International Journal of Master of Engineering Research and Technology, 2394-6172-(O)
Volume-5, Issue-5, May 2018

A Fast Feature Reduction and Detection of Intrusion Based on Plant Theory Optimization

Naman Godre
Department of CSE
SIRT, Bhopal (M.P.)

Mr. Mayank Namdev
Department of CSE
SIRT, Bhopal (M.P.)

ABSTRACT
The process of features reduction enhanced the performance of intrusion detection system. Now a day used various features reduction algorithm. the available algorithm used for static as well as dynamic features reduction. The feature reduction technique behaves in dual mode. The reduction of features is cannot have fixed how many features are reducing for the better detection process of intrusion. The process of features reduction used plant grow optimization algorithm and for the process of classification used support vector machine algorithm.
Keywords: Intrusion Detection, PGO, Feature Matrix, SVM, Precision, Recall, Accuracy.

INTRODUCTION

An interruption recognition framework progressively screens the occasions occurring in a checked framework, and chooses whether these occasions are symptomatic of an assault or constitute a honest to goodness utilization of the framework. Figure delineates the association of an IDS where strong bolts show information/control stream while specked bolts demonstrate a reaction to meddlesome exercises [1-3]. As a rule, IDSs fall into two classes as per the recognition strategies they utilize, in particular (i) abuse identification and (ii) irregularity discovery. Abuse location recognizes interruptions by coordinating watched information with pre-characterized depictions of nosy conduct. In this way, understood interruptions can be recognized proficiently with a low false positive rate. Consequently, the approach is generally embraced in the larger part of business frameworks. Nonetheless, interruptions are typically polymorph, and develop constantly. Abuse location will flop effortlessly when confronting obscure interruptions[7-9]. One approach to deliver this issue is to routinely redesign the information base, either physically which is tedious and relentless, or naturally with the assistance of directed learning calculations. Lamentably, datasets for this pur-posture are typically costly to get ready, as they require naming of every case in the dataset as ordinary or a kind of interruption. Another approach to deliver this issue is to take after the irregularity discovery show talked about by Denning [12-14].

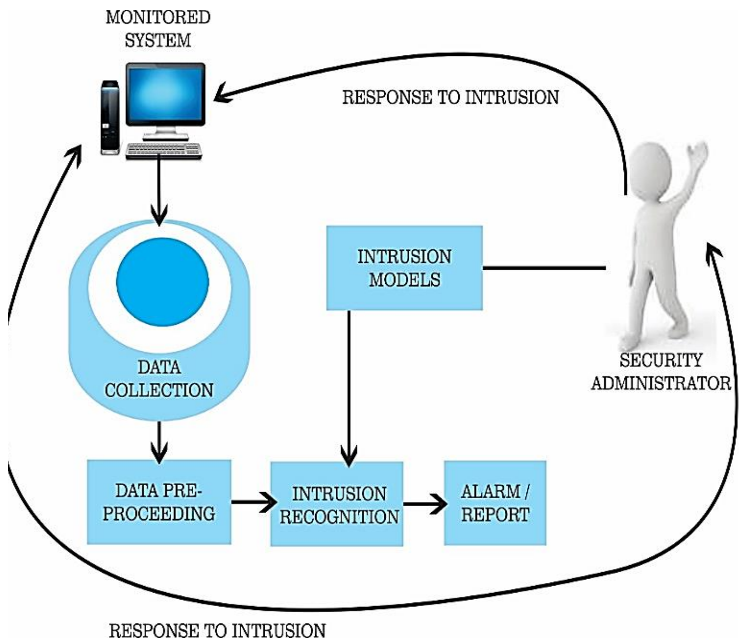

Figure 1: Organization of a generalized intrusion detection system[4].

In the rest part of our research, plant grow optimization described in section II, proposed algorithm explained in section III, Experimental and Result Analysis discussed in section IV and finally, conclusion and future work discussed in section V.

II. PLANT GROW OPTIMIZATION

The PGO take the solution space of the problem as the growth area of the artificial plant, one point of the plant as one potential solution to the problem. The algorithm searches the optimal point in the solution space through two behaviors [5-6]:

1. Producing new points by branching to search the optimal area where the optimum solution is;

Paper ID:- 2018/05/IJMERT/5/329

2. Growing leaves around the branch points to find the accurate solution in the local area;

Given the definitions of the preceding section, formally the Plant Growth Optimization is [10-11]:

Start

Initialize:

Set NG=0 {NG is the generations counter}

Set NC=0 {NC is the convergence counter}

Set NM=0 {NM is the Mature points counter}

Set the upper limit of the branch points N and initialize other parameters.

Select N0 branch points at random and perform leaf growth.

Assign morphogen

Calculate the eligibility of the leaf point.

Assign the concentration of the morphogen of each branch point.

Branching

Select two critical values between 0 and 1 randomly and dispose.

Produce new points by branching in four modes.

Selection mechanism

Perform leaf growth in all the points.

Pick out the mature branch points, the number of which is k $(0 \leq k \leq N)$, by the maturity mechanism.

Set NM = NM + k

Produce a new point in the center of the crowded area and select the best point to substitute the crowded points.

Eliminate the lower competition ability branch points and select N branch points for next generation.

Competition

Compare the current points with the mature points and get the best fitness value f_{max}

Set: $NG = NG + 1$

$If\ \left(f_{max} < f_{\max_{old}}\right) Set{:}\ f_{max} = f_{\max\_old}$

If $\left(\left|f_{max} - f_{\max_{old}}\right| < \varepsilon\right) Set{:}\ NC = NC + 1$

else

Set: NC = 0

else

Set: NC = NC+1

Check the termination criteria:

$If\ (NG < NG_{max}\ \&\&NC < NC_{max}\&\&NM < NM_{max})$

Goto step 2

else

Exit

Stop

One execution of the procedure from step2 through step6 is called a generation or a cycle.

III. PROPOSED ALGORITHM

Feature reduction and classification of intrusion data is major issue. For the reduction of feature used various optimization technique. In this dissertation used plant grow optimization technique for the reduction and selection of features. The plant grow optimization algorithm is inspired by the process of development of plants. The development of plants divided into three sections as describe below

1. Morphogen
   In the case of morphogen check the status of plants for growing.
2. Branching

In the case of branching check the section condition of new leaf policy

3. Termination
   Termination is final process of plant theory. The termination process gives the optimal solution of given problem

The following parameter is used for the process of path, x1, x2,…………..,xn is the path component of robot. W is the Wight factor for the path, T is the value of morphogen, c1 and c2 is contour value of path.

Step1. Define the value of path set set S1{x1, x2,…………xn} with population

Assign the value of contour and weight of path C1=0, C2=0 and W=0

a. Morphogen selection of plant function

$$F(s) = \frac{(Ffd-Fpf)}{Fd*fp}, wi\epsilon S(x1, x2 \ldots \ldots xn) \ldots \ldots \ldots \ldots \quad (1)$$

Here Ffd is process features set and Fpf is final features set of plant and w is set of path component of sum sets

The features set the value of branch $F = \{fa1 \ldots\ldots an\}$. these branch value proceed for the estimation competition condition of local leaf.

$$Fcom = \begin{cases} \dfrac{(T_i)^{\alpha}\left(LI_i^{S_j}\right)^{\beta}}{\sum_{g \notin S_j}(\tau_g)^{\alpha}\left(LI_g^{S_j}\right)^{\beta}} & if \quad i \notin S_j \\ 0 & otherwise \end{cases} \quad (2)$$

Here T is target value of features, and LI is the value of features difference.

Step2. Branching condition

Input the selected path for the Competition

1. Calculate the value of relative features of C1 and C2
   $\mathrm{Rf} = \frac{\mathrm{LSI}}{\mathrm{Wd}}$ Here Lsi the difference of intrusion features
2. The PGO estimate the optimal features for selection.

$$FS = \begin{cases} \dfrac{\max\ (RF)\ - F(s)}{\max_{h=1:}(WS)} & if \ \ s_i \in f_j \\ 0 \quad otherwise \end{cases}$$

(3)

3. create the relative FS difference value of features set

$$\mathrm{Rd} = \sum_{\mathrm{fd}=1}^{\mathrm{n}} \sum_{\mathrm{pf}=1}^{\mathrm{m}} (\mathrm{xi} - \mathrm{fs}) \ldots \ldots \ldots \ldots \ldots \ldots (4)$$

4. if the value of Rd is zero the features optimization process is terminated

step 3 Termination

. Where $Rd$is the relative difference of $T(i)$; f_z is the fitness value; standard deviation S_z and local density D_z are defined in formula (5):

$$\begin{cases} R_d = \sqrt{\dfrac{\sum_{i=1}^{n}(z(i) - E(z))^2}{(n-1)}} \\ f_z = \sum_{i=1}^{n}\sum_{j=1}^{n}\left(R - r(i,j)\right) u(R - r(i,j)) \end{cases} \quad (5)$$

.

Defining $d\big(z(k), z(h)\big)$ as the absolute distance between the two-optimal path

$$d\big(z(k), z(h)\big) = \sqrt{\big(z(k) - z(h)\big)\big(z(k) - z(h)\big)} = \sqrt{\big(z(k) - z(h)\big)^2}$$

$k = 1, 2, \ldots \ldots \ldots, N; h = 1, 2, \ldots \ldots \ldots, N$ and finally, path is terminated.

step 4 Input of classifier (SVM)

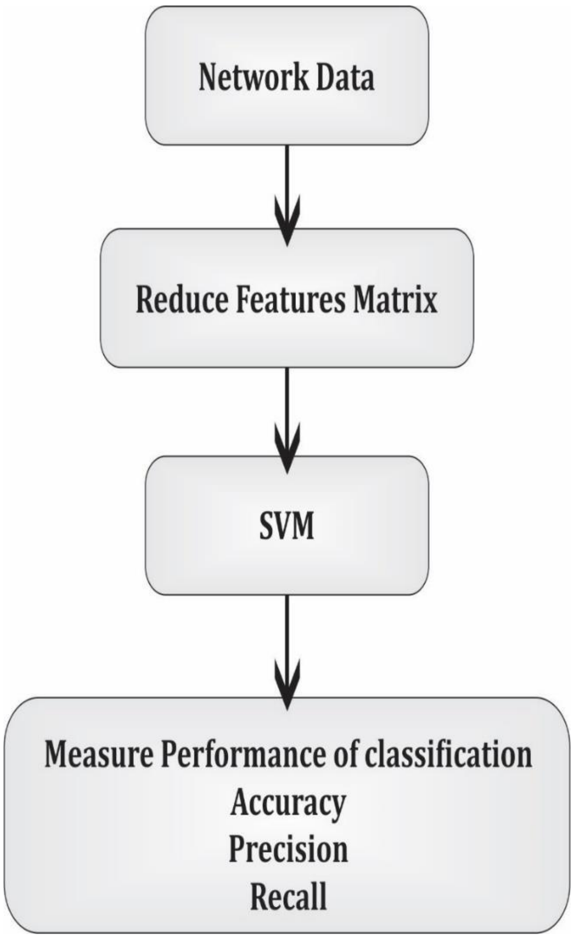

Figure 2: process block diagram of optimized features classification using support vector machine.

IV. EXPERIMENTAL AND RESULT ANALYSIS

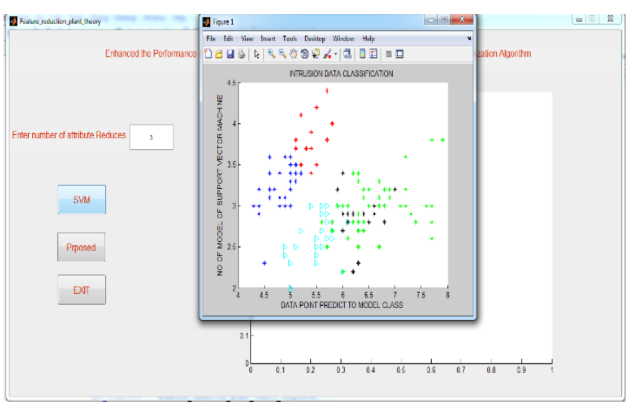

Figure 3: window show that the number of attribute reduce value is 3, using SVM method in Enhanced the performance of Intrusion Detection System Based on Feature Reduction using Plant Grow Optimization Algorithms.

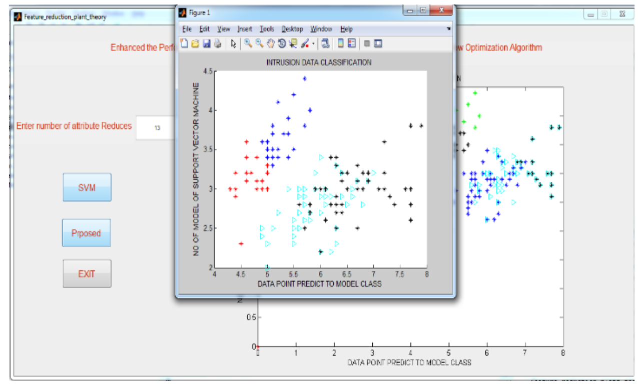

Figure 4: window show that the number of attribute reduce value is 11, using PROPOSED method in Enhanced the performance of Intrusion Detection System Based on Feature Reduction using Plant Grow Optimization Algorithms.

Method	Accuracy	Precision	Recall
SVM	80.265990	78.265990	77.265990
PROPOSED	87.870988	82.870988	83.870988

Table 1: Comparative output value of our implementation using SVM and Proposed Method with input number of attribute reduces is 7.

Method	Accuracy	Precision	Recall
SVM	82.870988	80.870988	79.870988
PROPOSED	98.940127	97.940127	99.940127

Table 2: Comparative output value of our implementation using SVM and Proposed with input number of attribute reduces is 11.

Method	Accuracy	Precision	Recall
SVM	85.265989	80.265989	81.265989
PROPOSED	99.940127	98.940127	97.940127

Table 3: Comparative output value of our implementation using SVM and Proposed Method with input number of attribute reduces is 18.

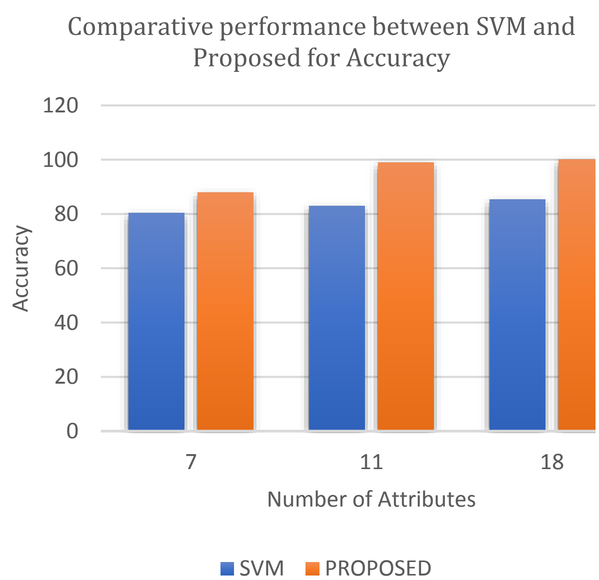

Figure 5: Comparative result graph based on the output value of Accuracy using SVM and Proposed Method for input number of attribute reduces is 7, 11 and 18 in Enhanced the performance of Intrusion detection System.

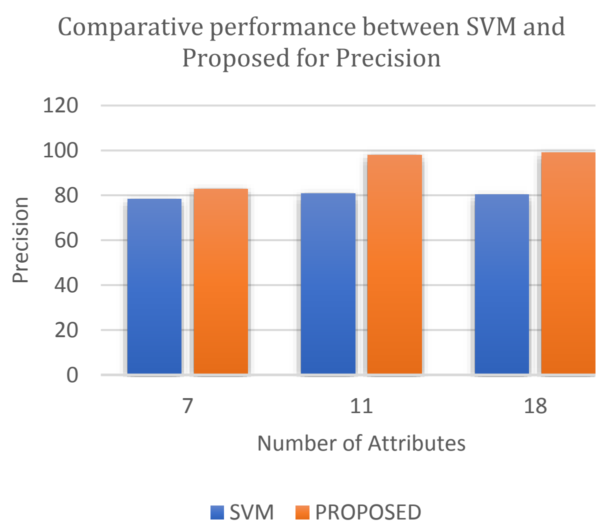

Figure 6: Comparative result graph based on the output value of Precision using SVM and Proposed Method for input number of attribute reduces is 7, 11 and 18 in Enhanced the performance of Intrusion detection System.

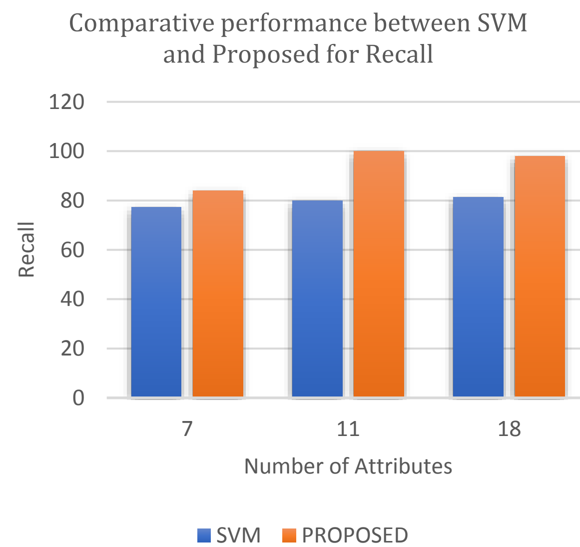

Figure 7: Comparative result graph based on the output value of Recall using SVM and Proposed Method for input number of attribute reduces is 7, 11 and 18 in Enhanced the performance of Intrusion detection System.

V. CONCLUSIONS

The processing of network data is very complex, now required the network features optimization. In this dissertation used plant grow optimization technique for the reduction of features. the plant grows optimization technique algorithm inspired by the behavior of plant kingdom. The reduce attribute classified by well know classifier is called support vector machine. The combination of support vector machine and plant grow optimization performs very well in compression of pervious feature reduction technique. The combination of plant grow optimization and support vector machine algorithm is better than SVM process of feature reduction and classification. The proposed algorithm is very efficient for dynamic attribute for the classification problem. The detection and classification process are better than previous method. In future, uses multi agent glowworm optimization algorithm.

REFERENCES

[1] Preeti Singh and Amrish Tiwari "An Efficient Approach for Intrusion Detection in Reduced Features of KDD99 using ID3 and classification with KNNGA", IEEE, 2015, Pp 445-452.

[2] Gaby Abou Haidar and Charbel Boustany "High Perception Intrusion Detection Systems Using Neural Networks", IEEE, 2015, Pp 497-501.

[3] D.P.Gaikwad and Ravindra C. Thool "Intrusion Detection System Using Bagging Ensemble Method of Machine Learning ", IEEE, 2015, Pp 291-295.

[4] Shelly Xiaonan Wu and Wolfgang Banzhaf "The Use of Computational Intelligence in Intrusion Detection Systems: A Review", Applied Soft Computing, 2010, Pp 2-42.

[5] Shi-Jinn Horng, Ming-Yang Su, Yuan-Hsin Chen, Tzong-Wann Kao, Rong-Jian Chen, Jui-Lin Lai and Citra Dwi Perkasa "A novel intrusion detection system based on hierarchical clustering and support vector machines", Elsevier, 2011, Pp 306-313.

[6] Asaf Shabtai, Uri Kanonov and Yuval Elovici "Intrusion detection for mobile devices using the knowledge-based, temporal abstraction method", The Journal of Systems and Software, 2010, Pp 1524–1537.

[7] Monowar H. Bhuyan, D. K. Bhattacharyya and J. K. Kalita "Network Anomaly Detection: Methods, Systems and Tools", IEEE, 2014, Pp 303-336.

[8] S. Revathi and Dr. A. Malathi "A Detailed Analysis on NSL-KDD Dataset Using Various Machine Learning Techniques for Intrusion Detection", IJERT., 2013, Pp 1848-1853.

[9] Mahbod Tavallaee, Natalia Stakhanova and Ali A. Ghorbani "Towards Credible Evaluation of Anomaly-based Intrusion Detection Methods", IEEE, 2010, Pp 1-10.

[10] Shaik Akbar, Dr.K.Nageswara Rao and Dr.J.A.Chandulal "Intrusion Detection System Methodologies Based on Data Analysis", International Journal of Computer Applications, 2010, Pp 10-20.

[11] Jayveer Singh and Manisha J. Nene "A Survey on Machine Leaning Techniques for Intrusion Detection Systems", International Journal of Advanced Research in Computer and Communication Engineering, 2013, Pp 4349-4355.

[12] A. M. Chandrashekhar and K. Raghuveer "Fortificatio of Hybrid Intrusion Detection System Using Variants of Neural Networks and Support Vector", IJNSA, 2013, Pp 71-90.

[13 Álvaro Herrero, Martí Navarro, Emilio Corchado and Julián "RT-MOVICAB-IDS: Addressing Real-Time Intrusion Detection", Elsevier, 2013, Pp 1-24.

[14] Bharanidharan Shanmugam and Norbik Bashah Idris "Hybrid Intrusion Detection Systems (HIDS) using Fuzzy Logic", Intrusion Detection Systems, 2011, Pp 1-21.