Slow Intelligence System Framework to Network Management Problems for Attaining Feasible Solution

T.S.Baskaran [1] and R.Sivakumar [2]

[1]Department of Computer Science, A.V.V.M. Sri Pushpam College, Poondi, India.
[2] Department of Computer Science, A.V.V.M. Sri Pushpam College, Poondi, India.

Abstract:

As a new approach slow intelligence system is proposed to manage the network problem. The architecture and special feature of SIS is to improve the result and get the feasible solution for the network management problem through a process involving such as enumeration, propagation, adaptation, elimination and concentration. Steps of initial experimental result are also focused.

Keywords: Network Management – Slow Intelligence System – Feasible Solution

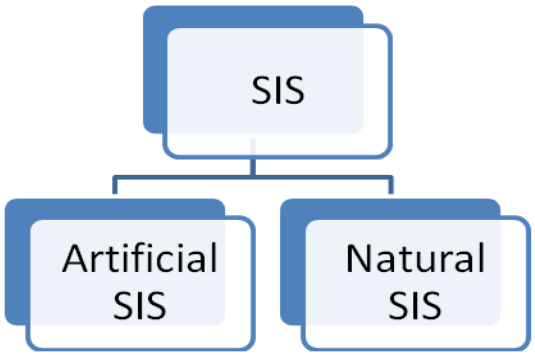
1.Introduction:

The modern computerised world is controlled by the network. Each and everything is easily accessible to people via media and social network. Provision of purchasing the essential things and home goods via internet online market is available. World becomes quite small, because of network development. This significant growth has increased the problems of network management in large measure.

The operation, administration, maintenance, and provision of network system can be referred by the activities, methods, procedures, and tools of the network management systems[1]. Frequent Changes, Minimal Visibility Control and Low-Level Configuration is the addressing challenges in network managements. FCAPS (Fault, Configuration, accounting/Administration, Performance and Security) is an acronym in network management area. There are many third party network management solutions available, such as WebNMS [2] and Zabbix [3], which exist for enterprises and other organisations with large networks. But all the solution is optimise the problem and get the optimal solutions. Rarely do they get the feasible solution for the problem. If the problem is solved based on slow intelligence system, Exact feasible solution can be attained.

2.Related work:

As presented in paper ”SINMS:A Slow Intelligence Network Manager based on SNMP Protocol” by Francesco Colace, Shi-Kuo Chang and Massimo De Santo[4] from University of Salerno, Italy and University of Pittsburg, USA introduce a novel approach to the network management based on the use of SIS and methods to develop a system able to acquire, according to an SNMP standard, messages received from various server that are in the managed network and try to solve the problem and showed the experimental result. The Slow Intelligence System is a general-purpose system characterized by being able to improve performance over time through a process involving enumeration, propagation, adaptation, elimination and concentration phases. Similarly, the Slow Intelligence System approach will allow the system to automatically infer the actions to take. In order to test the effectiveness of the proposed approach[5], it has been applied to various LANs that adopt the SNMP protocol for the network management.



Fig(i) Types of SIS

3.Slow Intelligence and the phases:

A continuous process of SIS propogates and shares its experience with other solution generator. Finally, feasible solution is arrived.

- ✓ *Slow Intelligence System for some can also be a Quick Intelligence System for others.*
- ✓ *A Slow Intelligence System can evolve into a Quick Intelligence System and vice versa.*

These two points are the important points to emphasize in SIS.[6]

Quasi-intelligent systems and semi-intelligent systems have more similar characteristic of "Slow". Some of the characteristic of Slow Intelligence system may exhibit with Distributed intelligence systems, multiple agents systems and emergency management systems.

In Fig(i) explains, the slow intelligent system has two kinds like, (i) Artificial (Eg: interplay of multiple decision cycles, levels of abstraction, system architecture, evolutionary ontology, knowledge propagation rules, learning rules, prototype implementation, visual analytics for SIS and visual semantics for SIS and so on). and (ii) Natural.(Eg: The Natural ECO systems, social networks and so on and so far).[5]

In Slow intelligence system, the decision cycle provide the result in short run may or may not be better. But, the decision cycle long run time indicates a better solution. The refinement in multiple solution path is carried out. Finally, SIS confirms the better solution.[6]

- Enumeration: In problem solving, the list of solutions is enumerated until the approximate solution is obtained.

- Propagation: Every SIS knows its context and environment related to its process. Through the continuous exchange of information, SIS transmits information to other (logically or physically close) SIS's.

- Adaptation: Solutions are enumerated and adapted to the circumstance. In some cases, the mutations despite optimal solutions are the past numbered solutions which already attained in the previous network fault issuses.

- Elimination: Approximate solutions and feasibility conditions not satisfied solutions are eliminated, and exact solutions will be considered for next progress.

- Concentration**:** In the midst of the appropriate solutions, resources will be concentrated Only one feasible solution(or a few at a time).

4.Solution:

The solution for the problem is to generate the values for the decisions making as well as functions. There are three type of solutions like, (i) Optimal solution, (ii) Feasible Solution and (iii) Relaxed Solution.[7]

4.1 Optimal Solution:

There are many solutions to deduce the network problems, but the best solution(Quick Solution,according to the time taken) out of all solutions is the optimal solution.

4.2 Feasible Solution:

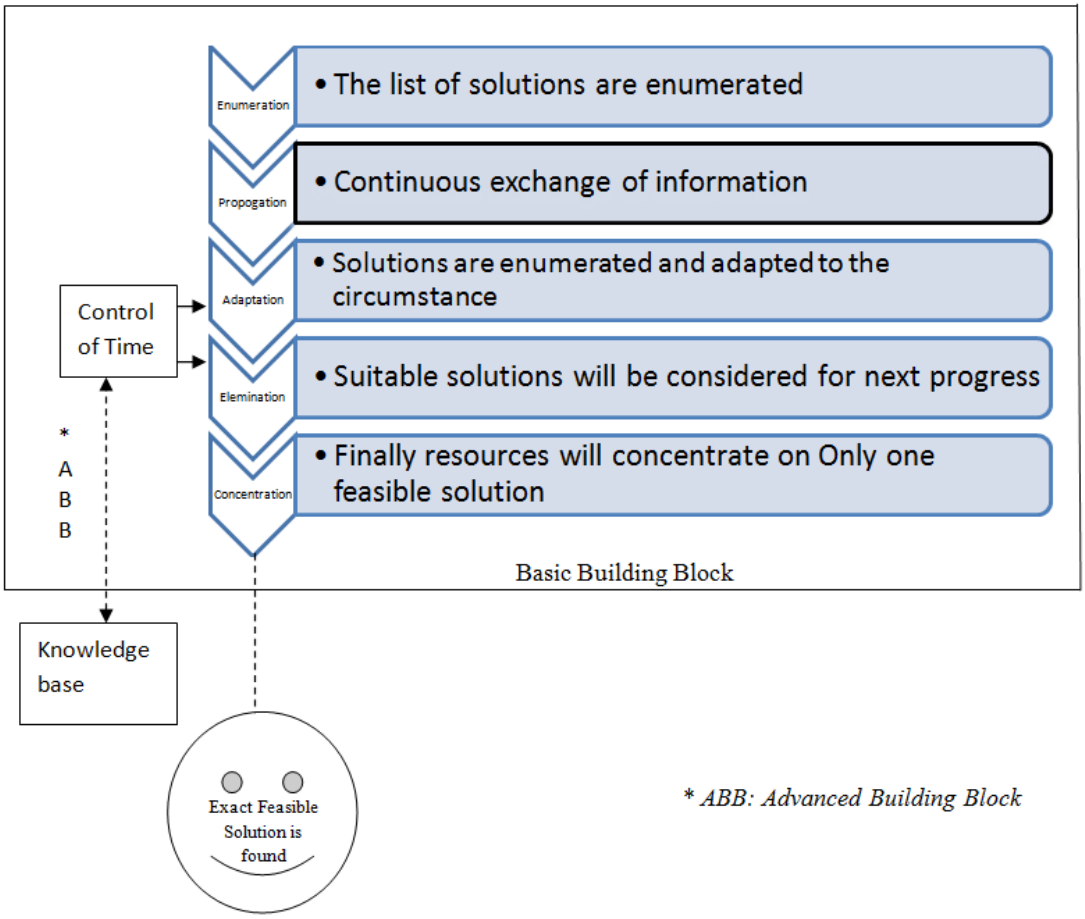
The conditions and constraints must be satisfied and generated best solution(Slowly get the solution) is the feasible solution.

4.3 Relaxed Solution:

In the relaxed problem, the solutions(0-false, 1-true) are not required to be binary but are allowed to take any values between 0 and 1.

5.Network Management Framework Based on SIS:

In this section, we described the Network Management structure of the proposed tool through the description of its major components. Particularly, the network management structure shown in fig(ii) based on SIS approach explains, how the server manages a computer network based on the principles of the Slow Intelligence System.



Fig(ii) Building Blocks

The structure of a Slow Intelligence System by the introduction of Building blocks in fig(ii) are two types like,the basic building block(BBB) and advanced building block(ABB).

Problem and solution are both functions of time, thus the time function for problem as A(tt)problem, and the time function for solution as B(tt)solution can be represented. The timing controller is also a time control of time function (tt). For the two-decision-cycle SIS, the basic building block BBB can be expressed as follows:

if control of time(tt) == 'slow'

then / control of time(tt) is 'slow'*

**/ B(tt)solution = SL_concentrate (SL_eliminate (SL_adapt (SL_enumerate(A(tt)problem))))*

else

/ control of time(tt) is not 'slow'*

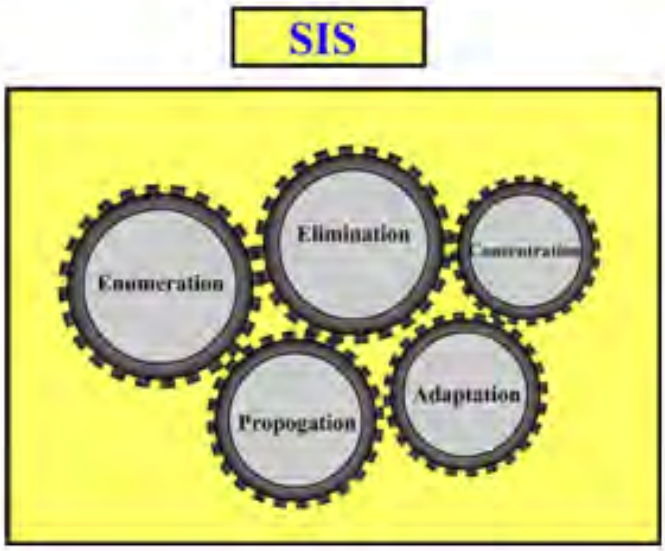
**/B(tt)solution = FA_concentrate (FA_eliminate (FA_adapt (FA_enumerate(A(tt)problem))))*

where SL_enumerate, SL_adapt, SL_eliminate, SL_concentrate are the transform functions for enumeration, adaptation, elimination and concentration respectively during slow decision cycles, and FA_enumerate, FA_adapt, FA_eliminate, FA_concentrate are the transform functions for enumeration, adaptation, elimination and concentration respectively during Fast decision cycles.

An Advanced Building Block can be a stand-alone system as shown in Figure(ii). The major difference between an ABB and a BBB is the inclusion of a knowledge base, further improving the SIS s problem solving abilities.

6.The Proposed Network Management Approach

The aim of this paper is to design and implement a network management tool based upon the slow intelligence system approach. The system follows the architecture showed in figure(iii) and this paragraph gives more detail on the operative workflow. First of all the server is described: it has the role to collect the information about the faults that are happening in the network and to solve them according the slow intelligence approach.



Fig(iii) Architecture of SIS Performened in Proposed problem

The operational workflow of the system can be described as follows:

Step 1: A message as result of a fault generated by a WAN/LAN s device is sent to a server "A".

Step 2: The server "A" receives the faults message and begines the enumeration phase.

Step 3: The server "A" tries to identify the problem through analysis of various methods that describe its knowledge base. If the fault event generated by the host of the network it is previously solved by SIS then the concentration phase can start (step 9). Otherwise the system infers a list of actions that can applied for the resolution of the problem and generates the solutions and the actions that the various hosts in the LAN have to apply. At this point the adaptation phase can start (step 7). If the local server "A" is not able to infer any actions the request is sent to the other neighbouring local server. In this way the propagation phase (step 4) can start.

Step 4: The central server tries to infer the actions that can solve the faults indicated by the web based event sent by local server "A" and find the solution forward it to server "A" . In this way the adaptation phase (step 7) can start. Otherwise the central server sends the web based events to the other local servers.

Step 5: The various local servers try to infer the actions from the received web based event. If actions are retrieved each local server sends them to central server.

Step 6: The central server collects the various answers from the local servers and send them to local server "A" and the adaptation phase (step 7) can start. If no answers are received from local servers, an empty action is sent to the local server.

Step 7: The local server "A" starts to adapt the actions according to the environment and components LAN/WAN s . After this phase the elimination phase can start. If no actions have been inferred in this phase a message to the network administrator has to be sent.

Step 8: The local server "A" selects the action to apply from the other ones collected in the other phases according to the predefined feasility conditions.

Step 9: The local server "A" can apply the action in order to recover the fault situation and update, if needed.

The system's performances have been evaluated according with the following approach: The aim of below index is the evaluation of the effectiveness of the system in the resolution of the faults.

The parameters precision and recall are typically used in information retrieval where a perfect precision score of 1.0 means that every result retrieved by a search was relevant whereas a perfect recall score of 1.0 means that all relevant documents were retrieved by the search. In our case the precision means how many events have been resolved in the correct way (the true positive) respect the number of events that system tried to solve. So in this case a false positive is a fault and the system managed is in a wrong way. The recall represents how many events have been resolved in the correct way (the true positive) respect the number of events that system could solve.

7.Conclusion

In this paper a new method for network management has been introduced. This method is based on Slow Intelligence System approach. The proposed approach introduces a powerful way for the improvement of the information model interoperable and allows the introduction of services for networks fault. The opportunity to continuously upgrade the knowledge base allows to continuously upgrade the capacity of the system to manage new faults. The future work aims to improve the system by the use of new and effective methodologies for the ontology management and the use of slow intelligence approach.

8.References

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