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# Survey Paper of the Energy-Efficient Assignment of Nodes in MAHCN for Disaster Management

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**Abstract:** ***Mobile Ad Hoc Computational Networks (MAHCN) is an advanced field in the mobile networking because of the explosive advancement in communication technologies and mobile devices. MAHCN simply divides a given task into few subtasks and assign those subtasks to all the available mobile devices in the Mobile Ad Hoc Network. The allocated mobile devices compute those subtasks assigned to them. The results from all these mobile devices are finally collected by the MAHCN. There is a large variety of the applications for the MAHCN, where the information is needed to be collected simultaneously from the various sources and all these information is needed to be processed together. Ontology is used in this technique for the processing the gathered data and to summarize it, so that the users can get the desired data and use them further. But the main issues in such mobile sensor nodes, is the limitations of energy, computational power etc. Our proposed work deals with this problem, and provides energy efficient assignment of nodes in MAHCN. The proposed scheme analyzes the tasks within the applications and then uses this analysis information for resource allocation. The Ontology is then used for summarization tasks, after collecting the information.***

**General Terms:** Mobile Networking, sensor nodes, resources, information analysis, distributed computing

**Keywords:** Mobile Ad Hoc Networks, Disaster Management, Ontology, Multi-document summarization, Mobile computing

## 1. Introduction

It is well realized that Hurricanes, earthquakes, and other natural disasters cause gigantic physical devastation and death toll and property around the globe. With a specific end goal to proficiently investigate the pattern of the disasters and minimize the subsequent misfortune for future circumstance, successful data gathering techniques are imperative. Particularly, a myriad of news and reports that are identified with the debacle may be recorded as content records. The experts hope to acquire consolidated data about the detailed disaster occasion depiction, e.g., the evolutionary propensity of the catastrophe, the operational status of the general population administrations, and the recreation procedure of the homestead. Mobile ad hoc computational network is coordination of computational Grids [1] and mobile ad hoc networks [2]. Hardware and software base that permits distributed computing gadgets to impart computing resources to take care of computationally escalated issues is known as computational network. A mobile ad hoc network is an organizing toward oneself network without any previous foundation of mobile gadgets associated by remote media. One of the key issues in Mobile ad hoc calculation network is constrained battery of the mobile nodes in the network. To handle with restricted battery of nodes issue it is critical to do asset portion vitality effectively. Vitality utilization of battery is made out of vitality for CPU handling and correspondence with different nodes in the network. This paper concentrates on vitality needed for correspondence with different nodes in the network.

Consider two interdependent tasks are designated to mobile sensors which are far from one another. As tasks distributed to them are interdependent, mobile nodes need to communicate with one another ordinarily. These two nodes are far from one another so to communicate they require high transmission power to communicate. As high transmission is obliged they will devour more battery power for correspondence. Now consider if those two independent tasks are dispensed to mobile nodes which are close-by to one another, they will require less transmission power to communicate and consequently less battery power. This illustration states that, if asset portion is incapable then correspondence expense may be high and there is a need of the plan which will apportion tasks of reckoning concentrated application to intrigued nodes in versatile impromptu system such that execution of those tasks will be vitality proficient. Ontology identified with disaster management, depicting the concepts and the comparing relations of these concepts, is frequently given by area specialists [3]. Such ontology contains ample theoretical information identified with the archive set, which may be valuable for clients to summarize the documents.

Scenario: In September 2014, the Kashmir region witnessed disastrous floods across majority of its districts caused by torrential rainfall. The Indian administrated Jammu and Kashmir were affected by these floods. By September 24, 2014, nearly 277 people in India had died due to the floods. The domain experts want to check the status of the Jammu and Kashmir region during flood and after flood has passed. This information is used in our project.

## 2. Related Work

As Mobile ad hoc computation network is developing field, look into on resource allocation in Mobile ad hoc computation network is still under work. Preetam and Nirmalya in [4] proposed first straightforward resource allocation plan for Mobile ad hoc computation network focused around first come first serve i.e. task is distributed to resource in ad hoc network according to tasks necessity. It underpins redundant execution of tasks to manage task

disappointment. This plan was outline to execute mobile ad hoc computation network effectively there was no destination for energy efficient resource allocation. Advantage of this technique is that if any node falls flat due to battery confinement or mobility, that task may be executing on an alternate node redundantly. Energy obliged resource allocation for Grid environments has been addressed in [5] where creators have examined energy minimization and Grid utility optimization issues yet this plan likewise does not consider task dependencies.

To pick the most fitting node for task execution, Gomes in [6] proposed an outline which uses a delayed reply instrument in which a more resourceful node answers sooner than less resourceful nodes. Advantage of this plan is that it is intended for efficient usage of accessible resources. Disadvantage of this plan is that it doesn't consider correspondence cost for execution of interdependent tasks. In [7] Humphrey displayed a framework uses manager-worker model to dispense tasks and backings application controlled migration to manage disappointment because of low battery power. Advantage of plan is that if any node fizzles because of battery disappointment, task can be migrated from that node to an alternate accessible node. Disadvantage of this is that if manager fails, complete model comes up short and there is no vision for energy productivity resource allocation.

Ray and Turuk [8] have examined the disaster management utilizing wireless ad hoc network. In this procedure, the distinctive stages utilizes the hop count metrics for message transmission, implies when level of seriousness is high the message will convey through less number of hops utilizing higher transmission power. In other circumstance nodes will adaptively adjust the transmission power to lessen the power utilizations in the network. The reproduction results demonstrate the end-to-end unwavering quality at distinctive node density and energy necessity in diverse stage. There are numerous issues in this work; one of the issues is failure to support reliable message transmission with considering power and mobility. Srivastava et al [9] showed and assessed the framework for post disaster mitigation mobility at salvage operation by salvage groups. This framework recreated framework of mobility with three MANET routing algorithms ZRP, AODV and OLSR. This framework had utilized the idea of attraction points for the model. Utilizing these points the mobility situations are designed. The framework takes the preferences of reference point group mobility inside the post disaster mitigation mobility model. The reenactment demonstrates that MANET routing algorithms acts fundamentally distinctive under the mobility situations designed on the same platform.

## 3. Proposed System

The proposed system can be divided into two domains, namely, Energy efficient assignment of nodes in MAHCN and the Domain specific Ontology.

### A. Energy Efficient Assignment of Nodes in MAHCN

This domain tries to allocate the assign the energy efficient nodes in the mobile ad hoc computational networks. This algorithm also tries to reduce the energy consumption in the communication between the nodes. For resource allocation allocator takes two factors of tasks into consideration one is dependency and another is task type. Dependency can be of three type's independent, dependent, interdependent tasks, name of them expresses their meaning. Task type can of three types computation bounded, local communication bounded, remote communication bounded. The central node is given the application, that it can analyze the resources before the allocation process takes place. It also needs to get all the interested nodes. So, that each interested nodes will get the nearest nodes at each transmission level. There are three distinct task set allocations [10]. They are:

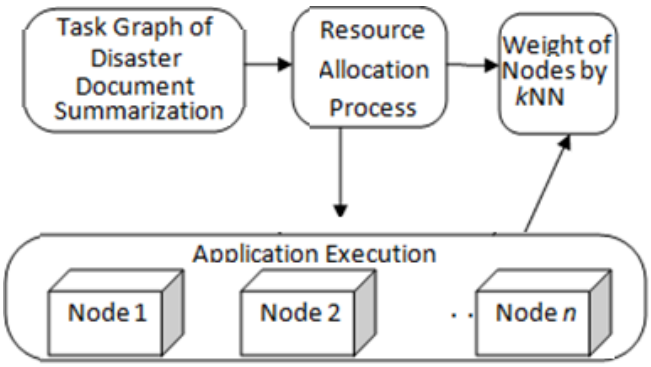


**Figure 1:** Proposed System Architecture

*i. Allocation of independent task set:*
Independent task don't have any reliance so task allocation of independent task depends of the task sort. In the event that task is computation dependent it is dispensed to the high transforming force processor generally in both cases i.e. on the off chance that task is nearby communication limited or remote communication limited they are assigned to the lower preparing force processor. Weight of node to who designate asset is not considered in the allocation of the independent task.

*ii. Allocation of the interdependent task set:*
At this step all independent tasks are already allotted to resources in the above step. Interdependent tasks set that need to be dispensed must have parallel execution conditions on each other in light of the fact that if there should arise an occurrence of priority conditions, antecedent tasks ought to be already assigned. Asset allocation service chooses node with most astounding weight in the mobile ad hoc computation network and asset allocation choice force is given to that node. Remaining asset allocation same as the portrayed in above segment, All tasks in the set are assigned all the while in the meantime more or less.

*iii. Allocation of dependent task set:*
Dependent tasks execution relies on upon some different tasks execution which is called as reference task of dependent task. Reference task is already distributed to resources in above steps. Dependent task can be one or more. If there should be an occurrence of one dependent task, task is allotted to the node open at least TPL then likewise considers task sort. Keeping in mind the end goal to allot tasks, asset allocation service spots a reference node, and after that checks kind of task executing on reference node and its guide dependent task. In the event that both of them are remote communication-bound tasks and other

dependent tasks are either neighborhood communication-bound or computation-bound tasks then dependent tasks set is designated to node with most elevated weight inside a scope of reference node overall a node with most noteworthy weight inside a Network is chosen for allocation. The remaining procedure is same as specified for interdependent tasks set.

The tasks can be also be classified from the computational point of view. The classifications are:

*a) Computation Bounded:*
These types of tasks have more computation part which requires more processing power and very less communication part. Thus, requires a node with high computation rate and high power.

*b) Local Communication Bounded Tasks:*
This type of services requires more local communication to execute and requires very less or simple computation part. Thus, should be assigned to low power node.

*c) Remote Communication Bounded Tasks:*
This type of services requires more remote communication to execute and requires very less or simple computation part. Thus, this task can be assigned to the low power node, unlike computation bounded task.

**B. Computing weights of the nodes:**

Computing the weights of the node is important as, the tasks are allocated to the available nodes, depending upon the classifications in above paragraph.. Like, interdependent tasks should be assigned to the nearest nodes; whereas the independent tasks can be assigned to far nodes. While, the computational tasks are assigned to the highly weighted nodes, and remaining tasks can be assigned to the low weighted tasks. kNN [12] is algorithm is used for searching the highly weighted nodes from the set of all available nodes.

kNN algorithm works as follows,

```
1.    Integer i=1
2.    List kNNList = null
3.    while(i<=n)
4.    {Broadcast a discovery message at TPLi
5.    Collect replies from nodes accessible at TPLi
6.    Add nodes to kNNList
7.    IF( number of nodes in kNNList >= k) THEN
8.    EXIT while loop
9.    ELSE i++
10.   }
```

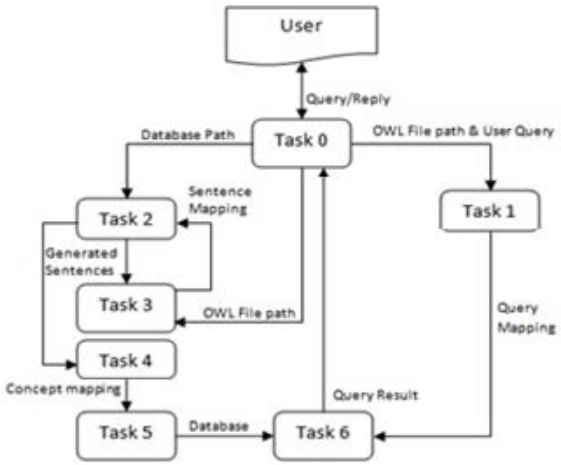


**Figure 2:** Task Graph of Disaster Management

**C. Information Summarization**

The gathered information from the various nodes is stored in the database. The gathered information is needed to be somehow summarized, so that the database can reply to user queries faster and efficiently. Thus, we have used the Ontology. In this, the 7 processes work with one-another to obtain the summarization of the information. Initially, the information is stored in the database. The OWL file of the information is created. The event is divided into the concepts. Each concept is added into the OWL file as a class. The instances of these classes, occurred in the gathered information are also added to this file.

**D. Query Processing**

Now, the 7 tasks of Ontology start working. The Task 0 assigns the dataset path to the task 2. And also assigns the OWL file to the task3. Task 2, 3, 4 are interdependent and they work together. The task 2 generates the sentences from the database, whereas the task 3 gets the sentences from Task 2 and maps these sentences to concepts or classes. All this information is then sent to the Task 4, which generates a mapping of concepts and all its related sentences. This mapping is then stored by the Task 5. When a user fires a query to search the data to task 0, it forwards the OWL file to task 1, which then creates the mapping of the query with the concept. This mapping of query is then forwarded to the Task 6. The Task 6 gets the information mapping from the task 5 and query mapping from the task 1. Then generates the result, and forwards it to the Task 0, who then replies to the user query.

## 4. Conclusion

The use of Mobile Ad Hoc Computational Networks has increased in past few years. There are multiple applications, in which this network can be used. Some of them are, forest, battlefields, disaster management etc. In this paper, we have studied the use of MAHCN for the disaster management. In this, the network nodes are placed in different locations. These nodes gather the sensed information from the surrounding environment. Which is then, used for the predictions of the future environmental disasters if any. The use of Ontology has given a new dimension to this system. Similarly, the distributed computing is also used. This method also concentrates on saving the energy of the nodes. Though, we don't pretend to have given a complete solution for the problems that are faced in WAHCNs and the disaster managements. But, we have indeed taken a step ahead in this field.

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