.
3. Employed bees find the neighbors of selected food source
4. Calculate the nectar amount.
5. All onlookers bees distributed
6. Memorize the best food positions
7. Find the discard food sources

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8. Create new positions for the discarded food sources
9. Continue above criteria until reaching final food positions.

Firefly Algorithms

Firefly approach is evolved as meta-heuristic algorithm based on flashing pattern and behavior of fireflies.
These can flash light to communicate with other flies and also for their partners for mating. The rhythm, rate and the duration of the flashing behavior is produced by biochemical process.
All fireflies are involved as elements of population. The attractiveness between fireflies is according to brightness. The brightness is related to kind of function need to optimize.
The algorithm is as follows:

1. Create the objective function.
2. Generate the initial set of fireflies
3. Calculate the fitness values of all fireflies and choose the best firefly
4. Update the fitness of all fireflies based on light intensity
5. Rank the fireflies and update their position

Continue above check until cover the all elements

6. Record the optimum firefly as solution.

Cuckoo Search Optimization

Cuckoo Optimization Algorithm is constructed on the life of a cuckoo bird. This algorithm basically considers the breeding and egg laying of adult Cuckoos. These Adult Cuckoos lay one egg at a time. These eggs are left in another birds nest. When the host bird is not recognizing them, these eggs grow and turn into a mature cuckoo. Sometimes host birds identify eggs are not their own, they will throw them away or abandon their nests and built new ones.
The algorithm is as follows:

1. Generate initial population of host nests with Parameters.
2. Lay the egg in randomly selected nest using levy flight.
3. If the host bird notices it, the nest is abandoned and new one is built.
4. When population is less than maximum then checks survival of eggs in nests.
5. Until the termination criterion is satisfied, continue the below steps of iteration. Let eggs grow.
6. Compare the fitness of host nests and find nest with best survival rate.
7. Determine cuckoo societies.
8. Move all cuckoos towards best solution.
9. Determine egg laying radius.

Machine learning:

Machine learning (ML) is an inspiration to learn from experience. In this learning, we select the training data and then select target function which will become the final model. An Algorithm is designed to conclude a model and this model is to be learned. Trained data come up with best function by using target function parameters which are explored by algorithm. Training data is expressed as characteristics of field and class of target functions are derived from characteristics. This representation is also called hypothesis language.

Table1: *Comparisons of ML techniques*

Requirements	Decision Tree	Random Forest	ANN	Deep Learning	SVM	Bayesian	K-NN
Classification speed	4	4	4	4	4	4	1
Learning speed	3	2	1	1	1	4	4
Accuracy	2	2	3	3	4	1	2
Handling Parameters	3	3	1	2	1	4	3
Managing missing Values	3	2	1	2	2	4	2
Overseeing redundant Variables	2	2	2	2	3	1	2
Overseeing over-fitting	2	2	1	1	2	3	3
Managing Noise	2	3	2	3	2	3	1
Overseeing highly independent Attributes	2	2	3	3	3	1	1
Overseeing irrelevant Variables	3	3	1	2	4	2	2

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1. Supervised learning

Supervised learning has both input data and resultant output data and each combination considered as data set. ML system can build a model based on these data sets. It is called labeled because at every instance output data is present. These training instances are given to the learning algorithm will produce model. This model will be utilized to classify or discovering output for any new input value.

When the target features represents discrete values such problems are called classification. Output target features represents continuous values then those problems are called regression.In Regression, output is dependent variable and input is independent variable then target function makes the relation to both input and output.

classification techniques in Supervised learning

Decision tree is a classification method which can forecast features of data by iterating the input data through a decision tree. In this process, the feature properties are evaluated with if then rules. This method gives transparent mechanism and reduces ambiguity in decision making.[21]

Random forest algorithm has a collection of trees and each tree gives unique classification. In the first stage random forest classifier should be created and results are predicted in next stage. This method correctly forecasts missing values. RF classifier is the best suitable method to classify hyper spectral data. [22] *The model of human neuron is used for classifying data in terms of* Artificial Neural Networks(ANN). ANN associated with large number of neuron processes and each node is *connected* with an active function.ANN can manipulate information and generate accurate results.

This method works on layers and *are related the to nodes* contains three layers called input layer, one or more hidden layers, and output layer. It can classify complex and non linear data sets very easily.[23]

Deep learning is a subcategory of ANN. Deep learning has multi-layer representations between the input layer and output layer. It creates with simple non linear units that renovate the representation from lower layer to higher layer to achieve optimized solution. It is developed based on communication patterns and information processing in human nerve system. This method obtains high level features from data, may or may not be work with labels and it will be trained to different objectives. [24]

Support Vector Machine (SVM) acts as a machine learning classifier and discovers a best high-level plane to categorize the data. SVM performs optimal classification utilizing high-level plane and synchronize individual experience. Support vectors are set of points helps to find the objective in excessive data.

Due to the features that come across in training data need not affect the complexity of model.

In case of Bayesian inference, it needs a relatively less number of training data. This method gets used to probability distribution in learning for uncertain concepts. It encounters the relations in data sets by learning restricted independence. The experience of past events happening can be applied to new data. It allows probability functions for different variables of class nodes.

K nearest neighbor (K-NN)method can learns from the training set and then discovers the label of new instance based on its nearest neighbors in the training set. It considers the training set as feature space. This Classification works on the space between training data and test sample. This method finds potential ignored values from space and decreases the dimensions.

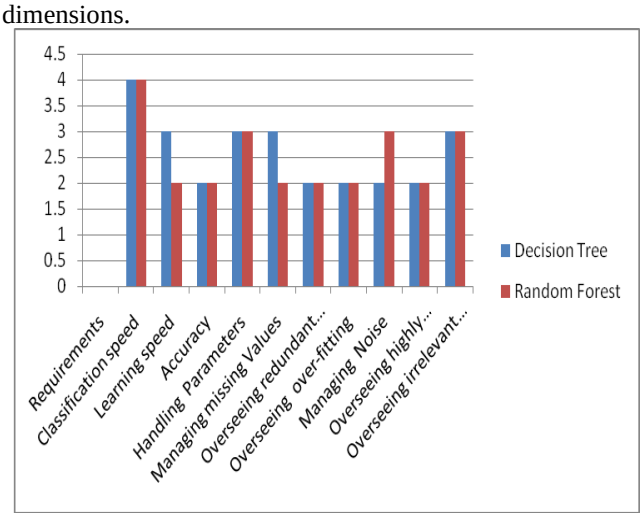

Figure1:Comparision Decision tree and Random Forest

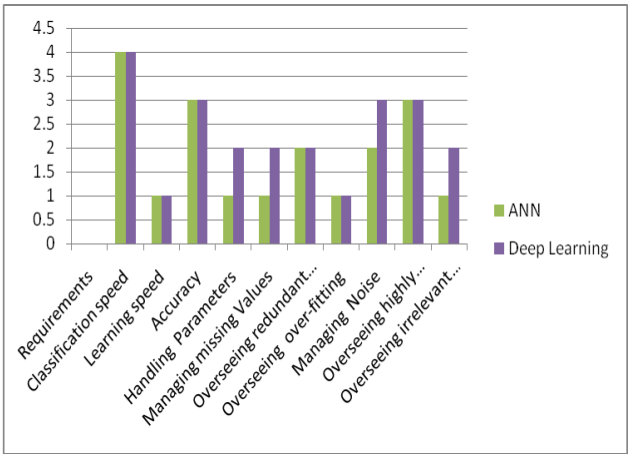

Figure2: Comparision ANN and Deep Learning

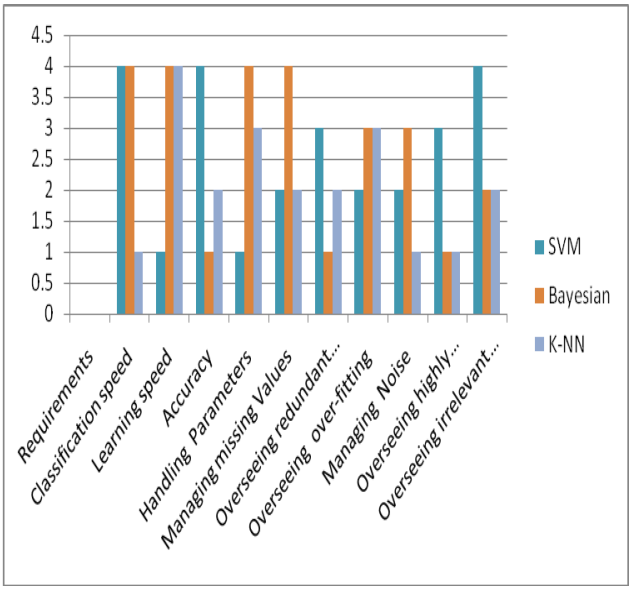

Figure3: Comparision SVM,Bayesian and KNN

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juxtaposing of classification algorithms according to given parameters are tabulated in Table1. The number 4 specifies the best performance, 1specifiespoor performance, 3 specifies very good and 2 can be considered as satisfactory.

2. Unsupervised learning

These algorithms will produce clusters which make grouped data from training data. Based on the likeness of data items to each other we can come across definite groups among the data. Here only input data is considered without output. This model attempts the extraction of relationships without label data is associate with data. Finally similar patterns are used as clusters, dimensionality reduction, and anomaly detection from data.

Unsupervised learning techniques

K-means algorithm prepares clusters from given dataset. Firstly K numbers of random locations are selected and remaining related with nearest centers. After creation of clusters a new centroid from each cluster is calculated again. Finally algorithm after iterations gives updated centroid for all clusters. [5]

Hierarchical clustering assembles similar objects into clusters which have previously concluded top down or bottom up order. In divisive clustering which is a top down Hierarchical method, a huge single partition splits recursively until a cluster for each experience. Agglomerative clustering which is a bottom up Hierarchical clustering, each experience relates to its cluster based on density functions. Number of clusters needed cannot to be initializedpriory in this approach. [6]

Fuzzy c means clustering which is a soft clustering uses fuzzy set theory to relate observation to one or more clusters. This clustering considers intensity, distance, connectivity to identify clusters.This algorithm iterates on the clusters to discover optimal cluster centers. [25]

Singular value decomposition is based on matrix factorization approach and it can be utilized to decrease the dimensionality. Matrix factorization is a way of representing a matrix into a product of matrices. SVD will reduce data dimensionality of feature space efficiently and it can producean assured optimal low rank of data modeling.

Principle component analysis contains multivariate analysis feature extraction approach for dimensionality reduction. PCA combines all information and removes less priority data from the feature space to reduce the dimension..PCA produces linear combination of observed variables as output. Independent component analysis identifies a new entity for data representation and decomposes multivariate observations into additive subcomponents. In this method these subcomponents are non Gaussian observations. It will delete the higher order dependencies. Comparisons of clustering algorithm summarized in Table. 2

Table2: *Comparisons of clustering algorithms*

Requirements	**K-means**	**Hierarchical clustering**	**Fuzzy-c-means**
Clustering speed	Fast	Fast	Slow
Accuracy	Low	High	High
Average forecast Accuracy	High	Low	Low
Performance with small observations in Datasets	High	Moderate	Moderate
Quality with huge datasets	High	Moderate	Moderate
Results of randomness in the datasets	Moderate	Good	Moderate
Sensitivity of noise data	High	Low	Low

3. Semi supervised learning

In general various domain applications have mixed data which contains both labeled and unlabeled.

This approach used for above combined data and it implements clustering for both labeled and unlabeled data. Also it covers classification on partially labeled data, regression for unlabeled data, dimensionally reduction for labeled data.[26]

This method supports to forecast the labels on unlabeled data in case of training data. So transductive learning is employing to forecast correct labels for provided unlabeled data. Again this approach is capable of forecasting labels on future data. Inductive semi supervised learning produces a model which is expected to be better predictor of future data.

4. Reinforcement learning

Reinforcement learning contains an agent who is acting in environment. Based on the provided rewards and penalties the agent can take actions in different states. This method maximizes efficiency by finding optimal results from environment. The agent can learn to get best actions so that increase its long period rewards by utilizing its own experience.

.Review on implementing learning techniques for Mobile Sink.

Sensor nodes which exists nearer to mobile sink becomes congested with heavy forwarded data from nodes placed at farther away. So these closer nodes are facing batterypower problem because of fast running out of battery charging. But the nodes placed far to sink are having charging more than 90% energy. This made non uniform depletion of energy in the network and energy holes are formed.[2]

Mobile sinks can survey and collect sensed data directly from sensor node and helps them by saving energy. Some feasible sites are maintained by network so that mobile sink visits and stops at these sites only. The sensor nodes dynamically plan one or more data forwarding paths to all these feasible sites. Mobile sink moves around some sensor nodes named as RPs and cover only these sites can maximize the lifetime of sensor nodes. Remaining nodes can forward their data to RPs.

Delay aware energy efficient path has been introduced by author for finding the most suitable RPs and mobile sink path that minimize the energy consumption. This is achieved through weighted rendezvous planning algorithm and ensures an optimal tour. All sensor nodes are allotted a weight by consider the hop distance from tour and data packets count forwarded to closest RP. WRP algorithm first constructs the Steiner minimum tree rooted at mobile sink node and uses virtual RPs in the final tour resulted as shortest path tree.

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Efficient path within range of mobile sink can make mobile sink visit appreciably more nodes during time bound and decrease the latency of data gathering. A path having flexible communication radius should diminishes the length of the path.One another approach is implementing Variable Dimensions Particle Swarm Optimization by considering the coordinates of all RPs on the sink path and take them as dimension of particles over non uniform deployment. In thisall particles of VD-PSO algorithm are taken as solution and a swarm of particles formulate a solution space. By evolving to next stage we are able to attain the optimal solution.[4]

In practical situations, the distribution of sensor nodes is always uneven like military and environmental monitoring. So it is difficult to control the topology of the network and make it homogenized. Here dimensionality of each particle is different and traditional iterative formula is not suitable in proposed algorithm. It is a new approach called variable dimension to each particle and updated the particle swarm algorithm with new variable dimension.

In case of non uniform data constraints Authors proposed Ant Colony optimizationalgorithm which had been used for rendezvous points selection and also shortest path of mobile sink. It can minimize the delay in collecting data from sensor nodes. This algorithm selects RPs nodes basedon their weights under restrictions of path length. It adopts reselection of RPs to balance energy utilization of the sensors. [5]\

A special mobile sink node adopted by author for collecting all sensors data through visiting each node. This sink is named as mobile data transporter (MDT) and here data collection has been devised as optimization problem. They proposed discrete firefly algorithm for minimizing MDT tour distance. Base station, sensor nods are supposed to be static and Sensor nodes are deployed at random. This approach is very helpful in a delay tolerant, low data rate WSNs. [3]

Recently Machine learning approaches have implemented for WSNs to schedule mobile sink and to choose the optimal set of rendezvous points. ML for mobile sink will produce finest rendezvous points. In case of data collection ML should give efficient cluster heads.[55]

IT applications, as a part of functioning in wide service area, they use mobile sink nodes to wrap up service area. These networks maintain delay tolerant sensor nodes to transmit the data through mobile sink. Bad connection may cause retransmission and it results in waste of energy. Authors introduced naïve Bayesian classifier to mitigate above issue and make sure that delay tolerant node transmits data to the mobile sink node properly. [50]

It is very difficult to manage a mobile sink in dead line based and event driven applications. This can be handled with trajectory for a mobile sink without allowing for any rendezvous points or virtual structures in the network.

[7] Authors proposed a trajectory which is named as optimal deadline based trajectory (ODT). This approach is based on decision tree and dynamic programming model. A mobile sink collects data from active nodes group with an intention of capturing event. Final optimal Path produces the vertices of ODT graph and all transmission statuses of active nodes.

In general mobile sink travels along trajectory to collect data. After completion of its visit, it moves near to base station and uploads collected data to base station. These frequent returns of mobile sink to base station could result in loss of more battery power. [57]Authors demonstrated mechanism to save in energy usage of sensor networks and improving network lifetime by using the clustering and the travel path of mobile sink's-means clustering is implemented to decrease intra cluster communications.

ML provides efficient mobile agent techniques to collect data from sensor nodes and transmission of data between the nodes. These can build up localization techniques and coverage for three dimensional spaces in static and mobile WSN.

IV. CONCLUSION

In this paper *a survey has been carried out to identify the* different approaches *related to* network data transmission using mobile sink. *In WSN, it would be difficult to find optimal travelling path of mobile sink while data transmission.* In recent *trends* of research, Social Algorithms and machine learning are used for mobile sink path determination. WSN main objective is to *optimize* the network *lifespan* and minimize the delay in collecting data from the sensor nodes.

The review briefly signifies the problems related to *life span* of wireless sensor network and we have showed the factors those influence the wireless sensor networks. *Analysis was carried out on different social algorithms and machine learning and the possible ways* to support the Wireless sensor networks having uneven data.

It is observed that Machine Learning techniques are providing innovative solutions for solving congestion and energy efficiency in WSN.

Proposal of learning mechanism for superior performance with energy conservation inwireless sensor networks *in the future course of work*. It *is* also applicable in non-uniform data constraints of the sensor nodes.

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