Global Scientific JOURNALS

PROPOSED INTRUSION DETECTION SYSTEMS BASED ON THE RAO-SVM MACHINE LEARNING ALGORITHM

Mansour Mohammed Hajajalajmi
Specialized trainer (B)
computer department
Higher Institute for Administrative Services

ABSTRACT

Scientific developments based on special applications in information and communications at the end of the last century and the beginning of the third millennium led to the creation of a different reality in all fields, as many of the concepts and principles that regulate the work of these fields declined, and the educational field was not immune to this transformation and development, as methods tended And the methods for the educational process towards adopting everything that is modern so that educational decisions, responsibilities and roles keep pace with the modern interactive environment. This included scientific research that represents the qualitative development of educational contexts and structures.

KeyWords
Systems - Intrusion Detection - Machine Learning Algorithm - Rao-SVM.

Introduction :

Scientific research is the basis of human progress. Experiments and research based on scientific objectivity have contributed mainly to improving life and the conditions for living in it. The fields of scientific research are not limited to one aspect or the other, but rather include all fields and specializations. It is one of the basic building blocks of educational institutions and the most important important activities carried out. To develop and improve the quality of performance of these institutions by providing an environment in which the scientific energies with the experience necessary to bring about change are integrated.(Boumaaraf, 2023: 102)

It has been noted at the beginning of recent times that there has been an increasing reliance on confidentiality, privacy, and security applications within educational institutions, so that educational content is presented under conditions and variables that suit emergency situations, or with directions that aim to achieve an educational and learning pattern in societies in an expanded manner. Technology, its tools, means, programs, and decisions, are... A suitable alternative for this, especially since the Corona pandemic has put educational institutions in front of one option, which is distance learning, e-learning, or blended learning. As a result, information security has become a major option for moving from within the spatial space (the classroom) to the larger space outside the classroom, (Al-Haimoudi, 2023: 177).

Higher education and scientific research are mainly linked to advances in innovative technologies and the high computational capabilities of smart machines. Among these technologies, artificial intelligence provides new opportunities and challenges for protecting networks. Moreover, it has the potential to create effective changes in the basic structure of higher education institutions (Negm, 2023: 89), It is currently progressing at rapid pace, and this is already affecting the deep nature of services within higher education. Deakin University in Australia has moved towards implementing a form of network security through the supercomputer Watson from IBM to help and guide students. This innovation has led to modifying the quality of services and the use of time. Practical within the university. It relies on programming-based solutions, while some of these solutions have an integral part of the ability to make predictions and learn different educational styles. (Nassif, 2023: 27)

Theoretical framework :

Today, it is considered an important security approach that many educational institutions rely on to protect networks and information, because it has attracted the attention of many scientists and researchers in various fields, due to the continuous developments that this field has witnessed that have achieved important impacts on the future of humanity at all levels due to its focus on

protecting information security. And help it in various daily tasks that affect a person in his professional, social, health, and other lives, as it has become more advanced and used in our daily lives.

Classification issues affect the educational and academic aspects as they relate to machine learning in light of the difficulties facing students' studies. The economic ones in particular, and therefore it represents a solution to combine machines and human capabilities to ensure the achievement of educational and teaching contexts and outcomes, as well as further challenging the pillars of the educational process to search for modern educational methods, methods and functions that push towards modernity in integrating technology and education, and one of these algorithms is the Support algorithm. Vector Machine, which has the symbol SVM:(Negm, 2023: 89)
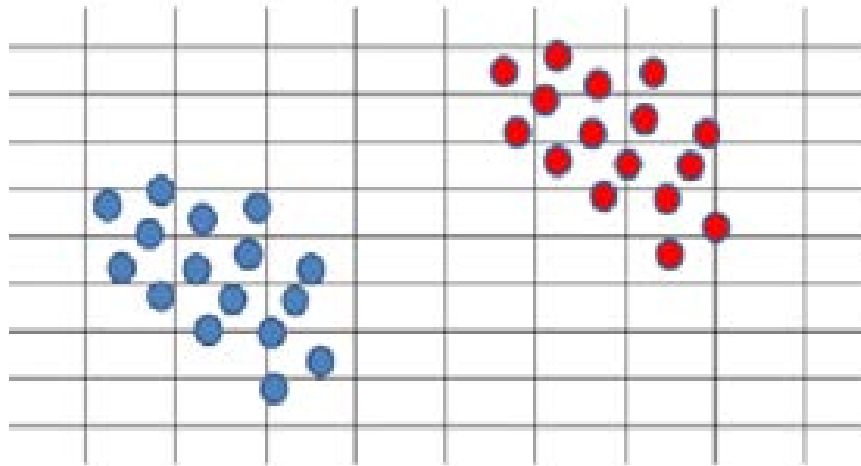

Figure (1) SVM algorithm

It is clear from the previous figure that the main idea upon which the SVM algorithm is based is on the idea of finding the best separating hyperplane that separates the groups, by trying to make the margin as large as possible, and the margin represents the distance between the training data and the separating level. Separating Hyperplane, which is the focus of the training process in the SVM algorithm environment.

Related studies:

Future challenges impose the need for scientific research to move towards benefiting from all special developments in technology. The digital system is currently prevalent in all areas of life, and the future predicts more rapid developments in technology. Therefore, scientific research, which represents the cornerstone of university academic work, requires that... It keeps pace with all axes and patterns of knowledge to invest its scientific results to achieve the concept of comprehensive and sustainable development (Ismail, et al., 2007: 4), The need to enhance skills and capabilities through the rapid expansion of technology to use technology to secure educational networks. Innovation in education is not just a matter of integrating more technology into classrooms; Rather, it is about modifying teaching curricula so that students gain the skills they need to succeed in competitive global economies.(Agustín, et al., 2023)

The necessity of employing technology systems and techniques in all fields and organizations that seek to employ knowledge to achieve creativity and research innovation, allocating technical units and human competencies, and conducting many practical and field studies that link improving research knowledge using the NDS network security approach.
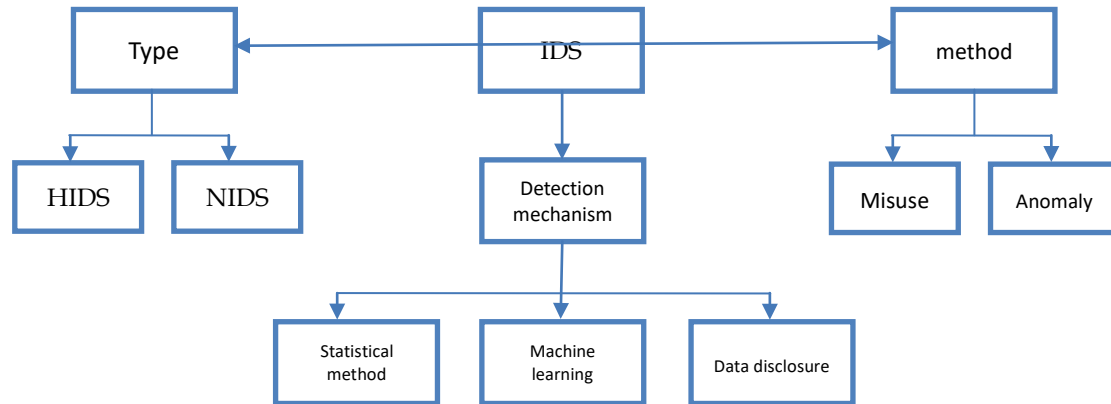
Figure (1) Overview of the IDS intrusion detection system

1- Detecting bad errors:

Artificial intelligence is a branch of computer science that specializes in designing programs that can simulate mental and human capabilities, and some of its work patterns, such as learning, problem solving, planning, reasoning, decision-making, perception, and communication. These patterns help smart machines to complete new tasks that have not been programmed without intervention from the element. Human. (Krishna, 2003)

There are many roles played by artificial intelligence that contribute to developing scientific research skills, such as:.

- **Robots used in the educational process:** They are an important part of artificial intelligence systems, as they are software that simulates the conversational processes of real people, in addition to providing interaction between the learner and the prepared program, using text or voice messages, as it is programmed to work independently without human intervention. The aim of this robot is to use it to answer questions that may be asked to it, provide answers from the databases stored in it, and call them up and answer the questions and inquiries of others like a real person.

- **Smart teaching systems:** These systems provide specialized educational lessons for students in different subjects and sciences. These systems are applied using artificial intelligence to mimic the teaching process carried out by the teacher inside the classroom, in addition to providing classroom and extracurricular activities that suit the learner's needs, which contributes to reducing The teaching load on the teacher in the classroom.

- **Smart content:** It means creating digital content by a robot with the same skill as a human. It can help in converting printed school books and notes into a digital format or creating educational digital platforms for students of all ages, and making them available at any time and place using the Internet. This content also varies in Media presentation methods including video, audio, online learning assistant, and virtual content such as digital lectures and virtual conferences have become a reality that has resonated during the Corona crisis.

- **Expert systems:** They are specialized programs designed to resemble human behavior or skills. The capabilities of expert systems stem from the fact that they can be used at any time to support, improve, and enrich learning processes, as it is a type of computer software system that contains many aspects of cognitive and skill learning in science. specific

2- Search for a defect:

The tremendous technical and technological developments have brought about changes that have included many areas of life in various aspects, the most important of which are scientific research skills, as it was necessary for educational institutions to keep pace with these developments in order to keep pace with the technological development occurring due to the development of assistive technology in securing networks, which has confirmed its effectiveness in many fields.

Suggested approach:

Networking skills reflect the ability of researchers to present their ideas, proposed approaches, and steps, and compare them with the ideas of previous researchers in the proposal, in addition to reviewing points of agreement and disagreement, and justifying that objectively and logically. It also means his ability to define the problem, formulate it clearly and accurately for the study, and choose the appropriate approach. Reviewing previous studies and literature, linking their results with his study, and working to build an appropriate tool that contributes to answering the problem.

The classifications of network security skills have varied, as some believe that the necessary skills that the researcher must acquire make him a discoverer and innovator rather than a receiver, and he possesses observational skills and the ability to use scientific research skills to communicate information.

It contributes to helping researchers choose an appropriate research design, how to examine sources of information, choose the research problem, and design scientific experiments to ultimately reach a solution to the problems.

Experimental setup :

The steps to secure networks are summarized as follows :

- Control and organization: Securing networks is a scientific, organized, disciplined, precise and planned activity. Problems, hypotheses, observations, experiments, theories and laws may be achieved and discovered by organized mental efforts, so they are not the result of chance or improvisation.

- Theorizing: Securing networks is based on theory to formulate hypotheses and build concepts.

- Experimentation: The idea of securing networks is based on conducting experiments and testing the validity of hypotheses.

- Renewal: It proposes the idea of securing networks for new and renewed knowledge, through which old knowledge is replaced with newer knowledge that is in line with the emerging variables.

- Generalization: The mechanism of securing networks allows for the dissemination of results, because knowledge and information do not acquire scientific status unless they are generalized research and accessible to anyone.

- Deduction: Generalization leads to derivation of the theory that explains relationships based on variables, so the research cycle returns to theorizing.

Results :

The table below shows the accuracy results for both datasets, and the accuracy result for the UNSW-NB15 dataset is shown in Table (1):

Table (1) Accuracy result of UNSW-NB15 dataset

Category	Rao	
LR	17	0.971
	18	0.943
SVM	16	0.932
	19	0.915
ELM	19	0.922
	20	0.9315

Algorithms are not a programming language, but rather the methods of analysis and thinking that we must follow in order to be able to write codes correctly RAO-SVM using the three ML techniques, and it also provided better time accuracy using the LR techniques. and SVM ML. However, RAO-SVM provided better execution time with ELM compared to RAO-SVM.

Summary of results :

Most of those who try to learn programming see them go straight in the wrong direction. They start directly studying a specific programming language such as (Java, C, C++) without learning the basic principles of programming, and without developing the basic ideas of the program and then analyzing and performing them one by one. .

Algorithms are the most difficult part of programming, and when we learn them correctly, this means that you are able to learn any programming language you want, because in reality, if you do not know how to deal with the code and address all the problems that you face while writing the code, then you will give up and stop where you are at the first trivial problem that appears. In the code, you have wasted your time because you do not know how you should solve the problem you are dealing with. Therefore,

when we finish analyzing the program, it can be written in any programming language we want with ease.

References

[1] Agustín Lara A , & Vicente Mayor A, & Rafael Estepa A , & Antonio Estepa A , &Jesús E. Díaz-Verdejo, (2023) : Smart Home Anomaly-Based Ids: Architecture Proposal And Case Study, Internet Of Things Journal, Vol. (22), No. (4).

[2] Al-Haimoudi, Badr (2023): CybersecurityAnd The Protection Of Information Systems, Volume (1), Number (2), North African Journal Of Scientific Publishing, African Academy For Advanced Studies, Libya.

[3] Boumaaraf, Manal (2023): Sirian Bullying, Its Causes, Methods, The Most Important International Programs To Confront It, Volume (7), Special Issue, Rawafed Journal For Studies And Scientific Research In The Social And Human Sciences, BelhajBouchaib University Center, AinTemouchent, Algeria.

[4] Ismail A. Ghaffar& Mohamed Aborizka, &Khaled A. Fatah (2007) : An Architecture For Distributed Intrusion Detection System Using Autonomous Agents, Proceeding Of The 12-Th Asat Conference, 29-31 May 2007.

[5] Krishna Kavi, David C. Kung, Hitesh Et. Al., (2003) : " Extending Uml For Modeling And Design Of Multiagent Systems", 2nd Intl Workshop On Software Engineering For Large-Scale Multi-Agent Systems (Selmas2003), Portland, Or, May 3-10, 2003.

[6] Nassif, Ahmed Mostafa (2023): Merging CybersecurityInto The National Security System: Cybersecurity And National Security, Issue (645), Money And Trade Magazine, Al-Tijara Club, Egypt.

[7] Negm, Al-Sayed (2023): Vogue Cyberspace Wars, Issue (418), Journal Of The National Progressive Unionist Gathering Party, Egypt.