SVML-HA - Support vector machine learning based hop count analysis for distributing the routes in wireless sensor network

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Abstract:

Wireless Sensor Network (WSN) has played a crucial role in the modern wireless and communication system. An optimal routing performance will significantly increase the wireless sensor network lifetime requiring higher power demand in routing. Support vector machine (SVM), is the learning models are monitored in the relevant learning algorithms that analyze the data used for the vector engine classification and regression analysis. It is often used in classification issues. However, the closer inquiry based energy learning performance indicates that all forms of deterioration are the root cause. While dedicated study has seen over a decade more than a wireless sensor network energy solving problems related to efficient communication, but still the energy efficient routing problem remains unresolved. So only, to design Support Vector Machine Learning based Hopcount analysis (SVML-HA) for distributing the routes in network. Normally the number of routers that occur between both the Hop Count Source and the Target Network. At the same time, SVML-HA is a dynamic routing protocol used by the Metric Hop Count to guide the best route between both the source and destination in network. The path with the low hop count is considered the best way to reach a network so the routing table will be placed. The SVML-HA source and the destination are permitted on a path to prevent routing loops within the limit of numbers. The maximum hop count allowed SVML-HA is access the 15th and 16th Hop Count network. Information can easily be shared on the route network. Our method of conducting research is analyzed by the use of network simulation.

Keywords: SVM, Sensor Node, Hop Count, Route, Network Simulation

1. Introduction:

SVML-HA is a set of autonomous devices that are integrated into the wireless channel. Over the past decade, WSNs have attracted industry attention as well as research community. The process of gathering and data is clever, and due to its efficiency and its low cost and applications to

communicate with its larger domains. This type of network is an interface between physical and digital world. Sensors gather data from the fields they are set up, and send it back to the tank of the node. Sensors are capable of storing and processing defects of their energy burden, when software fails to cause a problem in sensor programs.

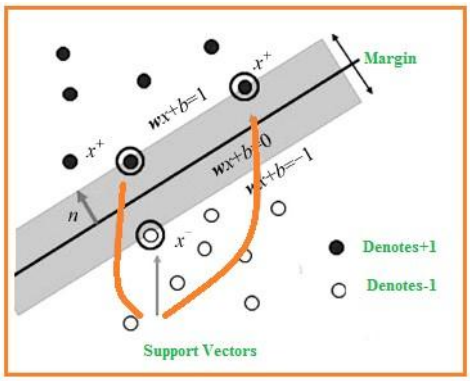

Fig. 1 SVM under the wireless sensor network

The SVM theory is designed to solve binary classification issues. The main idea of SVM is to set the linear path and find one that has the big separation between the two classes. In fact, finding the best way is to be considered for resolving the optimization (also known as the focal programming). In addition to linear classification, SVMs can effectively cover high or infinite dimensional feature spaces with their inputs, using a mercer kernel expansion principle and a non-linear classification and resilience. In short, the SVML-HA theory classifies classification training data for higher dimensional space and makes them straightforward.

Communication failures can occur due to sensor transceiver problems. Mistakes in WSNs can also be classified according to the data sent by the sensor, they are Offset error: When a data that is expected to be caused by bad calibration for the acquisition of a constant unity is added. Gain fault: When the time-consuming data conversion rate differs from expectation to time. Editable at fault: This happens when the variation of the data series does not seem to be zero.Out of bounds: happens when the unrecognized data values are outside the normal running range.

There is a lot of mistake about data loss, aggregation error, and error of alignment. Route failure is one of the more important errors. These failed sensors can be a mistake of the entire network. On the one hand, mistakes that link to data can occur simultaneously or individually. On the other hand, it can occur in a time or immediately. It's so hard to deal with the wrong and simultaneous phenomenon. Another way of learning is the introduction of his or her career in the creation of the lines.

It involves these actions in the wrong event. In light of what's ahead, it will conclude that the failure of the WSNs is of a significant importance to guarantee a regular operation. The primary reason for routes, they are set is where sensors properties and fields can be considered a challenging problem. Furthermore, detecting the disorders in other domains, as well as critical down on one side, and on the other hand should be quick and accurate to make a difference between normal and defective route prediction in network.

2. Related works:

WSNs failed to deal with the failures and errors, and did not do many research efforts. The proposed techniques are either distributed or mixed and one is centered. They are based on static, neighbors, self-detecting or machine learning. This technique will be discussed in the works section.

Using machine learning is one of the most convenient solution for finding faults in WSNs [1]. As a data mining technology, classification is the most adequate and applied technique used in diagnostic automation systems. These approaches contain material or data algorithms. Furthermore, the data learning algorithms allow for the recognition of complex models, and to make clever decisions, automatically learn [2-3].

SVM technique is used to classify sensor data and to find faults based on kernel functions [4]. As the medical risqué management automation system identifies, and image processing has been used for other serious problems, SVM mainly provides dimensional results with dimensional data.

This technique can be accessed based on standard Marquo models. Training package and experimental collection: Data collected as a supervised machine learning concept is divided into two types [5-6]. The method was based on the faults of the mistakes, where the wrongs performed on the actual scenes were stuck-at-fault and was wrong. Distributed faulting plan based on the recovery neural network [7].

The energy shorter is stored using several sets of hop data and the changes in a tank over time, thus making use of sensors located near the power consumption is symmetrical on the entire network [8-9]. Using mobile sensors, the early use of sensor mobility due to the progress that has been made to balance energy consumption and to extend the network's lifetime [10].

Learning technique is used to determine classifiers. As a data mining tool, the Bayes classifier is used to detect and disrupt the pitch sensor nodes from the usual, the authors use this type of tool to deal with WSNs failures [11-12]. The technique is called the Bald Detective Plan (deposits) [13], the stable deposits function out of two positions: the first one is the node itself. The higher the second level, the cluster head or gateways are performed.

Cloud-based WSNs technique for fault detection is another type. In such condition, it isn't achievable to set up a fueled base station with Internet association. An approach is to utilize versatile base station to perform data gathering occasionally [14]. Next, the diagnostic task diagram reduces the use of connecting the full screen. This actually significantly reduces the detection of fault detection.

In fact, the calculation combined with the advantages of teachers, especially large, saving, and cloud advantages of large sensor data packages provided by the Meeting of Software Services [15-16]. The main technique is to quickly detect data errors as well as the pinning nodes. The collecting sensor tip is first made, and the next one is collected at each group SVM Succeeding the capacity of the Internet has transformed from the past necessary document transmission or making an impression on enormous information transfer limit required in sensor network [17-18] The switch is the internal node of network; it directly affects transmission speed and consistent quality of the method.

3. Materials and methods:

In this proposed work, every aspect of each data item is defined as a point of value n-dimensional space, (the number of n features). Later, SVML-HA is done by finding a best route characteristic between two best routers. In addition to the linear classification show, SVML-HA can effectively map their inputs with a non-linear classification, indirectly high-dimensional feature spaces.

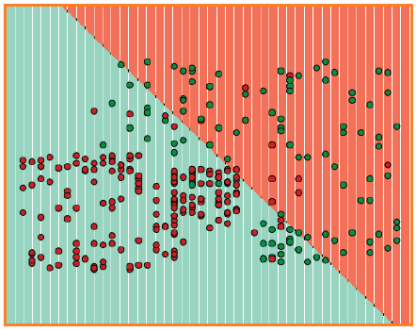

Fig. 2 Node placement under the learning timer

Some of the learning timer spaces are given below, they are

Update timer: run routers it is transmitted via best route. The default time is 30 seconds. Using updated timer, routers often exchange their routing table.

Bad timer: If any upgrade comes up to 180 seconds, then the target router is considered invalid. In this situation, count the target router key as the number 16 for the router.

Press and hold the timer: this time the router is waiting for the neighboring router. If the router does not respond to the dead at a specified time. Its 180 seconds by default.

Flush time: If it does not respond within the time of the flip, the path entry scholarship is only after the specified time. Its 60 seconds by default. This timer path is reported to be false and then 60 seconds will start, 180 + 60 = 240 seconds after the time.

The proposed technique functional requirements are as follows:

1. The large WSN was distributed and used randomly. Network constant panel leader node and many mobile base stations are considered available.
2. Sensors node is widely classified in spherical areas in complete circuits and is arbitrarily arranged where ARC is in the form of algorithm that enables energy efficient load balancing.
3. The model uses a random way of implementing motion feedback for multiple mobile base stations separated in the system simulation area.
4. The project is intended to direct the work asset upgrade packets communications system that is oriented along the sphere of spatial areas and work packets that are oriented together in arbitral areas.
5. Work assignment system as well as data packets renewal process, the product is sent due to the novel communication protocol. The second objective of the system is to balance traffic congestion by controlling control flow.

6. Due to the Sensors Operation the height difference in the territories is a set of data in rounded fashion levels. The circular system is divided into two more uniform broadcasts, namely spherical and arbitrary areas.

Each passing region has a specific index of personal identification. In each meeting of the internal sensors, each area is selected in a neighborhood of an adjacent premise. All member sensors of internal sensors are responsible for producing peacocks to answer questions in the job.

Wireless node should choose an optimal path where minimum traffic is located. It calculates the paths of traffic available on the basis of traffic team entries. The traffic team has been updated according to flow to each node traffic. Paths are available to construct the path selection and at least the estimated traffic flow pockets are selected for assessing traffic estimation using valued traffic.

Algorithm

Step1: start

Step2: read neighbor matrix N_b.

Step3: read route matrix R_b.

Step4: compute available routes Ar.

Step5: TE= Traffic estimator (Ar).

Step7: return Ar.

Step8: Stop.

Learning for the route optimization:

SVML-HA is an intolerant classifier defined in systematic separation. In other words, the algorithm given labeled training data (monitored learning) releases an optimal paths which classifies new examples. The most important question that arises when using SVML-HA is how to decide the right path. Consider the following scenarios:
In the situation 1:

In this situation (Fig 3) there are three ways A, B, C now the problem is to find the right path to reveal the difference in the best stars and circles.

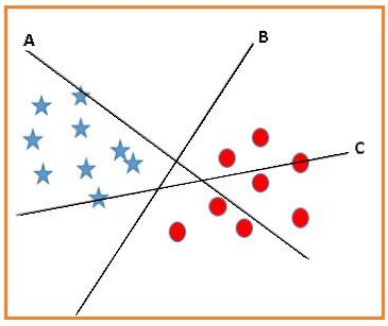

Fig. 3 Learning Consideration under the different routes

Learning rule, to be known by the star and circle, to find the right two nodes before it finds the right path to be selected. In this case the class B is the star and the best circle, so it is the right path.

In the situation 2:

Normally learning process can divided the no of classes (routes) where another scenario is taken, the route request arises how to identify the right path in this situation.

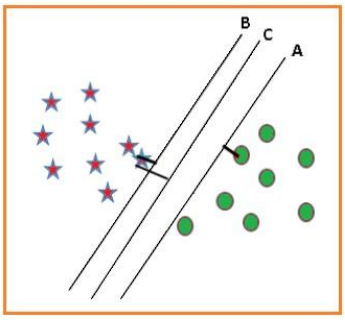

Fig.4 Learning Consideration under the different routes (Scenario 2)

In such scenarios, it calculates the distance between the distance and the distance between the data point and direction. The right path to classify the best class of aircraft with the maximum distance considered. Here is the maximum margin of C, so be considered to be in the right way.

Route Distribution under the SVM

Route has identified three significant issues of WSN's system as well as the loss of energy and the network.

I) the amount of data is calculated using SVM planning each sensor is collected each sensor data collection requires a different amount of energy requirement during each cycle.

ii) Energy requirements vary for each sensor, and it is not very easy to control data aggregation when the full cycle of energy consumption becomes an unexpected variant.

B) Due to the SVM planning, data collision is likely to be necessary between data or two different clusters simultaneously. This problem leads to the pocket conflict generation which creates overhead on the base station.

There is a possibility of existence of the same as the packets of data from different clusters. It is a hyperbolic data and the interstellar package is a difficult situation for filtering it from the platform. Hence, such events can lead to the re-broadcast event once the excessive data requiring more power in the base station sensors rejects. Finally route distribution is easy for many reasons due to fault detection: The sensor is not supported when the node's resources are restricted and used on a more expensive computer with simple techniques. Stopping the sensor can be done in a variety of dangerous and varied types of ecological fields indoor, forest, highways. The detection must be accurate. In fact, detection is a normal function and a false position e.g. the distinction between the detection systems must be understood in the presence of fire and a gain fault. Finding and it can also result in a bad result in a wrong sensor from receiving false information, e.g. Loss must be quick. This challenging problem can be used to classify methods. The classification appears to be an appropriate strategy for deciding.

4. RESULT AND DISCUSSION:

The process of learning is based on simulated action. Whenever there is something new in the world, try to learn a lot of things in the study and operation, first by examining it. This whole course is called simulated. In order to understand the need to understand the play model with the overall role through the formation of the computer formation of one of all complexes correlating in this process, the need to create artificial objects and assign them to change roles. The simulation of computer simulation modeling, execution and analysis is the design of a theoretical body system in a digital computer. The most important step after the creation of the mathematical model is to create a computer program that enhances state and event variables through time (time slices or event table). If this simulation is done successfully with parallel computers, it is called parallel or distributed simulation.

In proposed system Support Vector Machine Learning based Hop count analysis (SVML-HA) compared with two existing methods they are Distributed Support Vector Machine Learning (DSVML) and Optimal Scheduling in Energy Harvesting (OSIEH).

There are six parameters is considered to my work for enhancing the quality of service, they are

- Throughput
- Delivery ratio
- End to End Delay
- Packet Drop
- Routing Overhead
- Lifetime of network
-

Throughput Analysis

The throughput of the network is computed based on the number of packets being delivered at a time in a single window. For example, if there is N number of packages being arrived into the network and K number of packets has been delivered to the destination, then the throughput T_h of the system could be computed as follows:

$$\text{Throughput } T_h = \frac{K}{N} \quad \ldots (4.1)$$

Table 1 Throughput Analysis

Number of Nodes	DSVML in %	OSIEH in %	SVML-HA in %
20	16	19	21
40	19	22	26
60	36	42	43
80	42	52	59
100	51	75	92

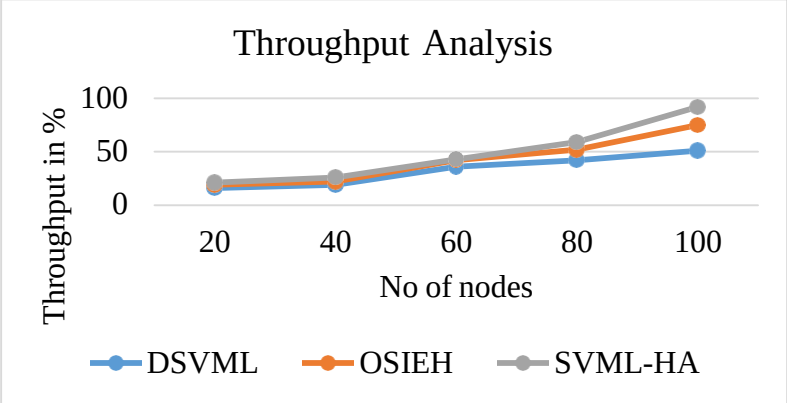

Fig. 5 Throughput Comparison result

Fig 5 shows about the throughput as a percentage. In this diagram, the x-axis represents the number of active number of nodes and y-axis.

Packet Delivery Rate (PDR)

It is defined as the ratio of the number of the packets sent by the source to the packets received at the destination. PDR = Σ Number of packet receive / Σ Number of packet sent *100 … (2)

Table 2 Analysis for delivery ratio

Number of Nodes	DSVML in %	OSIEH in %	SVML-HA in %
20	22	6	31
40	28	2	45
60	32	6	59
80	45	5	61
100	51	6	89

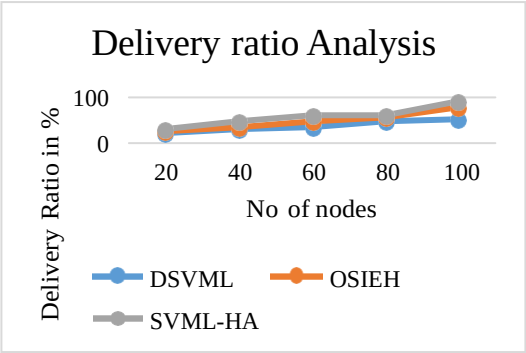

Fig.6 Packet delivery ratio comparison

Fig 6 shows the PDR rate. In this representation, the percentage of x-axis nodes and y-axis represents the percentage of the percentage of the pocket.

End to End Delay Analysis

The time is taken by the data packet to reach from source to destination node. End to End Delay=Arrival time - Sent time / Total number of connections … (4.3)

Table.3 End to end Delay analysis

Number of Nodes	DSVML in %	OSIEH in %	SVML-HA in %
20	32	29	8
40	69	63	5
60	76	72	5
80	81	79	0
100	86	85	6

Table 3 determine of result comparison of existing system the new idea proposed system conversion of the end to stop delay analysis low.

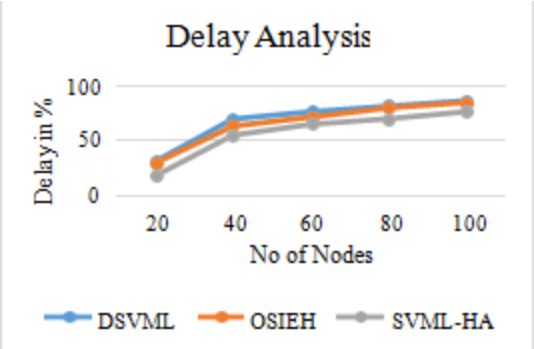

Fig.7 Average delay Analysis

Fig 7 is showing about the average end-to-end delay as percentage displaying the graph.

Dropped packets

The dropped packets analysis is some packages are not provided if their data loads are corrupted, or the packets will come when the way the buffers are already full. The recipient's application may ask for retransmitted information that will cause severe delays in the total transaction.

Table 4. Dropped Packets Ratio analysis

Number of Nodes	DSVML in %	OSIEH in %	SVML-HA in %
0	12	9	
0	25	2	6
0	32	0	2
0	45	2	5
00	56	4	0

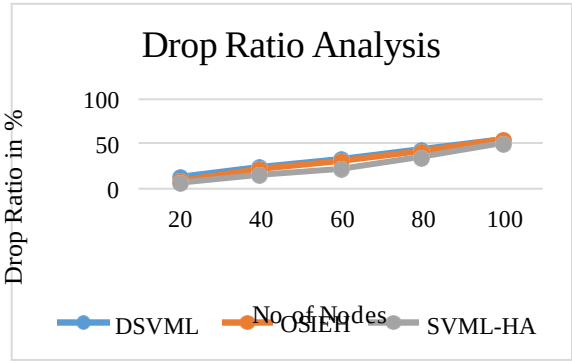

Fig. 8 Dropped packets ratio Analysis

Fig 8 is showing about the data drop packets as percentage displaying the graph. In this graph, x-axis represents the number of nodes and y-axis represent the drop packets ratio percentage.

Lifetime of the network

If the lifetime of the network node processing high-performance data storage is moving the every node system. It based on the number data packet transaction of time delay delivery in a single node.

Table 5 Lifetime analysis of the network

Number of Nodes	DSVML in %	OSIEH in %	SVML-HA in %
20	12	18	21
40	19	22	36
60	26	31	49
80	33	46	55
100	55	72	88

Table 5 lifetime data node sending packet of every second of with node comparison new proposesystem lifetime very high position node.

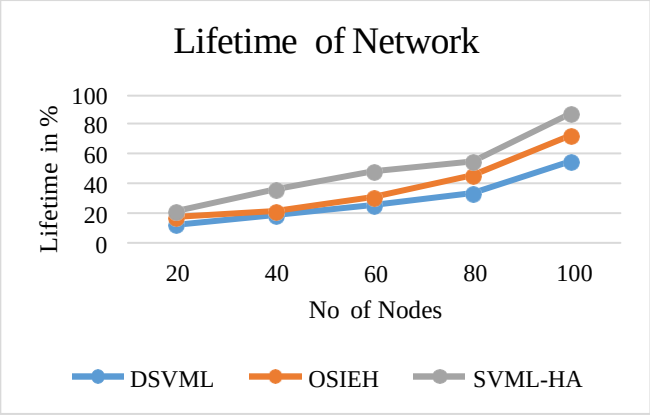

Fig.9 shows the lifetime network, for the x-axis, is some node and y-axis is lifetime network all themethods are compared on with based on life on the network system basis.

5. Conclusion:

In this analysis, propose a shared SVML-HA algorithm. Based on Hop Count SVM, select the extreme point nodes with neighboring terminals. The proposed generated procedures ensure a simple global communication technique integrates a common global solution. Furthermore, the only margin with neighboring terminals should be used to demonstrate global flexibility and to validate that the routes and intermediate nodes. Finally, the proposed approach hasa 92% outcome. The network gives a better result as compared to all other proposed methods.

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