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**CYBERSECURITY IN E-GOVERNMENT: A CASE STUDY
MALWARE ATTACK DETECTION**

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Master's Thesis

Supervisor

Prof. Dr. Osman Nuri UÇAN

Istanbul, (2022)

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Shaymaa Mousa Abdullah AL-GABORY

DEDICATION

I dedicate this thesis to my supervisor, father, mother and my all friends.



ABSTRACT

CYBER SECURITY IN E-GOVERNMENT: A CASE STUDY MALWARE ATTACK DETECTION

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One of the new concepts offered to us by rapidly advancing technology in these days we live in the internet age is "Electronic Government (e-government)". E-government, state and citizen in the digital environment; is to establish a simple, fast, low-cost, uninterrupted and secure relationship. E-government, which helps citizens and governments in the internet age in order to fix the messy bureaucracy, takes the service transactions offered to the public to the citizens' feet instead of keeping them in archives, and performs these transactions in an easier, cheaper, more transparent and more modern way.

In this study, malware attacks investigated in e government applications. The proposed method combined KNN based whale optimization algorithm and K-mean to enhance the performance of the model. furthermore, several classifiers such as DT, SVM and KNN applied to evaluate the results. In the last stage, the proposed method compared with several studies presented in this field and show that the presented biometric system is best with 99.54% accuracy.

Keywords: Whale optimization algorithm, E- Government, SVM, KNN, Biometric System.

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ABBREVIATIONS

GIS : Geographic Information Systems

SVM : Support vector machine

NN : Neural Network

RBF : Radial Basis Function

1. INTRODUCTION

Since the beginning of the 1990s, thanks to the acceleration of technological advances, the introduction of the internet into our lives, and the easier access to computers and mobile environments, the provision of many traditional services in electronic environment has come to the fore. In this context, the sector that receives the most service in daily life is the central and local public institutions. Therefore, public institutions have started to see these developments as opportunities and use information and communication technologies (ICT) to deliver their services to a wider audience without being affected by geographical restrictions and physical barriers, at lower costs, with less bureaucracy and 24/7. they are oriented. The concept of e-Government, which emerged in this process, entered our lives in the form of providing the services currently provided by public institutions to citizens, the private sector and other public institutions in the electronic environment, and its scope has expanded further in the process and has taken a more holistic form to include foreign citizens and refugees. . While the widely accepted definitions of e-Government are “the use of information and communication technologies, and especially the internet, as a tool to provide better public service” by the Organization for Economic Cooperation and Development (OECD) [1], the United Nations Economic and Social The Department of Business elaborated the traditional definition of "use of ICT to increase the efficiency of public institutions and to provide public services online" as "sharing information and services electronically with citizens, business world and other public institutions". . If we refer to all segments served by e-Government as "beneficiaries" and to central and local public institutions providing services as "service providers", this new form of service not only makes life easier for beneficiaries, but also creates more effective and efficient service provision opportunities for service providers. we'll see. As a matter of fact, human resources are saved by providing existing services via electronic infrastructures, this capacity is utilized in more qualified areas, and office and operating costs are minimized. In the processes, stationery (document preparation, printing, paper and postal expenses, archiving, etc.) is eliminated, transparency and accountability are increased, and time is saved by providing services to a much larger segment in unit time. Another invisible saving in public resources is the indirect costs and losses that the citizen has to make in order to receive this service (labor losses due to work permits, transportation costs when returning to the public institution, deprivation of rights due to health problems, and having to cover the cost

of stationery). losses due to bureaucracy, fraud risks caused by document-based work, loss of rights due to not being able to access the most up-to-date information instantly, etc.).

E-Government services, which emerged with the provision of services by public institutions in electronic environment using information and communication technologies, reached a higher level of maturity especially since the beginning of the 2000s and started to reach wider audiences. Although the main and only output of e-Government services seems to be the official document showing the service provided, the data collected from the applicants for the provision of this service, the data obtained from other institutions and organizations for the realization of the service, and the new data produced as a result of the service. Since it has reached very large volumes, it has become attractive in many respects to generate added value from these data [2]. In particular, the desire to use data as an analysis tool to improve the quality of the service, the use of technologies such as artificial intelligence in this process, but the need for high-volume and diverse data stacks for the maturation of decision mechanisms of these technologies, the need to produce statistical results, the need for such data to be a valuable asset in research processes. Many reasons such as being an input, the emergence of opportunities to produce economic value within the scope of open data have further increased the need for such data and made it more valuable. In order to provide this value, the data to be used as input must be qualified, that is, it must be error-free, complete, holistic and reliable. The way to achieve this in the e-Government project, which is the main data source, is through the successful construction, successful development and successful implementation of e-Government projects. The correct method to be used to achieve this is to use a software framework that will holistically manage the development and operation processes of e-Government software. Some measurements made in this direction, both by the private sector and the public sector, show that when the e-Government software framework is used, efficiency and productivity increase by up to 30%, data quality increases and more successful results are obtained in the development process [3].

In practice, a significant portion of the large data piles that emerge with e-Government consist of personal data belonging to the applicant and the individuals who are the parties to the application. For this reason, under normal conditions, institutions should destroy this data, which they keep electronically, after the storage periods specified in the legislation expire. At this stage, the personal data protection legislation includes "deletion" (preventing access to the data by the

relevant user), "destroying" (making the data inaccessible by any technological means) and "anonymization" (personal data, other data, etc.) for the destruction process. Even if it is matched with the sources and statistical methods are used, it provides the options. Of these methods, deletion or destruction are the easiest and risk-free technical methods. However, since this approach means that the benefit to be obtained from the data is also lost, tendencies towards more effective alternative methods have started. Therefore, there are many current and developmental issues such as research and development, academic studies, data analysis, generating economic benefits from data and revealing new application areas, creating projections for the future, needing big data as an input to artificial intelligence solutions used to increase the quality of a given service. The critical requirement makes anonymized data with the lowest loss an indispensable source of input. At the same time, with the Personal Data Protection Law No. 6698 adopted in Turkey in March 2016, as with the General Data Protection Regulation that entered into force in May 2018 in the European Union, rather than the destruction of data by deletion or destruction following the completion of the data retention periods ordered by law. Anonymization and re-use will become widespread. Thus, the development of anonymization models that cause less losses on this large data, which is not limited to only e-Government applications, but even in our country, consisting of hundreds of millions of places and records every year, will lead to large-scale social benefits. As a matter of fact, when the subject is examined in terms of contribution to social life, centers and universities that conduct research in all research and investments that take into account the distribution of population, need demographic information and the distribution of this information on addresses. Again, many academic and commercial researches in the field of health can produce more consistent solutions with real health data. Especially for educational research and investments, the data accumulated in the education world from pre-school to post-university is very valuable. Today, location data is indispensable for personalized services that increase the quality of life. It is possible to increase these examples in every sector. Therefore, providing an improved anonymization model, which keeps the benefit at the highest level while protecting the privacy at the highest level between the existing data and the people who need it, constitutes the motivation of this study [4].

The main objectives of the e-Government application can be listed as follows [5]: Savings in Public Expenditures: Public expenditures can be greatly reduced with effective planning to be made through e-Government [6]. Abolition of Paper Use in Government Services: With the

implementation of e-Government applications, paper-based; all kinds of transactions such as voting, health, tax, population and customs procedures, municipal services will be transferred to electronic environment and will allow all kinds of analysis. Transparent Service: Accessing all kinds of information online will bring the concept of "transparent state", state-citizen relations will be more transparent and state services will have a more accountable structure [7]. Service Standards and Quality: The services offered online will ensure that government services are offered at certain standards and quality. 7 Days and 24 Hours Service: In addition to the increasing service quality, the government will be close to the citizens as "a click" and will be open to service 24 hours a day, 7 days a week. In case of going to the institution during working hours, only the model of the state providing service will change.

The first e-Government applications in the world were made in the late 1990s, when the number of individuals with internet access began to increase. Due to internet access speeds, the first studies were informative, one-way studies from the state to the citizen. It is seen that some studies were carried out in Turkey in the same years. As a result of the rapid increase in the number of individuals accessing the internet together with the internet access speeds, the studies are diversified and become more interactive. In the world, examples of EDGovernment studies have been seen primarily in local governments. Besides developed countries, developing countries also attach great importance to the development of e-Government applications [39], although their objectives are different.

1.1 THE PLACE OF E-GOVERNMENT IN THE INFORMATION SOCIETY AND THE IMPORTANCE OF DATA

Since the 1920s, along with technological developments such as the telephone and transistor, the races of countries in the nuclear and space fields and the application of the technological experiences they have gained on this occasion in the field of production have caused the ongoing race in the industry to shift towards the field of technology, a period characterized as the information age. has begun. According to the Brooks Act of 1949 [8], the General Services Administration (GSA), which is also responsible for the procurement of communication technologies (IT) to the federal governments, realized in the 1960s that it could benefit from IT in order to make the back office operations more efficient in purchases and started to use the

technology here. has begun. This awareness was later used in the National Finance Center of the Department of Agriculture to control the financial flow of commercial shelf products to prevent duplications and errors of human origin. However, especially since the early 1990s, these productivity efforts in the back office have met with a new approach. The Federal CIO Council has recognized that IT systems can also be used in service to the citizen (G2C). In the same period, NPR (National Performance Review) Report, also known as “reengineering government”, started to emphasize heavily on government services where IT is used. Particularly, the 1997 February report (Access America: Reengineering Through Information Technology) published by NPR is remarkable in this regard because it emphasizes the approach known today as e-Government in federal services [6]. During this period, it is seen that the National Science Foundation (NSF) and the State Council of Excellence also have studies on the digital state. The first concrete environment in this regard is the official US e-Government Gateway, which was put into service in September 2000 and promises that all kinds of services expected from the government can be accessed from this address, which started its service at the address "firstgov.gov". The concept of government-to-citizen service (G2C), which emerged in this process, started to be included in the work of international organizations at the beginning of the 2000s, and the concept of e-Government built on the basis of the information society emerged.

In the same period, a Short-Term Action Plan was prepared in our country in 2003, followed by the first "Information Society Strategy and Action Plan" (BTS) covering the period 2006-2010, and the second BTS for the period 2015-2018. has been published. Since the early 2000s, in the field of e-Government, where services have begun to be provided at a certain maturity level, concepts such as e-governance, e-participation, and techniques such as national data center have been incorporated into the “Effective E-Government” in which more integrated and holistic service is focused. period appeared. Nowadays, it is seen that studies in the field of digital economy, which focuses on using developing technologies such as blockchain, artificial intelligence, platform economy, internet of things, especially in the economic field, based on the development in e-Government, are gaining momentum. When this process is taken into account, in the e-Government approach, in which the main aim was "service", in which the government aimed to deliver the service electronically anytime, anywhere and to everyone in the first periods, the data collected during this service and also produced as a result could be an output or waste information. While evaluating this output, it has been seen that it is possible to provide the service more

effectively by analyzing this output in the following periods, methods such as artificial intelligence, data analysis and anonymization have gained importance. It has been realized that it is the main factor in producing statistical results and also plays a critical role in determining national targets and strategies. For these reasons, since the data, which is described as the fuel of 13 ages, is seen as the most important input source, since the targeted purpose has been achieved and the storage period has expired, instead of being destroyed, it has started to gain great importance.

"Success" in e-Government projects started to gain importance when the advantages of putting this form of service into operation as soon as possible, due to the significant gains provided by e-Government to both the beneficiary and the service provider, and the value of the data, which is the output of e-Government, started to increase. The more successfully an e-Government project is implemented, the higher the quality of the data to be generated and the potential added value to be generated. Therefore, similar to the negative effect of data losses that occur during anonymization on the result set, especially the failure to ensure the integrity of personal data and the low quality of the data will cause deterioration on the result. Therefore, before the anonymization process, in order for the data in question to be qualified and holistic, a successful project setup, realization of development, implementation of technical models that will ensure and maintain integrity, in addition to these, it is necessary to continue the similar line in the operation process and to realize this whole process at the targeted time. It is open. These requirements reveal the need for a holistic framework for e-Government software projects. 14 e-Government services require 2 basic technical components. The first is a software that provides the service, and the other is the communication infrastructure required to access this software. When the software development phase that emerges in the technology component of e-Government is examined, the success criterion gains importance. In the e-Government software project, it is not enough to see the success criterion as "the completion of the software in a way that will provide the targeted functions completely and without errors", but the "complete completion of the project at the targeted time and within the planned budget" is accepted as the basic success criterion. In other words, failure to complete the project is considered a failure, while the failure to complete the project on time or its implementation at a cost exceeding its budget are other failure criteria. To give an example, at the stage of bringing electronic signature capabilities to the software, there are different libraries published by different CSPs and it is necessary to develop separate codes for

each of them. In order to avoid the time and labor cost incurred in this situation, some projects do not provide support for all CAs libraries. This situation causes the beneficiaries of the project to suffer in terms of their electronic certificates. From the other point of view, if the institution prefers to introduce all libraries to its software in order to prevent this victimization, it has to solve it by outsourcing (via the private sector) when the information exceeding its technical capacity is required, which causes an additional cost. In addition, even if this need is met with the resources of the institution or with the outsourcing method, a repetitive technical investment is made. However, having an intermediate library (E-Signature National Library) that enables all ECHS libraries to work with any software will save all institutions from this trouble. If we look at the subject in terms of guidelines, the "Guidelines for Interoperability Principles" [9], which is obliged to comply with the Prime Ministry circular, was made mandatory by the Prime Ministry Circular No. 2005/20 and updated with the Prime Ministry Circular. In this guide, the technical standards that e-Government software must comply with in the process of electronic information and document sharing with each other in order to serve them in a holistic manner and in a standard are discussed. These include file presentation and sharing, formats to be used in documents, pictures, audio, video and animation files and compressed files, formats to be followed in correspondence documents, character sets, communication and data transfer protocols and standards to be used, principles to be applied in data integration, web site where this application will be published. It has been prepared with a holistic point of view, under many topics such as the standards that should be on the site, security criteria (web service, e-mail, e-signature, timestamp, encryption, summary creation, network security, personal data privacy etc.), standards to be used in GIS mapping. guidelines are included. Therefore, although it is a very valuable resource for an e-Government software project, it requires a lot of technical work to comply with all the technical issues specified in this guide. For these reasons, it is striking that it is partially applied in projects or sometimes not taken into account at all. However, such a software project.

Having a library component (National Library for Interoperability) that will allow it to comply with the national guideline will both provide significant savings to the institution and national integrity will be ensured among the software in the field of e-Government. It is possible to increase these examples for each legislation, guideline and standard. In the event that the libraries (E-Signature National Library, National Library of Interoperability and others) to be put forward in this way are brought together in a holistic structure in harmony (by taking into account the

technical relations between them), the “e-Government (National) Software Framework” will be created. The general architecture of the e-Government software framework, which was revealed in the light of all these determinations and evaluations, However, due to the limitations determined in the introduction, in this thesis, parts of the protection of the integrity of personal data and efficient anonymization are discussed rather than detailing the entire architecture in question. This framework specifically addressed what kind of an approach should be in order for the "Personal Data Revocation Center Model", which was put forward to prevent inconsistency between different previously reproduced copies, in the destruction (deletion, destruction or anonymization) processes of personal data, in order to work in an institutional structure. For example, the personal data:

- i. Deletion of personal data by the data owner by exercising the right to be forgotten,
- ii. Completion of the storage obligation, personal data deleted as a result of the institution's data policy or the request of the individual, partially or completely due to the related tables as a result of the restoration of another application data in the institution (unnoticed) being reused
- iii. The re-processing of the data made available in this way due to applications or automatic notification systems,
- iv. The fact that the same destruction process has not been applied in other copies previously shared with other institutions within the framework of the relevant protocols, although the data was duly destroyed in the institution.

1.2 AIM OF STUDY

- i. Presented new method for increase the security of E-government system..
- ii. The proposed method combined KNN which is effective machine learning supervised classifier with K-mean that is effective feature selection method. The K-mean role is to reduce the size of input features and reduce the load to the KNN that is not effective with huge number of features. then, the whale optimization algorithm applied for optimizing the structure of the KNN.

- iii. The presented new application based KNN combined with K-mean and Whale optimization algorithm decrease the execution time in minimum point to reduce the cost of the model and use little hardware resource.



2. OVERVIEW

2.1 E-GOVERNMENT

The reform of service delivery systems by many governments around the world by using Information and Communication Technologies (ICT) in order to achieve greater efficiency in the public sector has given birth to the concept of e-Government. However, the concept of e-Government does not mean giving computers to government officials or automating old practices, but aims to modernize and reform public administration. Many definitions have been made about e-Government in transforming relations between government agencies, businesses and citizens through the use of ICT. e-Government has been defined as “a form of e-Commerce in the field of management” and has been expressed as the processes and procedures required to provide electronic services to citizens and businesses, and to cooperate with public institutions and organizations. The primary objectives of this major reform in the public sector are; to increase efficiency, competition and modernization. It is defined as “the use of information and communication techniques to improve the activities of public institutions” [10]. e-Government has been seen as an application that will accelerate government processes in terms of ICT. It has been argued that the internal management hierarchy should be kept separate in order to keep the internal relations and connections between different government institutions simple [11]. e-Government is defined as the process of relations established and maintained through ICT between public institutions and their service and information providers and the beneficiaries of these services, and it appears as a structure that aims to offer these services to citizens. 20 e-Government has been explained as a concept connected to internet technology, where the state, citizens, businesses can play an important role in ensuring that they are effective and efficient. e-Government is defined as the provision of information and services to institutions and citizens through the internet and ICT. It is explained that it is a case aimed. e-Government is defined as a concept that includes citizens, businesses and other community organizations that widely use and implement ICT tools and provide more effective services to users. They expressed it as a broader concept that deals with the spectrum. There are many reasons for the widespread use of e-Government applications. These can be explained as follows. e-Government applications offer a wide range of services. In addition, the cumbersome and inefficient management of public institutions causes a serious loss of image in the eyes of the citizens who finance these institutions with their taxes. This situation directly

damages the trust in the state and public institutions. Because the state structure in states like Turkey is extremely large. Unnecessary public expenditures are also seen as the most important reason for the economic crises that have enlarged and unwieldy state structures. ICT should be used effectively to solve such problems. Thanks to ICT, effective e-Government applications are developed and these applications are widespread. Thus, it is aimed to achieve high savings in terms of time and cost. In countries where e-Government applications are widely used, it has been observed that this aim has been achieved and for this reason, e-Government applications have become widespread rapidly. By mentioning the general lines of the e-Government concept, in order to increase the awareness of e-Government services and to eliminate their problems;

- i. It is necessary to organize courses to raise awareness of the concept of e-Government and its functions,
- ii. There are many documents on paper to move from the existing structure to the e-Government structure and there are difficulties in transferring them to electronic environment,
- iii. Inadequacy of technical infrastructure in the creation of infrastructure in electronic environment,
- iv. Great distrust in electronic environments
- v. Insufficient human factor to maintain and repair these services
- vi. It can be listed as dependency on traditional infrastructure.

If the processes, awareness and difficulties of e-Government transition among countries are compared, Chile and Uruguay (America), Tunisia and Mauritius (Africa), Singapore and Bahrain (Asia) are compared. It has been determined that the differences between the transition to e-Government between countries are based on the socio-economic and educational level differences of the people living in those countries. At the same time, it has been shown that these systems can be used effectively with an effective control. An evaluation was made by collecting data from individuals at 3 different levels in Turkey, taking into account factors such as politics, power, communication, quality, competence, culture, infrastructure, and the results are listed below;

- i. People do not have sufficient knowledge in the fields of e-Services,
- ii. Public institutions have insufficient level of information in this field,
- iii. People are reluctant to switch from deep-rooted habits to new systems.
- iv. Insufficient ability to use technical infrastructure.

Lack of manpower capable of solving technical infrastructure problems Due to the above-mentioned reasons, it has been determined that the utilization rates of existing structures in the field of e-Services are low.

The concept of e-Government and its elements are examined in detail. The transition process from the traditional understanding of government to the understanding of e-government is revealed and its differences are emphasized. At the same time, e-Government applications in Turkey are presented in detail. The history, purposes, features and usage areas of e-Government application in Turkey are examined. It has revealed the requirements of the technical infrastructure necessary for the e-Government structure to be carried out without interruption.

The e-government concept identified the main stages in the development of e-government projects implemented in Korea in accordance with the vision of the European Union. Regarding the universality of the e-government concept, a solution approach was presented to accurately implement the e-government concept in developing countries. These proposed solutions are based on the social implications, difficulties and barriers faced by electronic government services in developed countries. Issues and barriers identified in this review included the instability of electronic services, financial deficiencies, various issues related to addressing security vulnerabilities, and cost and budget structures. Here; The most important common characteristic is the use of the Internet and ICT. With these factors in mind, the global success of electronic commerce has led countries to consider participating in electronic government. The difference between e-commerce and e-government is that e-government serves multiple customers (citizens, businesses, employees, and the government itself), and over the past 20 years, governments around the world have begun to implement e-government. electronic. state government project. ..Global interest in e-government is growing rapidly and its importance and role in the progress and growth of modern society is understood. E-government means that all government transactions are done

through e-government portals (big websites where all information and services are available online) and all transactions can be done by citizens. E-government projects are of vital importance to all governments in the world, as they represent the sector to achieve what it needs to achieve through administrative reform, reducing and improving waste and business efficiency in the sector. 28]. Recognized for the ability of various government sectors to provide information and services to citizens, businesses, and the government itself, e-government always acts accurately, quickly, and securely through its own website using information and communication technologies. communication. Gives skills. In addition, electronic government is a challenge that society must face. By considering the use of e-government and its impact on public misunderstanding in this context. Issues such as cyber literacy, employment, income levels, resistance to change regardless of urban area, civic education and awareness, digital segmentation, and privacy and security obligations have a direct impact on email use and the job. Government statement. Education is the most important factor to invest in to achieve the greatest social impact in e-government applications. Measures should be taken to internalize the concept of ICT by increasing computer literacy through education and training.

In today's world, computer applications have their place in all areas of e-government, business and people. Electronic services provided by computerized government systems increase the efficiency and productivity of government agencies. Internet is one of the most effective IT applications in the world of e-government due to its efficiency and effectiveness. The need for high performance computing applications is a major challenge for organizations providing advanced services. Therefore, the organization prioritizes services to meet the needs of its citizens. Thanks to the Internet, electronic government has become a milestone. The government is committed to developing services that are transparent and citizen-centered, with priorities. E-government is becoming increasingly important as an important tool for government organization and development. Initially, the development of e-government received positive feedback from both citizens and service providers, as it was seen as a constantly changing tool. According to a recent UN report, e-government has been implemented in 193 countries and is used as a governance and compliance tool. Despite the great interest in electronic government, some studies argue that electronic government as a technological tool is ineffective.

It is becoming increasingly difficult for e-government portals to expand new and existing technologies as threats to transaction security increase. To solve this problem, many countries (EU countries) have recently considered the deployment of cloud computing as a key innovation to make the e-government process efficient, effective and successful [12]. It has been observed that the use of cloud computing as a technical factor has a significant impact on the security aspects of users regarding e-government security and security measures for e-service providers. In addition, several technological innovations such as cloud computing, mobile technology, Internet, social networking and geographic information systems (GIS) have had a significant impact on the development of e-government. Although there is constant innovation in technology, e-government service providers must constantly update the technical aspects required to provide e-government services. Technological advances are changing the way people transact on e-government portals and we need to understand how these changes affect users and what needs to be done. Technological change is part of e-government research. For example, with the development of e-government via cloud computing, 25 citizens will face serious information security issues when running their businesses through e-government portals. Today's technology allows people to use mobile devices to access online government services such as cloud-based applications of the technology used in desktop personal computers. Therefore, people are aware of new contextual factors such as human-computer interfaces, ease of use of technology, ease of use, security, risks, privacy issues, and quality issues. For example, Facebook and Google Maps are two good examples that e-government organizations have adopted through private cloud services such as cloud storage. Cloud computing is still in the early stages of development, but many countries are starting to take advantage of this technology. Cloud computing emerged mainly due to the potential for poor security and privacy that allows citizens to transact on web portals developed in conjunction with e-government. Lack of information regarding security and user data protection may affect users' trust in government when transacting through government web portals characterized by changing circumstances. New technologies and business practices are brought into the organizational context primarily through areas and techniques such as project and program management, change, technology transfer, and business. Depending on the purpose or practical inclusion in the development of e-government applications, an effective electronic portal is created by applying some of these technologies. The concept of e-Government is classified in four critical stages:

- i. Web interfaces: Transparency of news websites e-Government processes and rules. For example, raising awareness of new models.
- ii. Limited interactions: Intranet connections - saving time and travel costs for citizens. For example, standardizing and simplifying rules, forms and information.
- iii. Transactions: Electronic provision of services and automated systems. For example, powerful network infrastructure and computerized operations with high processing power.
- iv. Transformations: Countries providing their services via e-Government, for example, government agency portals and expanding access.

From a country perspective, the transformation phase, including the implementation phase, is now opening to a new level and is beginning to spread to developing countries. The benefits of e-government are not limited to providing e-services to citizens. At the same time, the private sector (small businesses, large enterprises) can use e-Government applications to grow and innovate their business. E-Government can be seen as an impending revolution, especially in the context of developing countries, as public sector enterprises are inefficient and in their infancy. In this context, e-government has the potential to revolutionize the public sector and bring many unexpected benefits. The successful implementation of e-Government improves the processes of government agencies, increases their efficiency, and improves the management and delivery of public services. However, for e-Government applications to become popular and successful, a process is required, especially for the robust use of strategies and best practices. In addition, e-government programs must articulate the interests of citizens, the challenges they face, and the level of institutional change needed to be successful in specific circumstances.

However, the applications needed to support the delivery of e-Government services are not equally used by citizens due to the lack of technological infrastructure and lack of use of computers and software. Without this infrastructure, applications would not be widely available. Moreover, the challenges of implementing e-government include lack of adequate ICT infrastructure, security, privacy, political and cultural barriers, portal design issues, e-government from a regulatory and legal point of view, security, privacy, etc. Included. The need to consider such issues is clear and moderate, especially given the risks that may arise when transacting through researcher-led portals for citizenship. Since this approach is considered a serious problem, it must show that e-

government services can provide security while improving the services provided to citizens. How to ensure that citizens receive safe and effective e-Government services and provide citizens and researchers with a framework to understand the security and compliance issues associated with e-Government services. management. Citizens are either subjective or objective. Safe places differ both subjectively and objectively, so it is important to consider subjectively safe places online. Lack of information and insufficiency can be a serious obstacle if many of the factors affecting public safety are insufficient. In this case, e-Government users need a strategy to address situations that affect their online security. Its various aspects have been developed and emphasized. According to one of these definitions, e-government is information. This is a reconstruction model that can respond to the needs of the information society through the strategic use of communication technology and provide efficiency, transparency and development by communicating with citizens or institutions in an electronic environment [13]. According to the above definition, the e-government model is a model that handles the ideal structure existing in the democratic era through communication between the people and the state and participation in administration, which are the premises of democracy. “e” represents the tools that provide this transformation. The opportunities provided by information and communication technologies, namely “e”, will make the citizen an active element of participation in the administration [14]. E-Government is a transformation that not only shortens processes and facilitates communication, but also has financial gains. As the bureaucracy decreased and some transactions became unnecessary thanks to technology, some financial savings emerged. With the efficient use of resources and the monitoring of resource use, new financial gains also arise. Even the savings to be made from less use of paper, electrical energy and use of space will be enough to easily finance the transformation and prevent waste of resources. In order to implement the e-Government model, those who provide government services and those who receive services should be included in planned learning activities and their transformation should be ensured [15]. The large number of service providers and service recipients and the impossibility of bringing them together necessitate planning these learnings as e-learning activities. In our country, the number of people connected with information and communication technologies is increasing rapidly. According to TUIK data in 2010, the number of people using the internet in our country is around 30 million [16]. Considering that this number will increase in the coming years, it can be thought that learners will not have problems in meeting the minimum requirements for e-learning. Infrastructure works carried out in our country in recent

years are a part of this transformation goal [17]. All public institutions and organizations have acquired the necessary infrastructure to use and deliver the service. Local governments define their own processes and continue their transformation [18].

Information has been defined in various ways in different sources according to the fields in which it is used. With a general definition, knowledge is all of the facts and insights obtained through learning, research and observation. Information has been a phenomenon that makes its importance felt in every age. In antiquity, knowledge is an element that can only be accessed and owned by the wealthy segments of society. At that time, wealthy individuals who did not have economic concerns began to seek information. In the Middle Ages (in Europe), the element of knowledge, which was intertwined with the Christian doctrine, progressed under the control and direction of the church. Again, due to the nature of the existing knowledge stock at that time, it is seen that its use in connection with technology was very limited. Developments related to science in the New Age have been important milestones in world history. In this age, the relationship between knowledge and technology has increased. With the increase of this relationship, an economic and social transformation emerged as the "Industrial Revolution". Knowledge has continued to progress more systematically in this age. According to the sociologist Saint Simon, society living in the industrial age has four important characteristics. The first of these concerns the production of industrial society. Secondly, the method followed by the industrial society is regular, precise, clear and clear. Third, the organizing elements of the industrial society are the "new people". The new people meant are engineers, industrialists and planners. The fourth is built on the concept of "knowledge" of the industrial society. Today, there have been important developments and changes in the quality of information. While the relationship between information and technology has accelerated, access to information has become easier. This situation has increased the effectiveness of information in daily life and business life day by day. Today's developments in the quality, production, storage and sharing of information have led to the development of a new field called "knowledge economy". "Knowledge economy can be defined as the economic structure in which information is used effectively for economic and human development". The difference that distinguishes the knowledge economy from other economies is that knowledge has the first priority among economic production factors and the increase in the production and use of knowledge with the help of information systems. In this respect, the concept of knowledge economy causes knowledge to gain a quality that combines human, physical and knowledge

capital. Globalization also plays a significant role in the formation of the knowledge economy. Knowledge economies rise on a set of values formed by the mutual interaction of political, social and economic relations at both national and international levels. In this field, it is known that today knowledge economies are getting stronger. Closed social systems arranged with hierarchical and extreme rules do not provide the conditions on which knowledge economies can rise (Karahana, 2004: 4). In the globalizing economy, the technology of other countries that countries choose as economic partners, the level of development in information systems, and the success in inventions have become important. In fact, the more different an economy is from the other, the more preferable it becomes. These developments have paved the way for an increase in the importance of the knowledge economy. The use of knowledge economies has become a prerequisite for a country to be preferred by other countries as a commercial partner [19].

The Information Economy is an economy in which the Intermediary Functions Between Producers and Consumers Have Abolished. With the new economic system, the old means of communication are disappearing through "digital networks". The reason for the slow functioning of the old system is the lack of functional tools in the public and private sectors. In the digital system, on the other hand, the customers of the system do their work from their own computer. Thus, instead of going to an airline company's office and buying a ticket, individuals can do it themselves via the internet. The same applies to banks. Individuals can now log into their bank accounts with electronic passwords from the internet and perform their transactions. The e-government project, which regulates the relations between the state and the individual, can also be evaluated within this scope. This subject will be discussed in detail in the following sections. Computer, Media and Personal Service Technologies Integrate Each Other, Bringing the Information Economy to the Position of the Leading Sector. In this regard, the close relationship of the media with the information economy should not be overlooked. In recent years, it can be said that communication has become easier with the transfer of the media to the electronic environment, and the costs of advertising in the media have decreased with the increase in media activities on the internet. As of today, the cost of the page opened on Facebook on behalf of the company is negligible, and if we consider that the company reaches many customers thanks to this, the importance of the media in the information economy can be better understood. Factors such as reduced advertising costs and brochure costs, thanks to the sites opened on the Internet, can be counted among the advantages of this new system [20]. Knowledge Economy is an Economy that Produces Knowledge, Converts This Knowledge

into Product and Brings Continuous Innovations. These innovations can be in the form of realizing a process that remains in nature but has not been seen (discovered) before. Continuous innovation environment is possible with sustainable organizational learning and individuals with innovative understanding. These individuals are not ordinary individuals. The main feature of these is that they have a productive brain (a brain that reveals relationships that exist in the universe but that a normal person cannot see or discover) [21]. The Information Economy transforms the old mass production into customer-specific production. The producer tends to produce according to the needs and tastes of the consumer. While there are millions of products similar to each other, mass production, which is the most characteristic feature of the industrial economy, there is a process in which production is made according to the wishes of the customers in the information economy. There are designs according to customers. This situation brings with it another phenomenon. In this way, strong bonds are formed between the producer and the consumer. In the knowledge economy, this phenomenon is called the “Knowledge Highway”. With this concept, besides the disappearance of the distance between the producer and the consumer, a communication chain is also formed. In this way, the consumer is involved in the production process of the product designed for him. The information economy has led to a change in the understanding of the market and the emergence of abstract markets with today's technology. These markets provide direct communication by eliminating the institutions between the producer and the consumer in the previous period. For this purpose, virtual communication networks that unite such producers and consumers are formed in globalized markets. Knowledge Economy is an Economy where Speed is Important. Speed is very important for trading in two different and distant parts of the world in globalizing markets [22]. Thus, the concept of speed becomes an element that accelerates competition. Speed will play a key role day by day in terms of economic gain and competitive advantage. Knowledge Economy is an Economy Based on Research and Development Expenditures. In the knowledge economy, where competition is the leader, innovation and therefore R&D activities have a great impact on this economy. R&D activities must be very advanced in order to catch the new and be different all the time. In the process of transformation into a knowledge economy, the underlying reason for the high investment in R&D is the reflection of new information on products. As R&D studies increase, the desire of companies to explore and invent also increases [23]. Thus, a different employee profile emerges from those in the industrial economy. In the knowledge economy, it is an important condition for the personnel working for

this purpose to be innovative. It is an important requirement for these personnel to specialize in their fields and to follow new ideas and products to be put forward by rival companies, but in the globalizing world, rival companies may not always be within national borders. It is also important to be proficient in the use of superior speed and digital tools to follow competitors elsewhere in the world. In today's world where a new technological development is experienced every day, with the introduction of information technologies into our lives, public institutions, which are the organs of the state, have started to use these technologies in their business and transactions by making an effort to provide the services they will offer for citizens effectively, transparently, safely, quickly and uninterruptedly [24]. These efforts and efforts brought along a new process, the public began to take steps towards restructuring and complying with the requirements of the age, and today this structuring has moved to a very advanced point. In this restructuring process, which is generally called e-government, the public services offered to the citizens should be reviewed, a balance should be established between the duties of the institutions and the organizational structure, the services provided should be made effective, fast and of high quality, and the staff should be employed with the quality and capacity to act as an intermediary in providing these services. implementation of a public-oriented management approach has always been at the forefront. With all the technologies that can be classified under the name of information technologies and especially the internet technology, people have started to constantly compare and question the state they live in and the services it offers with other countries. This questioning causes people to want to receive safer, faster and higher quality service in our age [25]. As a result of these demands from their citizens, states have begun to move their services to electronic media, to environments based on internet infrastructure, and to transition to the logic of internet-based service provision, within the framework of the opportunities offered by this age, which is knitted with information and technology according to their financial strength and possibilities. Today, this change and transformation continues unabated with new technologies. Every new technology discovered helps a new type of service to come into play, so that citizens benefit from these services offered by their governments in the electronic environment. The quality and diversity of new technologies and the services offered depending on them changes in proportion to the power of the states. With the spread of this still ongoing e-government process and understanding, the services offered have become optimal, state-citizen relations have developed and improved as citizens have easier access

to services, and thanks to this new environment, a transparent state understanding based on 6 participation and in accordance with democratic traditions has begun to emerge [26].

2.2 HISTORICAL PERSPECTIVE OF E-GOVERNMENT

The age we live in is called the information age. If the concepts of ICT and government are to be evaluated historically, the emergence and spread of the concept of e-Government in this age is interpreted as a historical necessity [27]. In addition, the state has been defined as a set of rules and institutions consisting of a combination of classical and modern processes. According to this definition, the historical perspective of e-Government needs to be revealed. The emergence of e-Government is a result of adapting to technology and improving current performance. The concept of e-Government finds quite a new application area in most developing countries. In this context, it is a bipolar platform that combines the basic features of technological applications and public administration. For this purpose, e-Government applications focus on customer services, pre-processing and background applications [28]. e-Government first emerged in developed countries. The first applications of e-Government are encountered in countries that play a role in the beginning of the digital age and where technology is used effectively. The emergence of e-Government in the USA began when there was a need for an electronic framework through which the government would interact with citizens. It has largely found work with server-based background applications for general protocols and centralized access purposes. Thus, the idea of e-Government has gained widespread acceptance in order to reshape government (using information technology to increase government service delivery). This led to the establishment of the federal links portal “FirstGov”. The project and methods have become the key to the successful adoption of e-Government. “FirstGov”, called government reform, has become a link page limited to the lower level of e-Government to provide information. Subsequently, as part of the 'modernization' of government reforms, the Bush administration Executive office, the Bureau of Management and Budget, was established, and with this development, many e-Services applications were published on different platforms [29]. England, another developed country after the USA, is one of the first countries to fully use the concept of e-Government. The change in current government technology in England in 2004 was created with the idea of e-Government. Unlike the US, the initial reform boom focused on government applications of the technology as opposed to eCommerce. Because e-Commerce portals were needed in order for goods to go beyond

borders in the globalizing World, and e-Commerce is an older and more established system than e-Government. The e-30 Services office acted as a coordinator for standards. The main milestone is the first modernization government document and e-Government strategy published by the Cabinet office in 2000 [30]. The principles of government and electronic services have led to significant changes in service delivery and are beginning to be commercialized. '.com' applications have determined that all services will be online until 2008. After the completion of the transition of the USA and the UK to the e-Government platform, other countries quickly moved their services to the electronic environment []. Especially in the Far East countries where the internet is used extensively, such as the Philippines, Malaysia, Singapore and India, e-Government adaptation has taken place faster than in developed countries. Thanks to the developing technology and internet network, the world has become a small place. Thanks to technological developments, an era has emerged, which is defined as the "new world order" and where information is transmitted at the speed of light. While developing states such as Turkey could not complete the industrial revolution, they faced the information age and the internet revolution. This era is also seen as a harbinger of new opportunities for new, developing countries. One of the products of the information age that most influenced the state theorem is e-Government. e-Government is a great opportunity for the correct management of growing data, preventing waste, and transforming the state structure from cumbersome to dynamic. In order to implement the "e-Transformation Turkey Project", studies were carried out in the state planning organization (DPT), and a unit called the Information Society Department was created in order to implement these studies as a process and to carry out their follow-up in a healthy way. In order for the project to be successful, economic and political supports were sought and this project was funded by the state. In addition, the main portals of all institutions were changed within the scope of this project, and the transition to the electronic document management system was accelerated [29].

Economies are in competition with each other in the developing and changing world. In this case, the importance of knowledge economies increases. The knowledge economy is on its way to becoming the main element of competitiveness. Because in globalizing economies, easy access to capital and labor elements can be provided [31]. Therefore, the most important feature that distinguishes one economy from another is the ability to use information. The ability to use information is a factor that increases competition. It is important not to confuse the type of knowledge that stands out in the knowledge economy with the factors in other economies. Because

knowledge should not be considered as an economic good. The knowledge economy should not be confused with the research economy. Because the main focus of the research economy is not the production of technological knowledge. The knowledge economy should not be confused with the innovation economy [31]. The focal point of the technological and organizational changes on the basis of the innovation economy is the production of technological knowledge. The knowledge economy, on the other hand, examines the characteristics of knowledge goods, the management of knowledge production, the distribution, processing and development of knowledge in the economy, its production and institutional conditions. Institutional terms refer to patent rights and information technology. Since the first days when it was discussed, discussed and implemented, "wired state", "ubiquitous state", "internetized state", "virtual state", "online state", "digital state", "smart state", "online state" The structure, which is called "electronic government (e-government)" and named as "mobile state" and "connected state", was first used as a term in 1993 in the United States of America (USA) within the framework of "national performance research". It was established and used by people. After that, studies were started to create an e-government portal or program called "Access America". Within the scope of this mentioned program, an internet portal called "firstgov" was established and this designed portal started to serve in 2001. Before this portal started to serve, the issue of providing one-stop access to the services offered by the public in the USA on a single screen and accessing the transactions was implemented in September 2000. The earliest studies revealing this by recognizing the power of e-government services in the restructuring efforts of the state, local governments, institutions and businesses operating on behalf of the state; The Gore Report, published in 1993 and defining the structure we call e-government as a kind of public administration that works better with less cost and produces the necessary service to the public, is the "Provision of Public Services in Electronic Environment", which is seen to be published in the UK in 1996 and stands out immediately after that. These are the studies named "Green Book for Education". When we pay attention to the developments in the formation process of e-government, it is observed that although we take the date of use of this concept back to the 1990s, it has become visible in the 2000s that the existing applications have been tested and the results of the e-government have been tested and discussed in order to actually start to serve. . The first services, which were started to be given within the framework of the new public administration approach, which started to be called under the name of e-government, generally showed themselves in the field of local administrations. It was implemented in Tilburg in the

Netherlands, Barintree in England, Duisburg in Germany, and Phoenix in the USA and citizens started to use it. After the concept of e-government entered our lives and started to be used, it has been seen as a "magical structure that overcomes all problems" by some thinkers, writers and scientists, after being evaluated from a very broad perspective [32]. It has even been described as "a savior". On the contrary, it has been narrowly evaluated by a number of thinkers, writers and scientists. The concept called "e-government" has different meanings for the structure, system, different people and groups, while researchers in certain groups define electronic government as a way of doing citizens' transactions through digitalized technologies, simplified digital government information, while some researchers define "e-government". It consists of the formation of a website, a portal that only provides various information and services on the topics of government and politics.” When e-government applications are evaluated based on this idea, the perception of applications within the framework of these narrow patterns in terms of content and design, that is, almost unfair to the concept, process and functions. Attributing little meaning and attempting to make narrow definitions like this means limiting the benefits and gains to be achieved by e-government, and there are also some electronic projects that are started and carried out, which are thought to be made from the lowest to the highest levels. It causes attempts to vlet applications to fail. When the above-mentioned short history and these perspectives of writers, scientists and thinkers are evaluated, it is considered that it would be useful to first define the concept of e-government, and to draw its outlines in terms of both its content and functions. Before moving on to definitions, the concept of electronic government, which has entered our lives, is generally clear, inclusive and clear, which is deemed appropriate by all parties, primarily in the discipline of public administration, in the field of administrative law, in the framework of public relations, in a way to cover all relevant scientific fields, especially informatics and engineering sciences. It should be noted that there is no definition. When it comes to e-government, many definitions can be made from country to country, from branch of science to science, according to the time and conditions. Moreover, these 8 definitions may have many dissimilar aspects. Considering these differences, some of the definitions of e-government included in academic studies are presented below in a tidy manner in order for the concept of e-government to be better established and to better understand the latest situation of the development and change process it has undergone thanks to various branches of science, disciplines and practices [33].

2.2.1 E-Government Security

Today, e-Government security is an important study topic for users, service providers and researchers. e-Government security has been recognized as a challenge for many in the literature [34]. E-Government security, which is a user-centered problem, is a major concern for users who operate on applications. It is thought that this situation has a reducing effect on the user potential in the applications. It is observed that the problems arising from e-Government security have a negative effect on users and the issue of security is among the important factors that hinder the development of e-Government. However, in another research source, it has been shown that contextual issues such as changing technology, geography, demographics and culture lead to the acceptance of e-Government's general policy, but security and privacy issues negatively affect e-Government users. At the same time, it has been shown that changing conditions and changes in social contexts such as technology, demographic scenarios, users' ability to use e-Government services, and culture have different implications for applications in different parts of the world. Therefore, how user-centered challenges related to e-Government may affect e-Government users should be addressed according to regional and cultural differences. Among the various challenges related to contextual factors, users' e-Government security concerns have been identified by many researchers as one of the main issues that need to be addressed by citizens transacting via e-Government. For this reason, it is argued that e-Government will cause negative effects among citizens if the security and privacy concerns of users are not addressed. Most of the studies found have discussed the concept of security from the perspective of technology and engineering. However, there are also studies that point out that users and service providers are a major concern in terms of user-centered e-Government service security [35]. In addition, it has been observed that user-centered e-Security researches in the field of e-Government are a neglected area, although there are some examples of research conducted in the context of e-Commerce. However, it has become an important element that its security cannot be ignored for the acceptance of e-Government. It clearly shows the impact of security factors. on the success of website implementations and online user satisfaction. Citizens of countries around the world have said that trust is the main tool for participation in e-Service applications. e-Government services aim to provide personalized services to citizens. In addition, technological developments cause an increase in mobile applications. Thus, the potential to reach electronic transactions through smart phones, which are found in almost every person, is increasing. It has been concluded that mobile

applications developed by the state and platforms that provide multi-purpose services will play an important role in meeting user needs [36].

2.2.2 Factors Affecting the Relationship between Technology and e-Government Security

Among the different factors that are claimed to affect the relationship between technology and e-Government security are the privacy of users, the quality of web design, the ease of use of technology, and the usefulness of e-Services. HCI comes as a factor affecting e-Government technology or online technologies. HCI stands out as an important determinant of technology. IBE acts as a bridge between a user and e-Government applications. Researchers questioning human behavior and interaction related to computers or technology have emphasized that many concepts involved in this interaction are responsible for recent advances in technologies and the relatively easy development of many complex applications. The developments in the latest technologies are affecting more and more people today. Besides the developments, there are difficulties behind the adoption and diffusion of these innovations due to the user interface and human factors problem. It is important to explore how HCI contributes to the acceptance and use of technology. As new applications are developed every day and each innovation needs to be investigated for user technologies, technologies affecting e-Government are based on factors such as cognitive adaptation, task technology suitability, users with individual differences, economic factors, users [37].

2.2.3 Privacy of Users

With the transition of people to the information society, serious difficulties have arisen; It is argued that digitalization, which is a popular concept especially related to information and network communities, causes social isolation and alienation, as well as concerns about employment and privacy. When online privacy and security are affected by cyber attacks, it can be seen that privacy is violated. Moreover, the concept of e-Government has always been seen as a concern when privacy issues, especially when technology changes and contextual aspects are involved. It has been emphasized that the necessity of e-Government technology to explain protocols such as online payment methods and storage of private information is the first condition in e-Government applications. Therefore, examining the relationship between technology and the security of e-Government applications becomes important when technological contexts change. All these

theories can be applied to explain individual behavior regarding the privacy and security of users regarding e-Government. However, in the ever-changing technology world, expanding and developing these theories to understand how privacy issues affect e-Government technology is among the important work topics of today [38].

2.2.4 E-Government Security Problems

One of the most important problems encountered in e-Government portals is security problems. In such systems, critical data is recorded. There are many attack methods to access this data. In fact, e-Government portals are constantly attacked in order to capture the critical information of the states. Security vulnerabilities in e-Government systems occur in two ways. These are system and user-generated vulnerabilities. In general, the security infrastructure of the systems is provided by using international security protocols. For this reason, very important security vulnerabilities are not frequently encountered on the system side. The most important risk factor here is people. Therefore, e-Government security is a field of study of social sciences. Factors related to e-Government users, especially from a social sciences and management perspective, are not well addressed in terms of e-Government service security. Even in practical terms, e-Government portals do not seem to be interested in informing users about security issues or educating them to be aware of security breaches. This is an important factor that causes mismanagement of e-Government services. Lack of knowledge about user-centered factors can affect the success of e-Government service providers and users, including e-Government service security. It is clearly observed that users are very concerned about security when they transact with e-Government applications. It is seen that technological factors force e-Government service providers to constantly change and organize their infrastructure in order to adapt to changes in technology in order to provide better service to users. However, the main focus among innovations in e-Government services is e-Government service security [39,40].

During the transition from industrial economy to knowledge economy, some features have emerged in globalized national economies. While these features form the basis of the knowledge economy, it is very important to recognize and understand this branch of economics, as it is a new concept. It can be said that the reason for the conceptual confusion experienced from time to time in the information economy is that it emerged in the twentieth century, is intertwined with

information-communication technologies, and unlike other economies, it has a structure that provides virtual and fast communication. The knowledge economy includes all the advantages of the age. Based on the close relationship of the knowledge economy with globalization, it can be said that the basic features of this economy are influenced by the concept of globalization. This concept is formed by education and new ideas, experiences gained in the workplace and relatively intellectual ideas rather than physical resources [41].

- i. Knowledge Economy is an Economy in which Service Production stands out. Service production is not a material production. In other words, some of our basic and tangible needs have been met. With mass production, demands for material needs were produced. After these needs were met, studies were carried out to meet the intangible service needs. At this stage, the knowledge economy has been developed to meet these service needs of individuals. The main difference between services and goods also formed the main differences between these two economies. Services, like goods, cannot be stored or transferred to another person. In this respect, it is essential to make an individual production. As the demand for services increased in the knowledge economy, the main sector became the services sector. However, as the basic needs in the industrial economy were goods, the basic sector became the industrial sector. As the importance of information increases, it can be said that the services sector will be more effective and functional in the rapid development of this sector. This development in the services sector ensures that the workers who will work in this field develop in terms of intellectual accumulation. In the industrial economy, it is foreseen that the competition that occurs over the goods to a great extent will be formed on the "Knowledge Workers" in the information economy [42].
- ii. Knowledge Economy is a Credit Based Economy. In developing economies, as an alternative to paying cash for purchased goods and services, payment is made with credit cards, checks, promissory notes and electronic money on the internet. It can be said that the most preferred payment tool among these is credit cards. Since it has the shopping power as much as the value loaded on it, all kinds of payment transactions can be made with credit cards. In this respect, two different currencies are mentioned. One is a smart card and the other is an electronic wallet. Thanks to a small electronic infrastructure, smart cards can be loaded with monetary values and reloaded when necessary. Electronic wallet,

on the other hand, has been developed entirely through software and appears as a type of money held on one's own computer through encryption. Considering the use of virtual money in this way, the establishment of the knowledge economy on a virtual structure, the importance of the time factor and the use of electronic networks, the use of such a system in the knowledge economy model shows that the innovations made in both areas overlap with each other. Therefore, it can be said that the developments in the transition to electronic money will accelerate in the recent period, since the use of cash used in previous periods is more difficult in terms of both time and reliability [43].

- iii. Knowledge Economy is a Global (International) Economy. Global economies are companies' dissemination of the goods they produce outside their own countries, through cross-border participation or through direct sales. In particular, global economies cause the preference of goods and services with different technological innovations rather than the goods that can be produced in every countries, or the production of technological goods with large and complex systems in more than one country (Friedman, 2008: 76). The production of different parts of any good in different countries, according to their comparative advantages, is due to the technological superiority of the companies, the cheapness of labor and raw materials. The production of different parts of a computer in different countries can be an example of this situation. The fact that transportation and communication systems are both cheap and fast is also a factor in the internationalization of production. This situation has caused companies to shift their production to places with cheap inputs [44].
- iv. Globalization has two sources: the first is technological and the other is political. Two different innovations are effective in the technology source of globalization. The first is communication technology innovation (telephone), and the second is information technology innovation. It can be said that the economy that will be formed during the production, distribution and operation of the technology to be developed in this field with the mentioned communication and informatics innovations is also the information economy.
- v. Knowledge Economy is Institutional Economy. In developed countries, the free market economy has turned into an institutional economy. There are three basic institutions in the

economy: the state, large companies and trade associations. The impact of these institutions on the economy is greater than the impact of individuals, households and small firms on the economy. The relationship between the three main institutions mentioned can be established as follows: Large firms form a pressure group on decision makers in order to fix their product prices. Governments are sometimes capitalists, depending on the relationship between employers and large enterprises and workers. Trade unions, on the other hand, prepare projects with unions on the determination of wages and how trade should be done. It is an important force in the unions and puts pressure on the government to make wages in favor of the workers. In the knowledge economy, in addition to these three institutional factors, consumers are increasingly organized. In this regard, policies for the protection of consumer rights are legally established. In order for the society to become conscious of consumer rights, cooperation with media elements is ensured and these rights are defined [45].

- vi. Information Technologies Transforms Economy into Information Economy. The process of producing and transmitting knowledge is the main solution to problems. This is such a process that there is school at the beginning, science in the middle, and communication technologies at the end. If it is accepted that the basic problems of humanity are caused by ignorance, we must accept that communication technologies that spread information everywhere are the information (information and communication) revolution. Capital values also change with the knowledge economy. The market capitalization of Facebook or Microsoft that exists today is greater than that of General Motors, which has gained the upper hand in terms of capital value in the industrial economy. In this case, while the capital of General Motors is composed of tangible assets, the capitals of companies active in the information economy are composed of human resources or, in the new term, knowledge workers. The equipment of these workers in terms of knowledge rather than their physical equipment is at the forefront. While this transformation is being achieved, financing the knowledge economy is an important issue. Financing the “knowledge” factor is an important issue in the knowledge economy. E. Karayılmazlar stated that three expenditure items are important in determining how much is invested in the “Knowledge” factor. These three items are R&D expenditures, higher education expenditures and software expenditures. The researcher, who made analysis according to these factors in Turkey and

OECD countries, stated that Turkey is quite backward compared to OECD countries in financing the information economy dependent on the information society. According to the findings, the share of R&D expenditures in GDP is below 1% in Turkey. This rate is around 2.5% on average in OECD countries. In terms of resources allocated to higher education, while 1% of GDP is allocated in Turkey, it is 3.5% of the average GDP in OECD countries. Since there is no data about software in Turkey, a ratio is not given for this item. However, it is known that R&D studies shed light on this item [46].

- vii. Knowledge Economy is a Digital Economy. The knowledge economy, which is defined in a period when technology is developing, will naturally take its source from knowledge. The resources that constitute the infrastructures of the information economy are digital codes provided in digital environments. Reporting, phone call etc. in previous periods. While analog communication such as coding is used, these methods have left their place to digital coding method. These encodings are getting more advanced as the innovations in computer use increase. Different methods are used, such as digital codes and new software. Authors and researchers have presented many data on this subject. Some authors have incorporated one of the emerging new methods, the "Virtual Space Experiment", into their work. They showed that with this method, the multiple relations of knowledge economy variables with each other could be handled more clearly. They also stated that the validity of the experimental control had estimation difficulties. For example, with these innovations, inter-institutional communication in the knowledge economy has become faster and more reliable. Moreover, it provides great convenience in archiving all data and accessing the archive. In this way, very fast access to a library located anywhere in the world can be achieved [47].
- viii. With the Shift of Information to Digital, Virtual Economy and Virtual Markets Emerge in Digital Networks. With the increase in digital technology, there have been significant developments in trade. Virtual economies offer dozens of services not only for trading but also for customer service, taking and delivering orders. The reason why the virtual economy comes to the fore is less tiredness, doing more work with less cost. Thus, virtual shopping centers were established. There are also classifications of virtual shopping environments among themselves. The structure of merchandising and shopping center is

dominant in the trade between the consumer and the institution called B2C (Business to Consumer, from company to consumer). In B2B (Business to Business, from firm to firm) model, there are combinations of one seller, many buyers or many sellers and one buyer. The digital economy is an economy with digital communication tools such as internet, intranet, extranet. In this economy, products are now sold on the web. A product to be purchased is purchased through digital platforms. Developments in the digital economy have also increased competition among institutions, providing an advantageous environment for both companies and consumers in this regard [48].

- ix. The Information Economy is an economy in which the Intermediary Functions Between Producers and Consumers Have Abolished. With the new economic system, the old means of communication are disappearing through "digital networks". The reason for the slow functioning of the old system is the lack of functional tools in the public and private sectors. In the digital system, on the other hand, the customers of the system do their work from their own computer. Thus, instead of going to an airline company's office and buying a ticket, individuals can do it themselves via the internet. The same applies to banks. Individuals can now log into their bank accounts with electronic passwords from the internet and perform their transactions. The e-government project, which regulates the relations between the state and the individual, can also be evaluated within this scope. This subject will be discussed in detail in the following sections [49].
- x. Computer, Media and Personal Service Technologies Integrate Each Other, Bringing the Information Economy to the Position of the Leading Sector. In this regard, the close relationship of the media with the information economy should not be overlooked. In recent years, it can be said that communication has become easier with the transfer of the media to the electronic environment, and the costs of advertising in the media have decreased with the increase in media activities on the internet. As of today, the cost of the page opened on Facebook on behalf of the company is negligible, and if we consider that the company reaches many customers thanks to this, the importance of the media in the information economy can be better understood. Factors such as reduced advertising costs and brochure costs, thanks to the sites opened on the Internet, can be counted among the advantages of this new system.

- xi. Knowledge Economy is an Economy that Produces Knowledge, Converts This Knowledge into Product and Brings Continuous Innovations. These innovations can be in the form of realizing a process that remains in nature but has not been seen (discovered) before. Continuous innovation environment is possible with sustainable organizational learning and individuals with innovative understanding. These individuals are not ordinary individuals. The main feature of these is that they have a productive brain (a brain that reveals relationships that exist in the universe but that a normal person cannot see or discover).
- xii. The Information Economy transforms the old mass production into customer-specific production. The producer tends to produce according to the needs and tastes of the consumer. While there are millions of products similar to each other, mass production, which is the most characteristic feature of the industrial economy, there is a process in which production is made according to the wishes of the customers in the information economy. There are designs according to customers. This situation brings with it another phenomenon. In this way, strong bonds are formed between the producer and the consumer. In the knowledge economy, this phenomenon is called the “Knowledge Highway”. With this concept, besides the disappearance of the distance between the producer and the consumer, a communication chain is also formed. In this way, the consumer is involved in the production process of the product designed for him. The information economy has led to a change in the understanding of the market and the emergence of abstract markets with today's technology. These markets provide direct communication by eliminating the institutions between the producer and the consumer in the previous period. For this purpose, virtual communication networks that unite such producers and consumers are formed in globalized markets. Knowledge Economy is an Economy where Speed is Important. Speed is very important for trading in two different and distant parts of the world in globalizing markets. Thus, the concept of speed becomes an element that accelerates competition. Speed will play a key role day by day in terms of economic gain and competitive advantage [50].
- xiii. Knowledge Economy is an Economy Based on Research and Development Expenditures. In the knowledge economy, where competition is the leader, innovation and therefore R&D

activities have a great impact on this economy. R&D activities must be very advanced in order to catch the new and be different all the time. In the process of transformation into a knowledge economy, the underlying reason for the high investment in R&D is the reflection of new information on products. As R&D studies increase, the desire of companies to explore and invent also increases [51]. Thus, a different employee profile emerges from those in the industrial economy. In the knowledge economy, it is an important condition for the personnel working for this purpose to be innovative. It is an important requirement for these personnel to specialize in their fields and to follow new ideas and products to be put forward by rival companies, but in the globalizing world, rival companies may not always be within national borders. It is also important to be proficient in the use of superior speed and digital tools to follow competitors elsewhere in the world.

3. MATERIAL AND METHODS

3.1 MACHINE LEARNING

Firstly, with computers becoming an accessible device, and then computer science becoming more accessible to wider masses, systems that solve problems faster than humans and take into account all the possibilities taught at the point of decision-making have begun to be developed. As developments started to offer solutions to problems in different branches of science such as biotechnology, medical, education, business, banking and finance, studies in this field increased rapidly and the concept called machine learning emerged today. Machine learning is a discipline based on data mining and artificial intelligence. Data mining can be defined as the process of recognizing previously undetermined patterns of information held in databases, finding the trend of data, and using this information to create predictive models. In other words, data mining is the process of selecting and modeling data to reveal previously undiscovered patterns. It aims to make new and valid inferences from the data by scanning large data sets to make complex patterns that are too complex for humans to perceive. The main idea in data mining is to discover consistent and useful patterns of system properties that determine program and user behavior and to use related system properties to calculate classifiers that can recognize anomalies and known properties [51]. The situation to be resolved is clarified and the project objectives and requirements are determined accordingly. As a second step, the sources to collect data specific to the problem are determined. Data can be kept in more than one database, although it varies according to the size of the data being studied. After the sources are determined, the data to be used is brought together. Before starting the analysis, the data is cleaned; For example, removing data that is not suitable for analysis, correcting and removing data entered manually by the user and made mistakes. A closer look at the data focuses on how well the data reflects the situation to be resolved, and new features can be added or removed depending on the situation. Various modeling techniques are selected and applied in line with the data set prepared in accordance with the subject to be researched. According to the results of the algorithm, changes can be made on the parameters in order to improve the model. Where necessary, data transformations and sometimes data simplifications can be made. At this stage of data mining, it is important to what extent the targeted result can be achieved. In the last stage of the data mining process, some improvements are made in order to solve the identified problem with the power of the new information obtained. With the

model application decided in the previous stage, new information is derived and the problem is solved. Thus, the ores of data stored in databases are revealed [52]. Data mining is defined as the spirit of knowledge discovery and the purpose of learning new and useful information. Therefore, data mining should not be considered in isolation. It should be considered as the main reason that draws help from different disciplines for the purpose of obtaining new information from the data at hand, and ultimately unites these disciplines at a single point. Since data mining is generally applied to large data sets, although not in all cases, it makes use of artificial intelligence and thus machine learning techniques. Classical Statistics, Artificial Intelligence and Machine Learning Statistics can be defined as data collection, compilation, analysis and interpretation of data in order to obtain information from data. With this definition, although statistics is considered the same discipline as data mining, there are some differences. Classical statistics is known as assumptions statistics. Before starting the analysis, assumptions are determined in line with the problem and these assumptions are tested. In classical statistics, emphasis is placed on confirming or falsifying the assumption; The predetermined parameters are tested with the established hypothesis. It is assumed that the final value calculated in classical statistics is unbiased, consistent and unbiased. Artificial intelligence is a branch of science and engineering derived to develop intelligent machines, especially computer programs. It modeled neural networks by McCulloch and Pitts in 1943 and connected with propositional logic. Problem solving with artificial intelligence was developed to basically serve the same purpose as human intelligence and reasoning. Many studies on artificial intelligence have focused on the role of knowledge acquisition; machine learning was emphasized especially in changing audit conditions. Learning in the language of artificial intelligence is a system that improves problem solving by experiencing from previous situations, and machine learning methods have been successfully applied in various problems, including bankruptcy prediction. Machine learning can be considered as a sub-branch of artificial intelligence. It is programming computers to optimize a performance measure using sample data or past experience. Following the development of artificial intelligence, the pioneers of machine learning, which became popular in the 1950s and 1960s, were again researchers such as Alan Turing, John McCarthy, Arthur Samuels, Alan Newell and Frank Rosenblatt. Machine learning and statistics are closely related fields in terms of methods, but differ in their main objectives: statistics aim to make inferences about the population from the sample, while machine learning aims to create generalizable models [53]. Classical statistics is generally based on shaping data

around a line. The aim here is to determine the relationship between dependent and independent variables rather than making predictions about the future. In machine learning applications, unlike this process, there are two different data sets called training and test sets. Model inferences are made on the training set and then the model is evaluated with the test set [54].

3.1.1 k Nearest Neighborhood (kNN)

k Nearest Neighborhood (kNN) algorithm is one of the supervised learning algorithms. This non-parametric algorithm is considered one of the most widely used classification algorithms because it is simple and easy to implement. The K nearest neighbor algorithm is an algorithm that has domain in both regression and classification problems [55]. The k Nearest Neighbor algorithm was first proposed in the early 1950s. In 1965, N. J. Nilsson made progress on this algorithm with the studies of minimizing the distance classifiers. With their work supporting Nilsson, T. Cover and P. Hart' transformed the working principles of the algorithm into its current use in 1967. The starting point of the kNN algorithm is the probability that similar data will be found in the same class. With the help of a distance criterion, the distance of the data to each other is calculated. From this point of view, the closest classified data to the data that has not yet been assigned to a class is determined. The most widely used distance metric, which is accepted as the basis for distance calculations in studies, is the Euclidean distance [56,57].

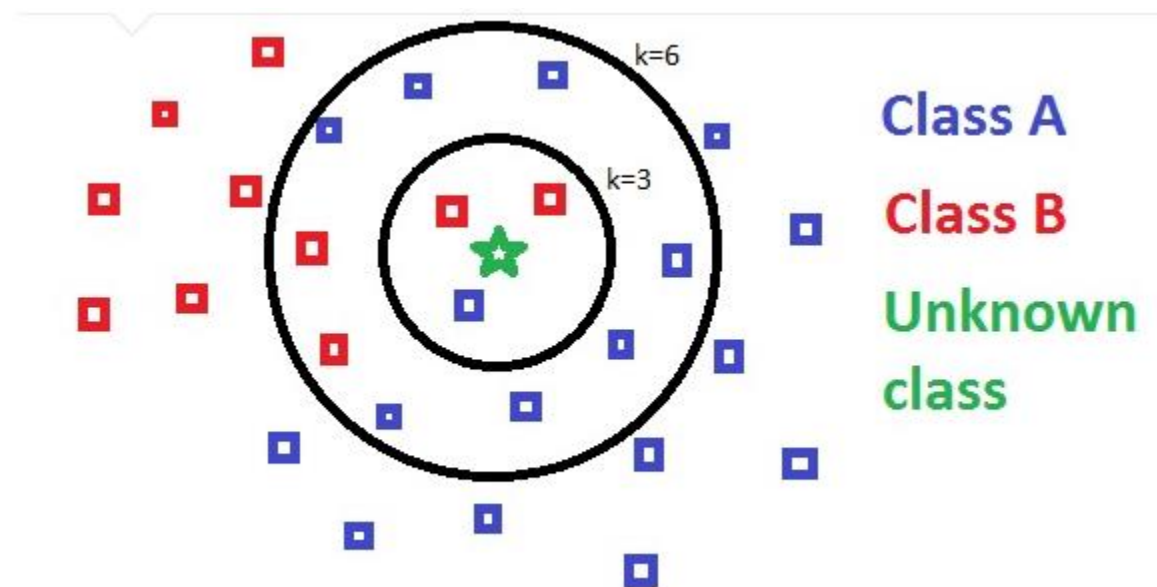


Figure 3.1: KNN

3.1 PROPOSED METHODOLOGY

In this section, deep sparse auto-encoder combined with K-mean proposed for website Malware detection in E-Government. In the first stage, K-mean applied for feature selecting of input data. In the second stage, KNN applied to classify the extracted features by the K-mean. The KNN trained in supervised technique to learn to classify the extracted data by K-mean. The whale optimization algorithm applied to optimize the performance of the KNN by finding best parameters of the KNN. The flowchart of the proposed method presented in the figure 3.5.

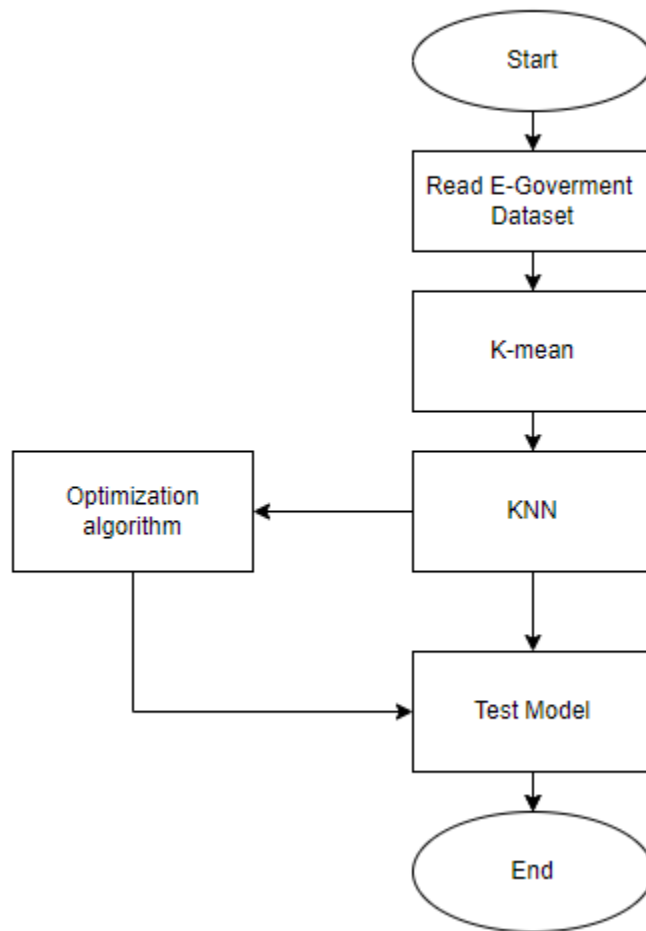


Figure 3.2: Proposed Method

4. SIMULATION RESULTS

In this section the simulation of this system validated using several validation techniques with several techniques. The validation techniques aim is to void the overfitting problem. Then, several techniques applied to recognize human hand images.

4.1 ROC CURVE

In this section, the ROC curve of the method plotted and shown in the figures below. The aim of this section is show the performance of the model in detail form.



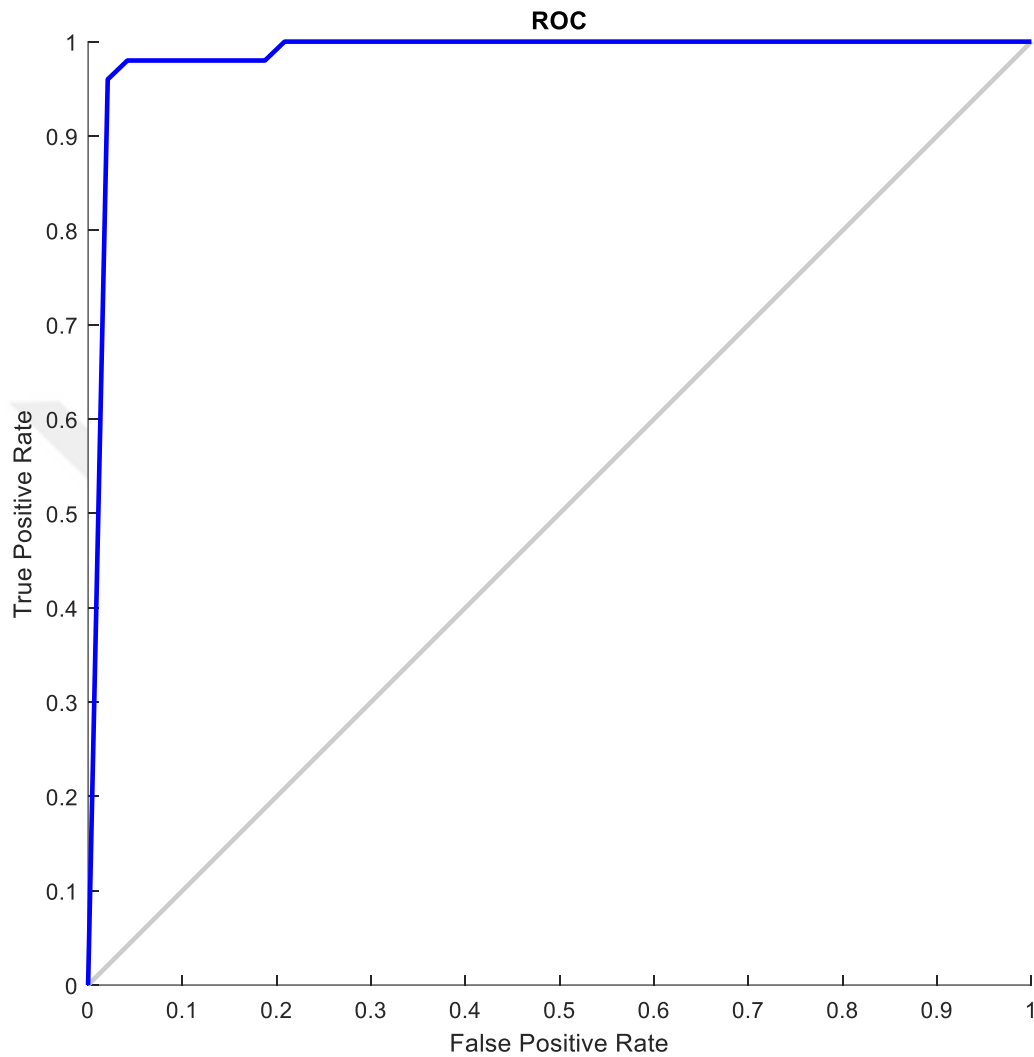


Figure 4.1: ROC Curve of SVM

Furthermore, the KNN applied also to detect the malware attacks in the e government applications. The obtained ROC curve presented in the figure 4.2.

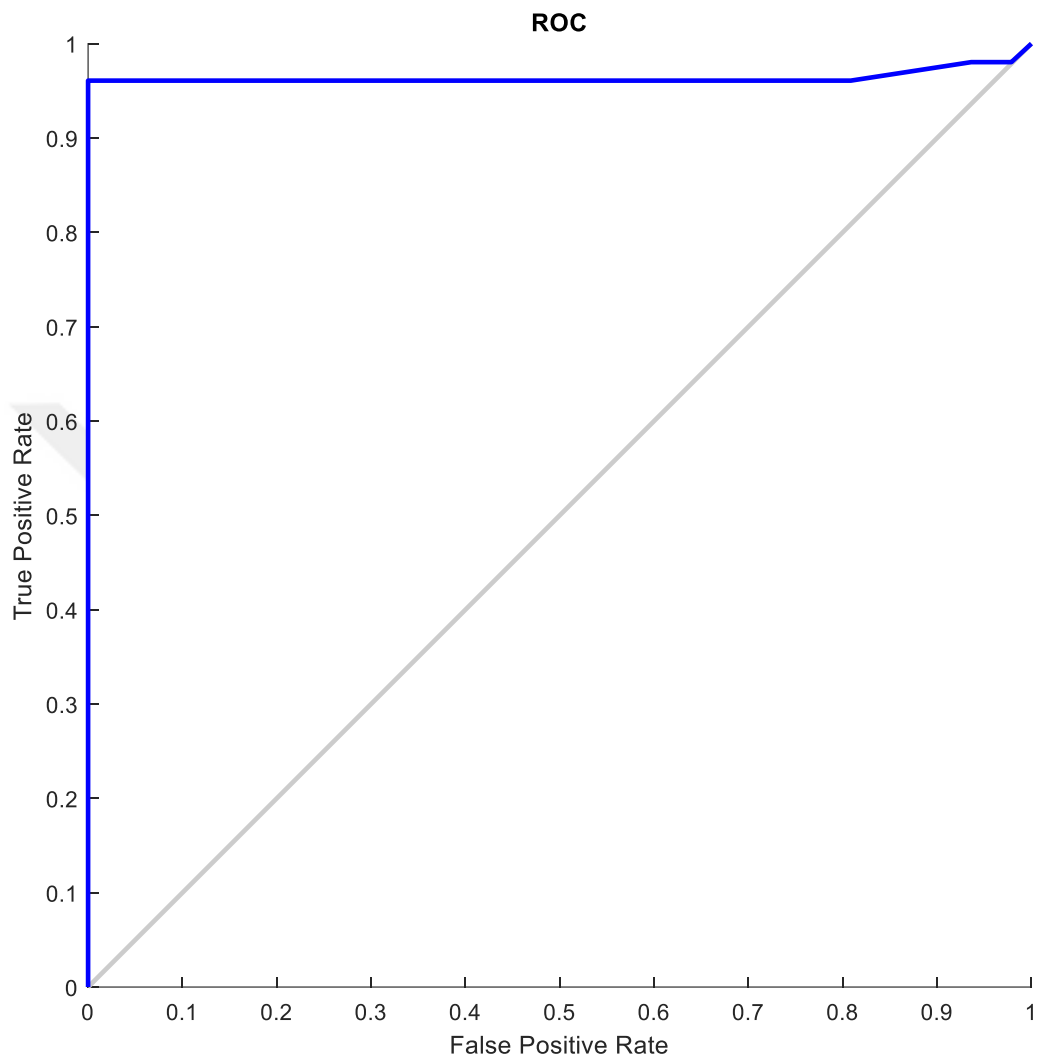


Figure 4.2: ROC Curve of KNN

Moreover, the decision tree applied to detect the malware attacks as shown in ROC curve 4.3.

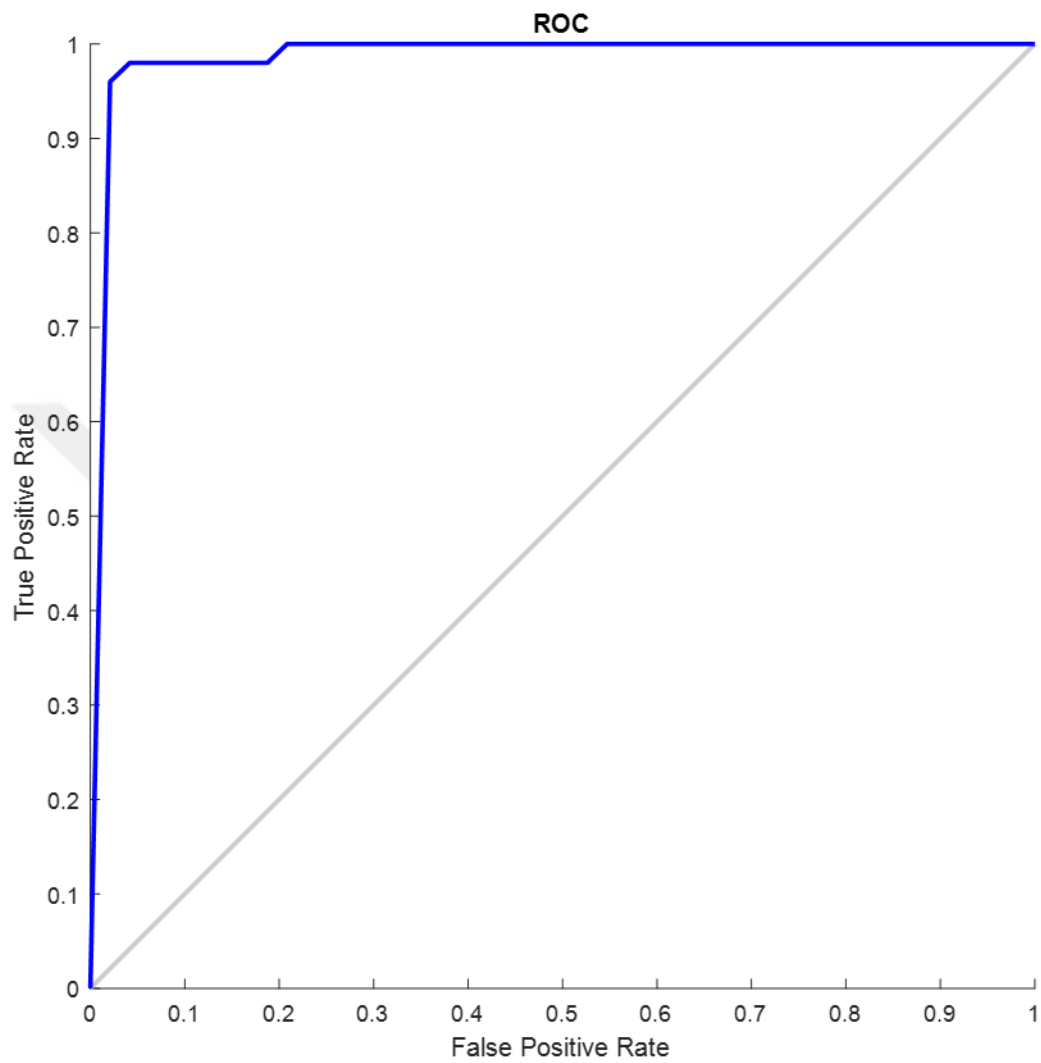


Figure 4.3: ROC Curve of DT

The results of the MLP also presented in the roc curve 4.4

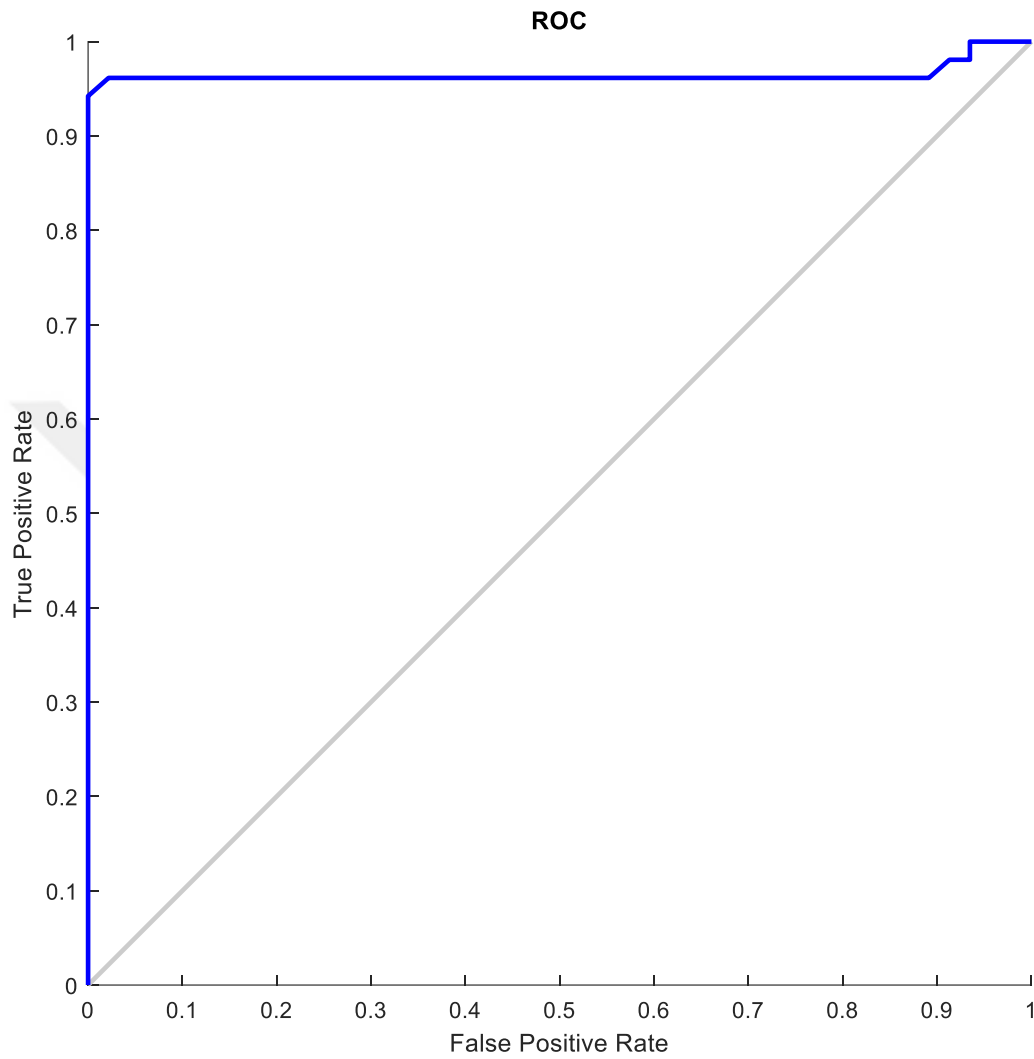


Figure 4.4: ROC Curve of MLP

Then, the proposed KNN based whale optimization algorithm presented the results in the figure 4.5.

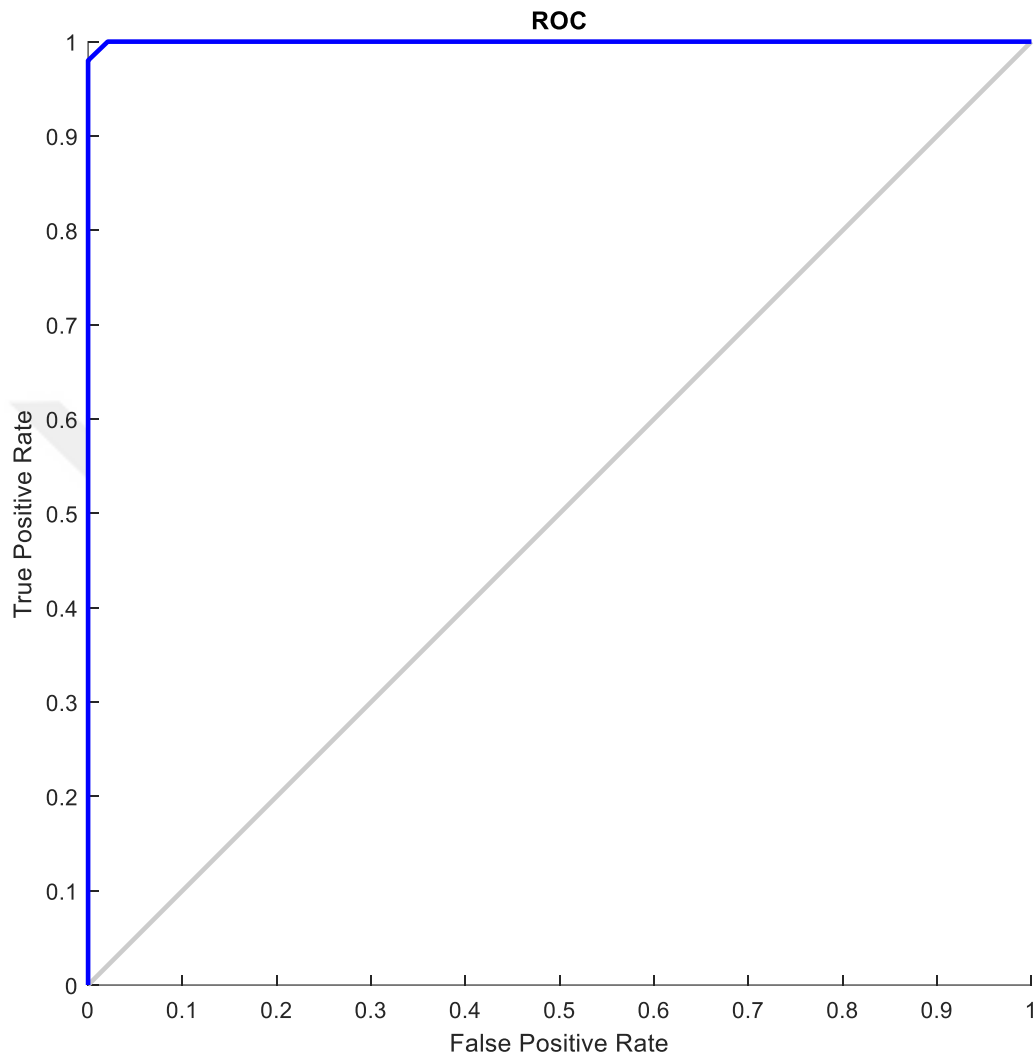


Figure 4.5: KNN based whale optimization algorithm and K-mean

4.2 STATISTICAL ANALYZIS

In this section, several parameters such as Accuracy, Sensitivity, and Specificity are calculated as shown in the tables below.

Accuracy: Classification accuracy is a measure that summarizes the performance of a classification model by dividing the number of correct predictions by the total number of predictions. Easy to calculate and understand, it is the most widely used metric for evaluating classifier models. This

sensitivity is violated when the sampling distribution between classes is too skewed. Practitioners' perceptions of balanced databases such as B. the 99th percentile representing competent models can be incorrectly and dangerously misinterpreted in terms of the unbalanced classification prediction modeling problem.

As a rule, the sensitivity and specificity of a quantitative value are taken into account when choosing a probability threshold for converting a probability model into a classification model. Sensitivity (also known as true positive rate) is the rate of correctly rated successful extensions, and accuracy (also known as true negative rate) is the rate of correctly rated failed extensions. You want to increase both amounts, but a trade-off is often required. Lowering the probability threshold increases the true positive rate but decreases the true negative rate. This compensation can be represented by the ROC curve from which the optimum can be determined.

Table 4.1: Results of SVM

Testing ratios (%)	Accuracy	Sensitivity	Specificity
20	87.84	88.94	88.34
30	85.34	86.23	84.43
40	82.73	83.56	81.46

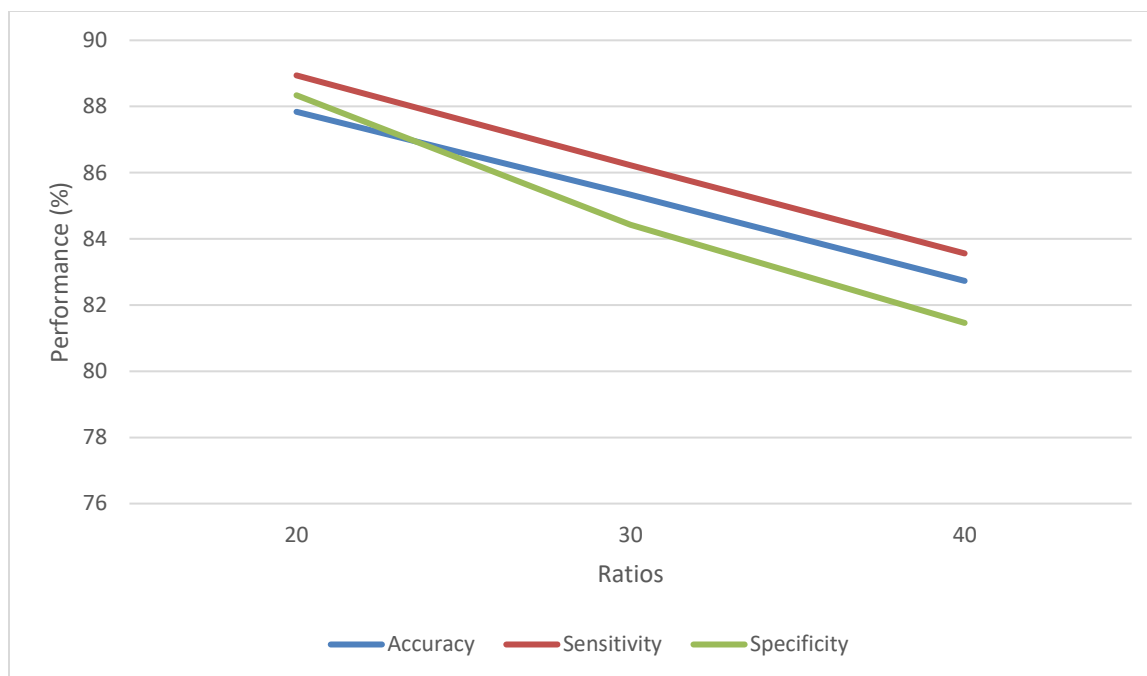


Figure 4.6: SVM Performance

Table 4.2: Results of KNN

Testing ratios (%)	Accuracy	Sensitivity	Specificity
20	99.61	98.33	97.45
30	86.13	83.43	82.56
40	81.34	81.65	80.21

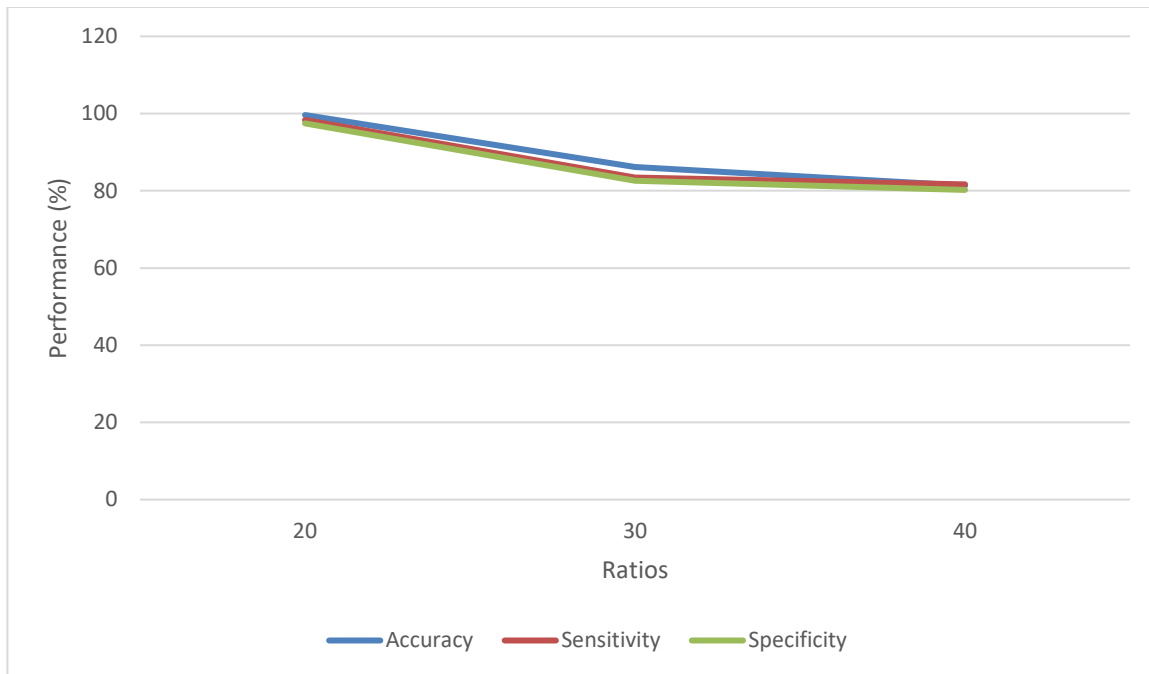


Figure 4.7: KNN Performance

Table 4.3: Results of DT

Testing ratios (%)	Accuracy	Sensitivity	Specificity
20	84.61	87.33	86.45
30	86.13	83.43	82.56
40	81.34	81.65	80.21

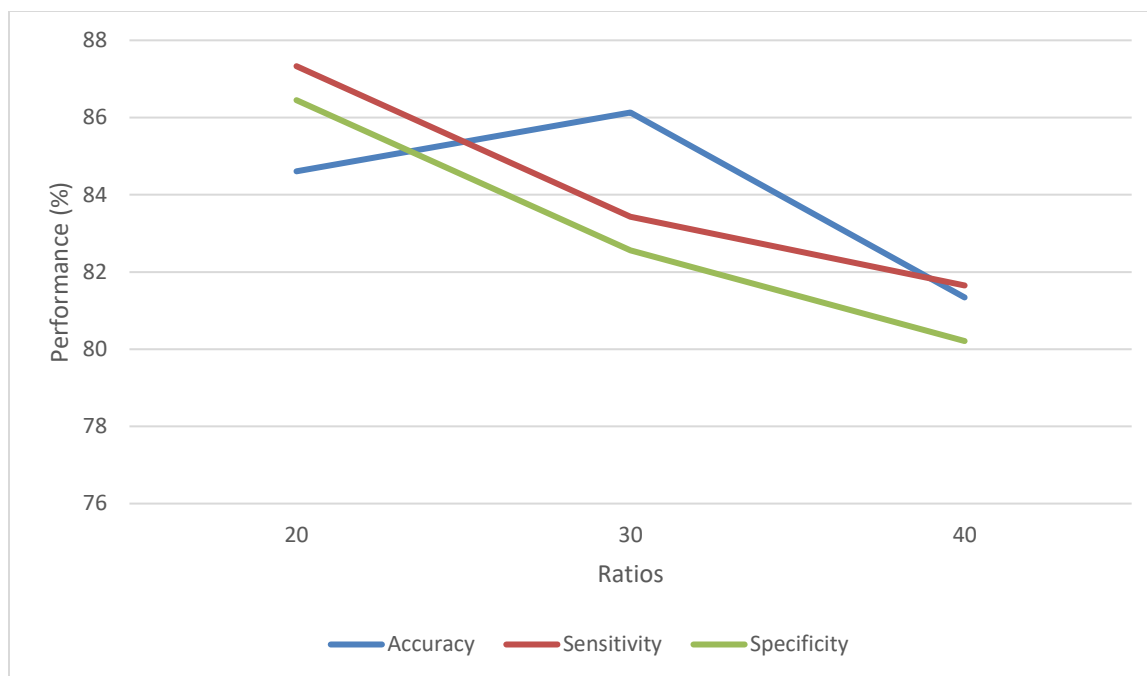


Figure 4.8: DT Performance

Table 4.4: Results of MLP

Testing ratios (%)	Accuracy	Sensitivity	Specificity
20	88.94	89.65	88.43
30	86.45	86.23	83.56
40	84.65	85.65	82.74

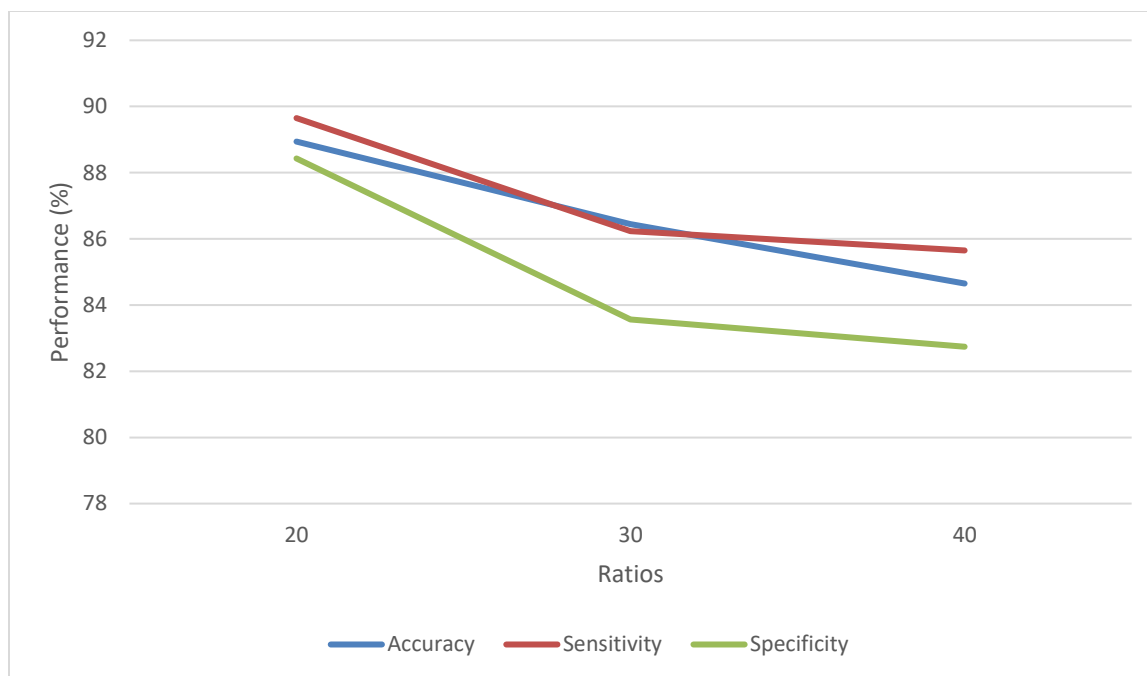


Figure 4.9: MLP Performance

Table 4.5: Results of Proposed Method

Testing ratios (%)	Accuracy	Sensitivity	Specificity
20	99.37	98.65	97.43
30	98.45	99.23	98.56
40	97.65	98.65	99.74

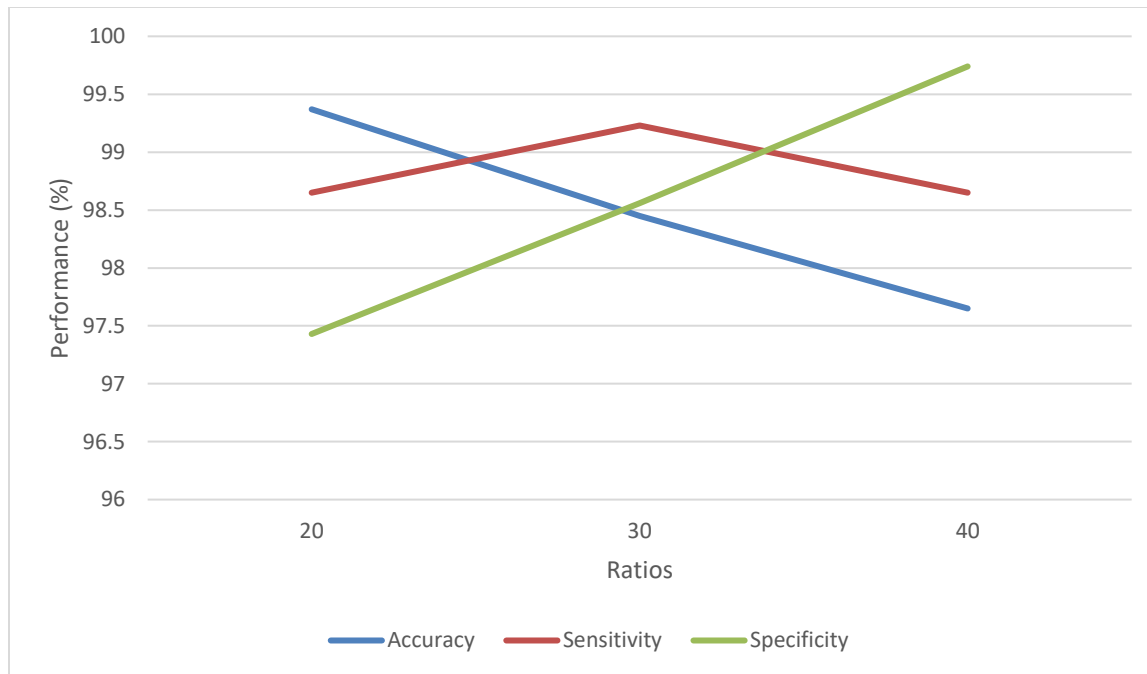


Figure 4.10: Proposed Method Performance

The last comparison between presented method and other traditional machine learning techniques is the comparison table for evaluating the execution time of the proposed method compared with traditional techniques as shown in the figure 4.7.

Table 4.6: Execution time

Testing ratios (%)	Accuracy
SVM	1537
KNN	1203
DT	1103
MLP	1532
Proposed method	804

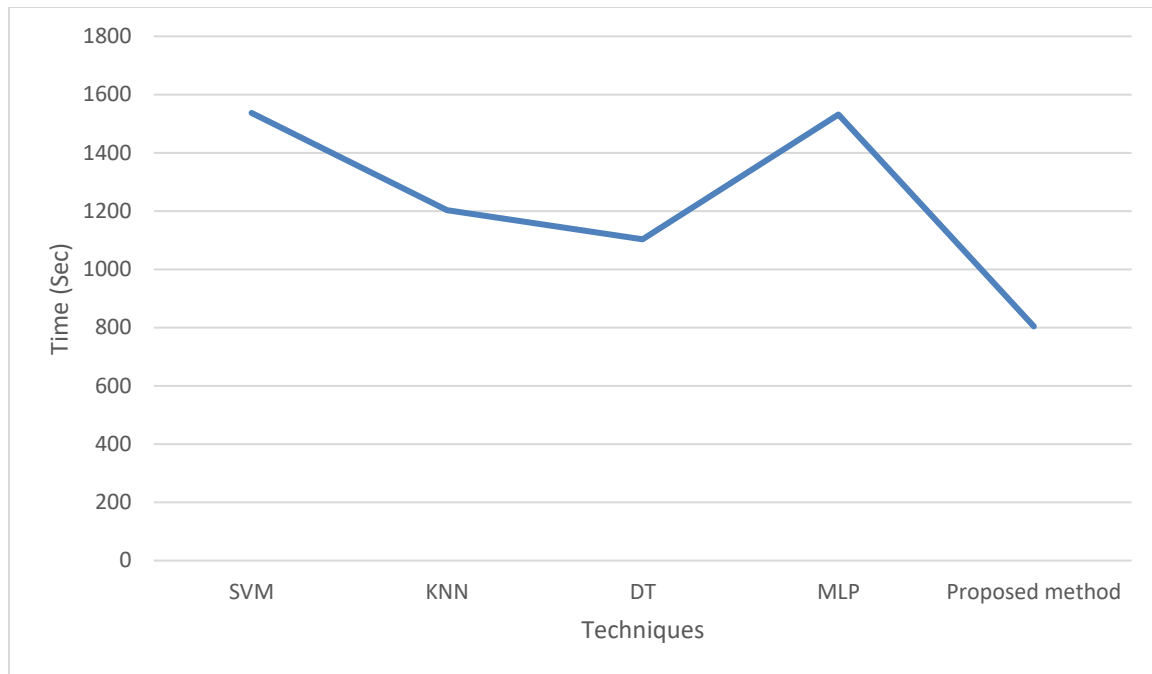


Figure 4.11: Execution time

5. CONCLUSIONS

In e-government sites, the target audience is the entire society. Individuals of all ages and professions, with different levels of use of internet services, should be able to use these sites. Usability principles should be taken as a basis during the design phase of e-government sites. In this study; The expectations of users from e-government sites were examined. In this direction, the usability level of the selected websites and their status relative to each other were evaluated. Public administration that uses information technologies and internet infrastructure to provide its services in our world where computer literacy is rapidly spreading in the information age, we live in. With its e-government efforts, it has brought service delivery to the virtual environment, and in parallel with these efforts of the central administration, and sometimes independently, municipalities have also started to provide their services with an e-municipal infrastructure.

The security and data management is one of the weaknesses of the E-government applications. The huge personal and official data in the e-government applications need to be secured and protected using effective security-based software.

This study presented new method combined machine learning famous classifier known as k-nearest neighbor algorithm (KNN). The KNN presented remarkable results in various fields but with e-government problems it need some enhancements because the e-government data are big and need special treatments. Then, the KNN enhanced with two techniques one of them called K-mean which is used for feature selection. The K-mean is clustering method applied for reducing the size of input features. On the other hand, whale optimization algorithm which is metaheuristic optimization algorithm applied to enhance the structure of the KNN. The using whale optimization algorithm as shown in the results led to increase the performance of the KNN in the classification. The evaluation parameters such as ROC curve , sensitivity, precision, and accuracy show that the proposed method presented remarkable results with the well known dataset that used in this filed. The obtaining results around 99% accuracy mean that the proposed method is applicable and can be used in real problems.

On the other hand, we advises the researcher to applied the proposed method in the other security problems. Furthermore, the cloud computing issues also can added to the e-government researches and the problems of cloud computing. On the other hand, we advises to apply new deep learning

techniques to this field. The deep learning obtained best results than traditional machine learning techniques.



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