ENHANCING QUALITY OF MONITORING IN MULTICHANNEL NETWORK USING EFFICIENT CHANNEL ALLOCATION ALGORITHM

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***Abstract** Passive monitoring utilizing spread wireless sniffers is an successful technique to monitor actions in wireless communications networks for fault diagnosis, resource management and serious path analysis. In this paper, we initiate a quality of monitoring (QoM) metric distinct by the predictable number of active users monitored and examine the problem of maximizing QoM by sensibly assigning sniffers to channels based on the knowledge of user actions in a multi-channel wireless network. The capture models are considered of Two types. The user-centric model assumes frame-level capturing potential of sniffers such that the activities of typical users can be illustrious even as the sniffer-centric model only utilizes the binary channel in sequence (active or not) at a sniffer. For the user-centric model, we show that the indirect optimization problem is NP-hard, but a constant estimated ratio can be attained via polynomial complexity algorithms. For the sniffer-centric model, we work out stochastic deduction schemes to change the problem into the user-centric domain, where we are able to be relevant our polynomial estimate algorithms. The efficiency of our projected schemes and algorithms is additional evaluated using both synthetic data as well as real-world traces from an prepared WLAN.*

***Index Terms**— Information retrieval, spatial index, keyword search.*

I. INTRODUCTION

Delay Tolerant Networks (DTNs),also called as occasionally connected mobile networks, are wireless networks in which a fully connected path from source to destination is unlikely to exist. In these networks, for message delivery nodes use store-carry-and-forward paradigm to route the messages. The examples of this networks are wildlife tracking, military networks etc. However, efficient forwarding based on a partial knowledge of get in touch with performance of nodes is demanding. It becomes serious to recommend practiced resource portion and data storage protocols. Although the connectivity of nodes is not continuously maintained, it is still popular to allow contact among nodes. Each time the source meats a relay node, it chooses a frame i for transmission with prospect ui. In the basic scenario, the foundation has originally all the packets .Under this statement it was shown in that the transmission policy has a threshold structure: it is best possible to use all chances to spread packets till some time σ depending on the energy restriction and then stop. This policy resembles the well-known "Spray-and-Wait" policy. In this work we take for granted a more general arrival process of packets: they require to be at the same time obtainable for transmission originally i.e., when forwarding starts, as assumed in the case when large Deployment and management of wireless infrastructure networks (WiFi, WiMax, wireless mesh networks) are often in a weak position by the poor visibility of PHY and MAC characteristics and complex connections at a range of layers of the protocol stacks both within a managed network and transversely multiple directorial domains.

In addition, today's wireless usage spans a varied set of QoS necessities from best-effort data services, to VOIP and streaming applications. The task of administration the wireless communications is made more not easy due to the supplementary constraints posed by QoS responsive services. Monitoring the comprehensive characteristics of an prepared wireless network is dangerous to many system administrative tasks counting, fault diagnosis, resource management, and critical path analysis for communications upgrades. Passive monitoring is a technique where a committed set of hardware plans called sniffers, or monitors, are used to monitor activities in wireless networks.

The information in trace files that will capture transmissions of wireless devices of interference sources in their nearby area and store. Which can be analyzed a central location. Wireless monitoring has been shown to complement wire side monitoring using SNMP and base station logs since it reveals detailed PHY (e.g., signal strength, spectrum density) and MAC behaviors (e.g, collision, retransmissions), as well as timing in sequence (e.g., backoff time), which are often necessary for wireless diagnosis. The structural design of a canonical monitoring system consists of three components: 1) sniffer hardware, 2) sniffer coordination and data collection, and 3) data processing and mining. Sniffers may have access to different levels of information that depend on the type of networks being monitored and hardware capability. For instance, spectrum analyzers can make available detailed timeand frequency domain information. However, due to the limit of bandwidth or lack of hardware/software support, it may not be able to decode the captured signal to attain frame level in sequence on the fly.

Commercial-off-the-shelf network interfaces such as WiFi cards on the other hand. It can only make available frame level information . The volume of raw traces in both cases tends to be rather large. For example, in the study of the UH campus WLAN, 4 million MAC frames have been together per sniffer per channel over an 80-minute period consequential in a total of 8 million distinct frames from four sniffers. A single sniffer can only monitor activities within its vicinity due to the propagation characteristics of wireless signals. The same frequency band tends to be highly correlated and observe the sniffers within close closeness over. There are addressed in the design of passive monitoring systems that is having pertinent issue to be needed: 1) what to monitor, and 2) how to coordinate the sniffers to maximize the amount of captured information. The network which operate over a set of contiguous channels or bands that the paper assumes a generic architecture of passive monitoring systems for wireless infrastructure network.

The two categories of capturing models differed by their information capturing capability of thinking first. The user-centric model is called as first category. The activities of different users can be distinguished that will imagine accessibility of frame-level information. The second category is the sniffer-centric model which only assumes binary information regarding channel activities, i.e., whether some user is active in a septic channel near a sniffer. By imposes later minimum hardware requirements and incurs minimum cost for transferring and storing traces. In some cases, due to hardware constraints (e.g., in wide-band cognitive radio networks) or security considerations.

Decoding of frames to extract user level in sequence is infeasible and thus only binary sniffer information might be available for observation purpose. We further characterize hypothetically the relationship between the two models. Ideally, a network administrator would want to perform network monitoring on all channels concurrently. To deploy the multi-radio sniffers are known to be large and expensive

In our system are low-cost devices which can only observe one single wireless channel at a time therefore assume sniffers. We introduce a quality-of-monitoring (QoM) metric defined as the total expected number of active users detected that will maximize the amount of captured information, where a user is said to be active at time t, if it transmits over one of the wireless channels. The basic problem fundamental all of our models can be cast as finding an assignment of sniffers to channels so as to maximize the QoM. The efficiency of monitoring solutions to systems where it is significant to capture as comprehensive in sequence as possible QoM will be an important metric that will quantifies. (e.g.: intrusion/anomaly detection and diagnosing systems

We note that the problem of sniffer assignment, in an attempt to maximize the QoM metric, is additional complicated by the dynamics of real-life systems such as: 1) the user population changes over time (churn), 2) activities of a single user is dynamic, and 3) connectivity between users and sniffers may vary due to changes in channel conditions. These sensible considerations reveal the primary intertwining of "learning", where the usage pattern of wireless resources is to be predictable online based on captured information, and "decision making", where sniffer assignments are made based on available knowledge of the usage pattern.

We prove that during learning in our earlier work, each instance of the choice making is equivalent to solving an occurrence of the sniffer assignment problem with the parameters properly chosen. Thus, successful and efficient algorithms for the sniffer assignment problem is serious. In this paper, we focus on designing algorithms

II. BRIEF INFORMATION ABOUT THE AREA OF PROJECT

A wireless network is any type of computer network that uses wireless data connections for connecting network nodes. This networking is connected to homes, telecommunications networks and enterprise (business) installations avoid the costly procedure of introducing cables into a building, or as a connection between a different equipment locations. In YouTube channels multi-channel network is an organization that works. By officering assistance in areas such as "product, programming, funding, cross-promotion, partner management, digital rights management, monetization, sales audience development" in exchange for a percentage of the ad revenue from the channel. They are also known as Online Video Studios, MCNs, OVSs, YouTube Networks or simply Networks.

The rich MAC/PHY layer information that will monitor Wireless has passive approach for capturing wireless side traffic. WM can suffer, however from low capture performance i.e., high measurement loss, due to the unreliable wireless medium. Prior works have attained a stable factor of the maximum monitoring coverage in a centralized setting. Our algorithm conserve the same ratio while as long as a distributed solution that is amenable to online implementation. Also, our algorithm is cost-effective, in terms of communication and computational overheads, due to the use of only local communication and the revision to incremental network changes. Even when the number of available interfaces is smaller than the number of available channels that will switiching interface to utilize all channesl.

To proposed to carry out the full examination on the current wireless monitoring networks and institute a system monitoring model based on the undirected bipartite graph. Then, compared with obtainable algorithms, we propose an optimization solution “Multiple Quantum Immune Clone Algorithm” to solve the problem. Finally, the algorithm has been proved to be with good performance both in theory and experiments and examine the channel allocation for sniffers to maximize the Quality of Monitoring for wireless monitoring networks, which is proved to be NP-hard. A Multiple-Quantum-Immune-Clone-based channel selection algorithm is put forward to solve the problem. By theoretical proof and wide spread experiments, we make obvious that MQICA can solve the channel allocation problem successfully and outperform related algorithms evidently with fast junction. As an ongoing work, we are dropping the computation complexity and proving the convergence performance of algorithm in theory.

III. PROBLEM DEFINITION

To monitor the activities of users the Wireless network sniffers are distributed in a region. It can be applied for fault diagnosis, resource management, and critical path analysis. Wireless sniffers naturally can only collect information on one channel at a time due to hardware limitations. Therefore, it is a key topic to optimize the channel selection for sniffers to maximize the information collected, so as to maximize the Quality of Monitoring for wireless networks. In this paper, a Multiple-Quantum-Immune-Clone-Algorithm based solution was projected to achieve the optimal channel allocation. The extensive simulations exhibit that MQICA outperforms that related algorithms obviously with higher monitoring quality, lower we carry out the full investigation on the current wireless monitoring networks and establish a system monitoring model based on the undirected bipartite graph . We propose an optimization solution “Multiple Quantum Immune Clone Algorithm” to solve the problem after that compared with existing algorithms. Finally, the algorithm has been proved to be with nice presentation both in theory and experiments.

The QoM metric with different granularities of a priori knowledge that will focus on designing algorithms aim at maximizing in this paper. The usage patternsare implicit to be stationary during the choice period.

Our Contribution: In this paper, we make the following charity toward the design of passive monitoring systems for multi-channel wireless communication networks

- ✓ We supply a formal model for evaluating the quality of monitoring.
- ✓ We study two categories of monitoring models that will be different in the information capturing ability of reactive monitoring systems. For each of these models that make available algorithms and methods that optimizethe quality of monitoring.
- ✓ Between the two monitoring models we unravel connections by devising two methods to exchange the sniffer-centric model to the user-centric domain by exploiting the stochastic properties of under lying user processes. As a covering problem that the user –centric model that we show that our problem can be formulated. To maximize the QoM that will show both the user and sniffer-centric models measured, a pure approach with more on purpose where a sniffer is assigned to a single channel suffices in order. The problem is proven to be NP-hard constant estimate polynomial algorithms are provided. We show that although the only information retrieved by the sniffers is binary "structure" of the fundamental processes is retained and can be improved with the sniffer-centric model,

Independent Component Analysis(ICA) and allow mapping the sniffer assignment problem to the user-centric model that are two different approaches are planned that utilize the notion . The first approach, Quantized Linear ICA (QLICA), estimates the concealed structure by applying a quantization process on the ending of the traditional ICA, while the second move toward, Binary ICA (BICA), decomposes the inspection data into OR mixtures of hidden mechanism and recovers the original structure. Finally, an general assessment study is approved out using both synthetic data as well as real-world traces from an prepared WLAN.

Wireless monitoring: The system-level approach work done on wireless monitoring. The connections among the apparatus of such systems in an attempt to design complete systems and address. The work in uses AP, SNMP logs, and active side traces to analyze WiFi traffic characteristics. Passive monitoring using multiple sniffers was first introduced by Yeo et al.

The advantages and challenges posed by unreceptive measurement techniques with the authors communicative and talk about a system for performing wireless monitoring with the help of numerous sniffers, which is based on synchronization and integration of the traces via broadcast beacon messages. These systems are mostly experimental that the results are obtained. Rodriget al. To capture wireless data by using the sniffers, and analyze the concert characteristics of an 802.11 WiFi network. One key contribution was the introduction of a finite state machine to infer missing frames. The Jigsaw system, that was planned in ,focuses on large scale monitoring using over 150 sniffers. A number of current works alert on the diagnosis of wireless networks to conclude causes of errors.

In , Chandraet al. planned WiFi Profiler, a diagnostic tool that utilizes replace of information among wireless hosts about their network settings, and the health of network connectivity. Such collective information allows conclusion of the root causes of connectivity problems. To developed a set of techniques for automatic characterization of outages and service degradation building on their monitoring communications, Jigsaw, Cheng et al. They showed how sources of delay at multiple layers (physical through transport) can be reconstructed by using a grouping of capacity, deduction and modeling. Qiuet al. in planned a replication based move toward to conclude sources of faults in wireless mesh networks caused by packet dropping, link congestion, external noise, and MAC misbehavior.

Disadvantages of existing system:

1. The core brave is to cope with lack of resolute connectivity and yet be able to allocate messages from basis to function.
2. The routing schemes that pressure relays' memory and mobility area predictable clarification in order to get better message release delay.
3. When large files need to be transferred from source to reason not all packets may be accessible at the foundation earlier to the first broadcast.

IV. LITERATURE SURVEY

1) Dbxplorer: A System for Keyword-Based Search over Relational Databases

AUTHORS: S. Agrawal, S. Chaudhuri, and G. Das. The keyword-based search paradigm to search internet engines have popularized. They do not allow keyword-based search with traditional database management systems officer powerful query languages. We discuss DBXplorer, a system that enables keyword-based searches in relational databases in this paper. DBXplorer has been implemented by means of a profitable relational database and Web server and allows users to interact via a browser front-end. We outline the challenges and talk about the completion of our system, together with results of general tentative assessment.

2) Db&ir Integration: Report on the Dagstuhl Seminar 'Ranked Xml Querying'

AUTHORS: S. Amer-Yahia, D. Hiemstra, T. Roelleke, D. Srivastava, and G. Weikum

Internet search engines that are having keyword based search has been popularized. While conventional database management systems offer commanding query languages, they do not allow keyword-based search. In this paper, we talk about DBXplorer a system that enables keyword-based search in relational databases. With the help of web server it allows users to interact via a browser front-end DBXplorer has been implemented using a profitable relational database . The completion of our system as well as the results challenges and discuss of the general experimental evaluation .

3) Min-max Heaps and Generalized Priority Queues

AUTHORS: M.D. Atkinson, J.-R. Sack, N. Santoro, and T. Strothotte

A simple implementation of double-ended precedence queues is obtainable . The proposed structure, called a min-max heap, can be built in linear time; in contrast to conventional heaps. It allows both Find Min and Find Max to be performed in constant time; Insert, DeleteMin, and DeleteMax operations can be performed in logarithmic time. Min-max heaps can be generalized to sustain other comparable order-statistics operations professionally (e.g., constant time FindMedian and logarithmic time DeleteMedian); furthermore, the concept of min-max ordering can be complete to other heap-ordered structures, such as leftist trees.

4) Objectrank: Authority-Based Keyword Search in Databases

AUTHORS: A. Balmin, V. Hristidis, and Y. Papakonstantinou

In databases modeled as labeled graphs Object Rank system applies authority-based location to keyword search . Conceptually authority originates at the nodes containing the keywords and flows to objects according to their semantic associations. Each node is ranked according to its authority with admiration to the exacting keywords. The weight of each keyword of the query one can adjust the wirght of global substance the importance of a result really containing the keywords versus being referenced by nodes containing them and the volume of authority flow via each type of semantic connection.

5) Effective XML Keyword Search with Relevance Oriented Ranking

AUTHORS: Z. Bao, T.W. Ling, B. Chen, and J. Lu

Keyword search on XML has emerged lately inspired by the great success of information retrieval (IR) style keyword search on the Web. The difference between text database and XML database results in three new challenges: (1) Identify the user search intention, i.e. recognize the XML node types that consumer wants to look for and search via. (2) Resolve keyword ambiguity problems: a keyword can come into view as both a tag name and a text value of some node; a keyword can come out as the text standard of different XML node types and carry different meanings. (3) As the search results are sub-trees of the XML document, new scoring function is desirable to estimate its significance to a given query. However, accessible methods cannot determine these challenges, thus return low result superiority in term of query application. In this paper, we propose an IR-style approach which essentially utilizes the statistics of underlying XML data to address these challenges. We first suggest detailed guidelines that a search engine should meet in both search purpose recognition and importance slanting ranking for search results. We design novel formulae to recognize the search for nodes and search via nodes of a query that are based on these guidelines and present a novel XML TF*IDF ranking strategy to rank the special matches of all achievable search intentions. Lastly, the planned techniques are implemented in an XML keyword search engine called XReal, and general experiments show the efficiency of move toward.

V. COMPARITIVE STUDY

User-centric model: At First we believe transmission actions in the network from the user's point of observation. The packet description information from each sniffer's captured traces that can believe that G is known by inspecting. In the user-centric model, the transmission probabilities of the users p = {p|u ∈ U} are known and unspecified to be independent3. Pude notes the program prospect of user u. puu and G can be predictable by putting all sniffers in the similar channel and iterating from side to side all probable channels for adequately long time. Each user process may be IID or non-IID over time. Consider a wireless network with 2 sniffers and 2users on 2 channels User u1and u are active on channels 1 and 2, correspondingly. Transmission probabilities of users are p1=0.2 and p centric model assumes G and p = {p1,p222=0.5. User-} are obtainable. Note that the greatest value of QoM in the higher then network is 0.7 attained when s1and sare assigned to channels 1 and 2, in that order.

Sniffer-centric model: The user-centric model requires comprehensive knowledge of each user's actions. This necessitates frame-level capturing ability by the inactive monitoring system. In the sniffer-centric model, only **binary** information (on or off) of the channel activity ateach sniffer is experimental. We indicate by x the binary vector of explanation when all sniffers operate on channel k and by Xkthe collection of T realizations of xk. We assume that K sniffers observations on various channels are independent. However need exists surrounded comments of sniffers operating in the same channel as a result of transmissions made by the same set of users. Given an assignment a, a total characterization of the sniffers' observations is agreed by the combined prospect allocation Pa(xk), k =1,...,K. Here, P) is absolutely needy on the assignment a such that if sniffer i is not assigned to the k'th channel, its binary inspection xa(xk(i)is always zero. By independence of different channels we have Pa(x)=_Kk=1).

MAX-EFFORT-COVERAGE PROBLEM

Under the user-centric model, the purpose to locate the sniffer-channel assignment that can monitor the major (weighted) set of users, subject to the restriction that every sniffer can only observe one of the K channels at a time. We hence forth submit to the problem as MAXEFFORT-COVERAGE(MEC) problem. Note that in MEC the weights can in fact be any non-negative principles and are not incomplete to the MEC problem can be cast as the following integer program (IP):

HARDNESS OF MEC

In what follows we show that the MEC problem is NP-hard for K = 2, even for the unweighted case (i.e., where p=1for all u ∈ U). The hardness of the MEC problem really follows from the choices obtainable to the dissimilar sniffers. It is naturally different from the hardness suggested for the MC-GBC problem, which follows from restrictive the number of sniffers one is allowed to use. We establish hardness of MEC using a decrease from the problem of Monotone-3SAT (MON3SAT), which is known to be NP-hard. In MON3SAT we are given as input an example of 3SAT where every clause consists of either solely positive variables, or solely canceled variables. The goal is to make a decision whether or not there exists an assignment which satisfies all clauses. We proved that the unweighted MECproblem is NP-hard, even for K =2. The result impliesthat one would have to resolve for estimated solutions to MEC. We note that Guru swami and Khot show that MON3SAT is NP-hard to near within a factor of 7/8+e for every e>0. The following is a consequence of the above fact.

VI . CONCLUSION

In this paper, we formulated the problem of maximizing QoM in multi-channel infrastructure wireless networks with different a priori knowledge. Two different models are considered, which differ by the amount (and type) of information available to the sniffers. We show that when complete information of the underlying cover graph and access probabilities of users are available, the problem is NP-hard, but can be approximated within a constant factor. When only binary information about the channel activities is available to the sniffers, we propose two approaches (QLICA and BICA) so that one can map the problem to the one where complete information is at hand using the statistics of the sniffers' observations. We further conducted a detail study comparing the performance of QLICA and BICA. Finally, evaluations demonstrate the effectiveness of our proposed inference methods and optimization techniques.

In this paper, we investigate the channel allocation for sniffers to maximize the Quality of Monitoring (QoM) for wireless monitoring networks, which is proved to be NP-hard. A Multiple-Quantum-Immune-Clone-based channel selection algorithm (MQICA) is put forward to solve the problem. By theoretical proof and extensive experiments, we demonstrate that MQICA can solve the channel allocation problem effectively, and outperform related algorithms evidently with fast convergence. As an ongoing work, we are reducing the computation complexity and proving the convergence performance of algorithm in theory.

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