DETECTION OF CYBER ATTACKS IN NETWORK USING MACHINE LEARNING TECHNIQUES

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Degree of

Master of Computer Application

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CERTIFICATE

This is to certify that this project work entitled **"DETECTION OF CYBER ATTACKS IN NETWORK USING MACHINE LEARNING TECHNIQUES"** submitted by Ms. **GORUMUTCHU POOJITHA** bearing Regd No**. 23054035** is the record work carried out by her/him during the period 2024-2025 in partial fulfillment of the requirements for the award of degree of **Master of Computer Application (M.C.A)** from Krishna University, Machilipatnam, Andhra Pradesh.

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I hereby declare that this project report entitled **“DETECTION OF CYBER ATTACKS IN NETWORK USING MACHINE LEARNING TECHNIQUES**” submitted by me in partial fulfillment of the requirements for the award of degree of Master of Computer Applications (M.C.A) is the record of work carried out by me during the Final Year of Master of Computer Applications.

This report has not been submitted previously for the award of any degree or diploma in this University or any other University or Institution of Higher Learning.

Date: **G POOJITHA**

(23054035)

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DETECTION OF CYBER ATTACKS IN NETWORK USING MACHINE LEARNING TECHNIQUES

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ABSTRACT

Contrasted with the past, improvements in PC and correspondence innovations have given broad and propelled changes. The use of new innovations gives incredible advantages to people, organizations, and governments, be that as it may, messes some up against them. For instance, the protection of significant data, security of put away information stages, accessibility of information and so forth. Contingent upon these issues, digital fear-based oppression is one of the most significant issues in this day and age. Digital fear, which made a great deal of issues people and establishments, has arrived at a level that could undermine open and nation security by different gatherings, for example, criminal association, proficient people and digital activists. Along these lines, Intrusion Detection Systems (IDS) has been created to maintain a strategic distance from digital assaults.

Right now, learning the bolster support vector machine (SVM) calculations were utilized to recognize port sweep endeavors dependent on the new CICIDS2017 dataset with 97.80%, 69.79% precision rates were accomplished individually. Rather than SVM we can introduce some other algorithms like random forest, CNN, ANN where these algorithms can acquire accuracies like SVM – 93.29, CNN – 63.52, Random Forest – 99.93, ANN – 99.11.

INTRODUCTION

OBJECTIVE OF THE PROJECT

The use of new innovations gives incredible advantages to people, organizations, and governments, be that as it may, messes some up against them. For instance, the protection of significant data, security of put away information stages, accessibility of information and so forth. Contingent upon these issues, digital fear-based oppression is one of the most significant issues in this day and age. Digital fear, which made a great deal of issues people and establishments, has arrived at a level that could undermine open and nation security by different gatherings, for example, criminal association, proficient people and digital activists. Along these lines, Intrusion Detection Systems (IDS) has been created to maintain a strategic distance from digital assaults.

THE EXISTING SYSTEM

Blameless Bayes and Principal Component Analysis (PCA) were been used with the KDD99 dataset by Almansob and Lomte [9]. Similarly, PCA, SVM, and KDD99 were used Chithik and Rabbani for IDS [10]. In Aljawarneh et al's. Paper, their assessment and examinations were conveyed reliant on the NSL-KDD dataset for their IDS model [11] Composing inspects show that KDD99 dataset is continually used for IDS There are 41 highlights in KDD99 and it was created in 1999. Consequently, KDD99 is old and doesn't give any data about cutting edge new assault types, example, multi day misuses and so forth. In this manner we utilized a cutting-edge and new CICIDS2017 dataset [12] in our investigation.

Disadvantages:

- Strict Regulations
- Difficult to work with for non-technical users
- Restrictive to resources
- Constantly needs Patching
- Constantly being attacked

PROPOSED SYSTEM

The important steps of the algorithm are given in below.

1) Normalization of every dataset.

2) Convert that dataset into the testing and training.

3) Form IDS models with the help of using RF, ANN, CNN and SVM algorithms.

4) Evaluate every model's performance

Advantages:

- Protection from malicious attacks on your network.
- Deletion and/or guaranteeing malicious elements within a preexisting network.
- Prevents users from unauthorized access to the network.
- Deny's programs from certain resources that could be infected.
- Securing confidential information

SYSTEM ANALYSIS AND DESIGN

System analysis is the performance management and documentation of activities related to the life cycle phases of any software namely:

- The Study Phase
- The Design Phase
- The Development Phase
- The Implementation Phase
- The Testing Phase

Software Analysis starts with a preliminary analysis and later switches on to a detailed one. During the preliminary analysis the Analyst takes a quick look at what is needed and whether the cost benefits. Detailed analysis studies in depth all the cornered factors, which builds and strengthens the software.

SRS

SRS (Software Requirement Specification) is a document that completely describes what the proposed should do, without describing how the software does it.

Performance Requirements

1) The operation time should be small and the throughput should be high.

2) It should produce timely and accurate result.

Software Quality Attributes

Maintainability – Since it is directly associated with the database, so there is very little maintainability problem with this application.

Easy to Learn – Since there are less number of forms, this application is very easy to learn with user-friendly screens.

Flexibility – This application is very much flexible for future enhancements.

Hardware Requirements

1. System : Pentium IV 2.4 GHz.
2. Hard Disk : 40 GB.
3. Ram : 512 Mb.

Software Requirements

- Operating system : - Windows.
- Coding Language : python

Software Design

System design is the second step in the system life cycle, in which overall design of the system is achieved. The functionalities of the system is designed and studied in this phase. The first step is designing of program specification. This determines the various data inputs to the system, data flow and the format in which output is to be obtained.

Design phase is a transmission phase because it is a transition from user-oriented document to computer data. The activity in the design phase is the allocation of functions to manual operations, equipment and computer programs. Flow charts are prepared in the study time and is decomposed until all functions in the system perform evidently.

Design is a multi-step process that focuses on data structures, software architecture, procedural details (algorithms etc) and links between the modules. The design process goes through logical and physical stages. In logical design reviews are made linking existing system and specification gathered. The physical plan specifies any hardware and software requirement, which satisfies the local design.

Modularization of task is made in this phase. The success of any integrated system depends on the planning of each and every fundamental module. Usually, a project is revised in step-by-step sequence. Inter-phase management of such module is also important. Software design methodology changes continually as new methods, better analysis and broader understanding evolve.

Various techniques for software design do exit with the availability of criteria for design quality. Software design leads three technical activities-design, code and test.

Each activity transforms information, which validates the software. The design system converts theoretical solution introduced by the feasibility study into a logical reality.

Modules

- Dataset upload
- Pre-processing data
- Extracting dataset
- Spliting dataset training and testing
- Applying models

UML Diagrams

UML stands for **Unified Modeling Language**. This object-oriented system of notation has evolved from the work of Grady Booch, James Rumbaugh, Ivar Jacobson, and the Rational Software Corporation. These renowned computer scientists fused their respective technologies into a single, standardized model. Today, UML is accepted by the Object Management Group (OMG) as the standard for modeling object-oriented programs.

There are three classifications of UML diagrams:

- **Behavior diagrams**. A type of diagram that depicts behavioral features of a system or business process. This includes activity, state machine, and use case diagrams as well as the four interaction diagrams.
- **Interaction diagrams**. A subset of behavior diagrams which emphasize object interactions. This includes communication, interaction overview, sequence, and timing diagrams.

- **Structure diagrams**. A type of diagram that depicts the elements of a specification that are irrespective of time. This includes class, composite structure, component, deployment, object, and package diagrams.

Types of UML Diagrams

UML defines nine types of diagrams: class (package), object, use case, sequence, collaboration, statechart, activity, component, and deployment.

Class Diagrams

Class diagrams are the backbone of almost every object-oriented method, including UML. They describe the static structure of a system.

Package Diagrams

Package diagrams are a subset of class diagrams, but developers sometimes treat them as a separate technique. Package diagrams organize elements of a system into related groups to minimize dependencies between packages.

Object Diagrams

Object diagrams describe the static structure of a system at a particular time. They can be used to test class diagrams for accuracy.

Use Case Diagrams

Use case diagrams model the functionality of system using actors and use cases.

Sequence Diagrams

Sequence diagrams describe interactions among classes in terms of an exchange of messages over time.

Collaboration Diagrams

Collaboration diagrams represent interactions between objects as a series of sequenced messages. Collaboration diagrams describe both the static structure and the dynamic behavior of a system.

Statechart Diagrams

Statechart diagrams describe the dynamic behavior of a system in response to external stimuli. Statechart diagrams are especially useful in modeling reactive objects whose states are triggered by specific events.

Activity Diagrams

Activity diagrams illustrate the dynamic nature of a system by modeling the flow of control from activity to activity. An activity represents an operation on some class in the system that results in a change in the state of the system. Typically, activity diagrams are used to model workflow or business processes and internal operation.

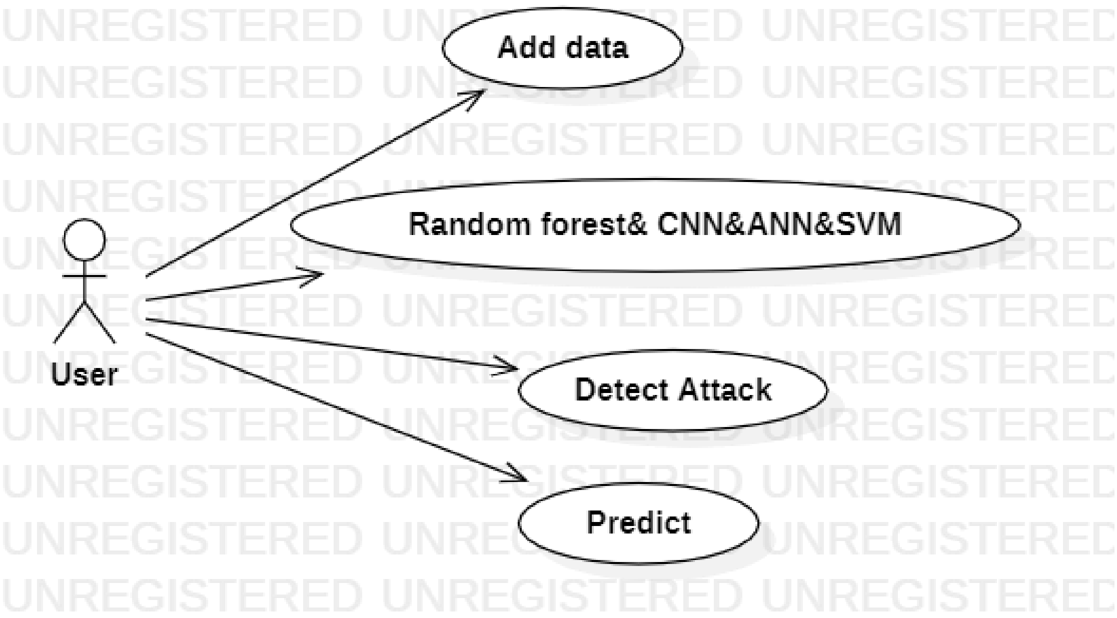
Component Diagrams

Component diagrams describe the organization of physical software components, including source code, run-time (binary) code, and executables.

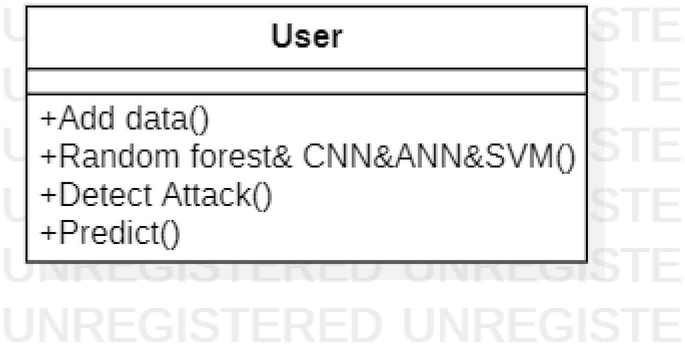
Deployment Diagrams

Deployment diagrams depict the physical resources in a system, including nodes, components, and connections.

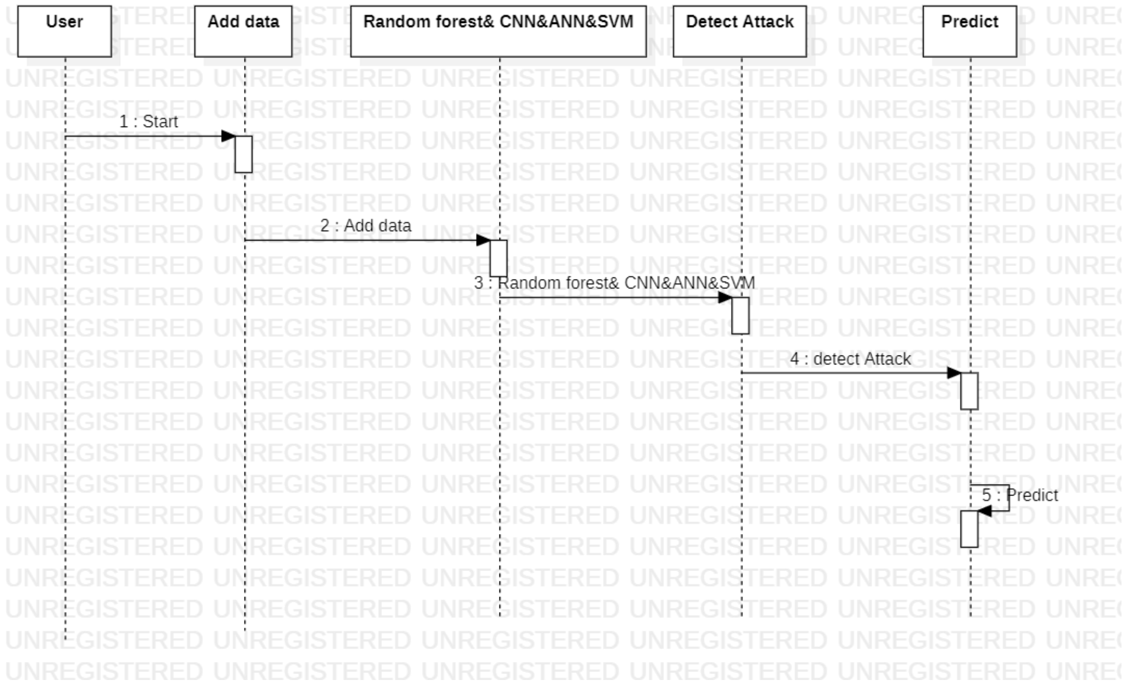
2.2.2.1 Use Case Diagram



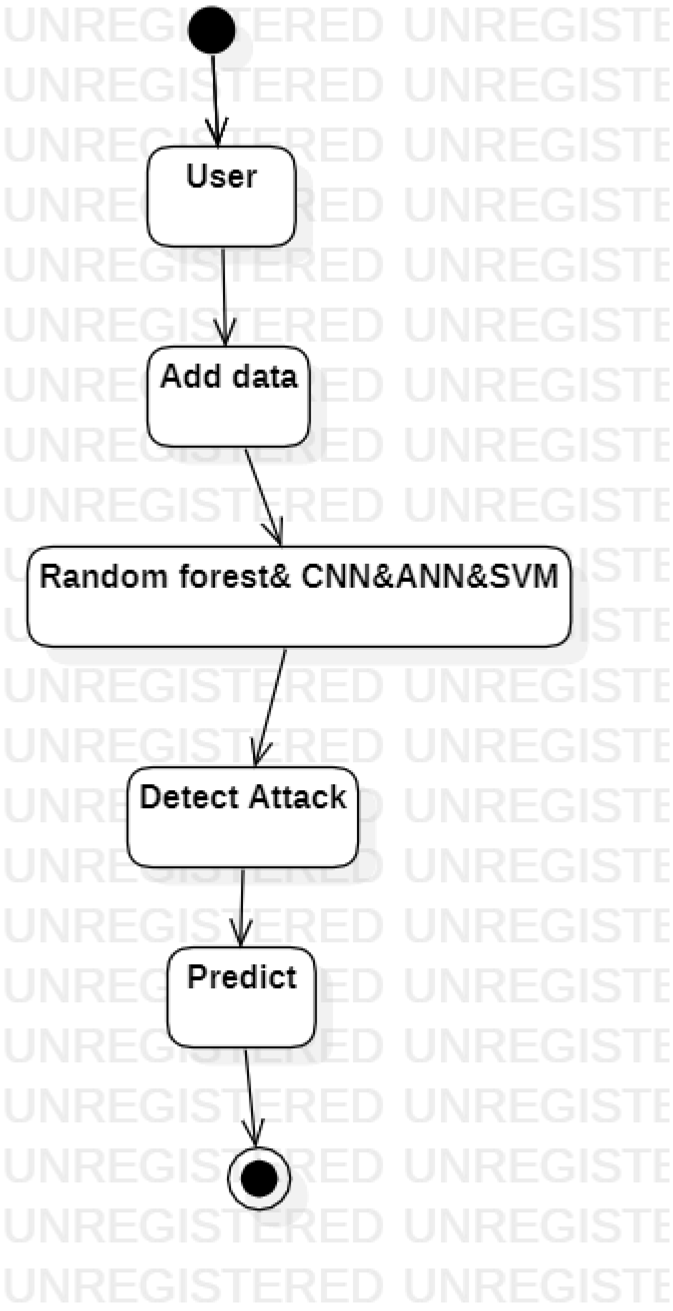
Class Diagram



Sequence Diagram



Activity Diagram


User
Add data
Random forest& CNN&ANN&SVM
Detect Attack
Predict

SOFTWARE ENVIRONMENT

What is Python: -

Below are some facts about Python.

Python is currently the most widely used multi-purpose, high-level programming language.

Python allows programming in Object-Oriented and Procedural paradigms. Python programs generally are smaller than other programming languages like Java.

Programmers have to type relatively less and indentation requirement of the language, makes them readable all the time.

Python language is being used by almost all tech-giant companies like – Google, Amazon, Facebook, Instagram, Dropbox, Uber… etc.

The biggest strength of Python is huge collection of standard library which can be used for the following –

- Machine Learning
- GUI Applications (like Kivy, Tkinter, PyQt etc.)
- Web frameworks like Django (used by YouTube, Instagram, Dropbox)
- Image processing (like Opencv, Pillow)
- Web scraping (like Scrapy, Beautiful Soup, Selenium)
- Test frameworks
- Multimedia

Advantages of Python :-

Let’s see how Python dominates over other languages.

1. Extensive Libraries

Python downloads with an extensive library and it *contain code for various purposes like regular expressions, documentation-generation, unit-testing, web browsers, threading, databases, CGI, email, image manipulation, and more.* So, we don’t have to write the complete code for that manually.

2. Extensible

As we have seen earlier, Python can be **extended to other languages**. You can write some of your code in languages like C++ or C. This comes in handy, especially in projects.

3. Embeddable

Complimentary to extensibility, Python is embeddable as well. You can put your Python code in your source code of a different language, like C++. This lets us add **scripting capabilities** to our code in the other language.

4. Improved Productivity

The language’s simplicity and extensive libraries render programmers **more productive** than languages like Java and C++ do. Also, the fact that you need to write less and get more things done.

5. IOT Opportunities

Since Python forms the basis of new platforms like Raspberry Pi, it finds the future bright for the Internet Of Things. This is a way to connect the language with the real world.

6. Simple and Easy

When working with Java, you may have to create a class to print **‘Hello World’**. But in Python, just a print statement will do. It is also quite **easy to learn, understand,** and **code.** This is why when people pick up Python, they have a hard time adjusting to other more verbose languages like Java.

7. Readable

Because it is not such a verbose language, reading Python is much like reading English. This is the reason why it is so easy to learn, understand, and code. It also does not need curly braces to define blocks, and **indentation is mandatory.** This further aids the readability of the code.

8. Object-Oriented

This language supports both the **procedural and object-oriented** programming paradigms. While functions help us with code reusability, classes and objects let us model the real world. A class allows the **encapsulation of data** and functions into one.

9. Free and Open-Source

Like we said earlier, Python is **freely available.** But not only can you **download Python** for free, but you can also download its source code, make changes to it, and even distribute it. It downloads with an extensive collection of libraries to help you with your tasks.

10. Portable

When you code your project in a language like C++, you may need to make some changes to it if you want to run it on another platform. But it isn’t the same with Python. Here, you need to **code only once**, and you can run it anywhere. This is called **Write Once Run Anywhere (WORA)**. However, you need to be careful enough not to include any system-dependent features.

11. Interpreted

Lastly, we will say that it is an interpreted language. Since statements are executed one by one, **debugging is easier** than in compiled languages.
Any doubts till now in the advantages of Python? Mention in the comment section.

Advantages of Python Over Other Languages

1. Less Coding

Almost all of the tasks done in Python requires less coding when the same task is done in other languages. Python also has an awesome standard library support, so you don’t have to search for any third-party libraries to get your job done. This is the reason that many people suggest learning Python to beginners.

2. Affordable

Python is free therefore individuals, small companies or big organizations can leverage the free available resources to build applications. Python is popular and widely used so it gives you better community support.

The 2019 Github annual survey showed us that Python has overtaken Java in the most popular programming language category.

3. Python is for Everyone

Python code can run on any machine whether it is Linux, Mac or Windows. Programmers need to learn different languages for different jobs but with Python, you can professionally build web apps, perform data analysis and **machine learning**, automate things, do web scraping and also build games and powerful visualizations. It is an all-rounder programming language.

Disadvantages of Python

So far, we've seen why Python is a great choice for your project. But if you choose it, you should be aware of its consequences as well. Let's now see the downsides of choosing Python over another language.

1. Speed Limitations

We have seen that Python code is executed line by line. But since Python is interpreted, it often results in **slow execution**. This, however, isn't a problem unless speed is a focal point for the project. In other words, unless high speed is a requirement, the benefits offered by Python are enough to distract us from its speed limitations.

2. Weak in Mobile Computing and Browsers

While it serves as an excellent server-side language, Python is much rarely seen on the **client-side**. Besides that, it is rarely ever used to implement smartphone-based applications. One such application is called **Carbonnelle**.
The reason it is not so famous despite the existence of Brython is that it isn't that secure.

3. Design Restrictions

As you know, Python is **dynamically-typed**. This means that you don't need to declare the type of variable while writing the code. It uses **duck-typing**. But wait, what's that? Well, it just means that if it looks like a duck, it must be a duck. While this is easy on the programmers during coding, it can **raise run-time errors**.

4. Underdeveloped Database Access Layers

Compared to more widely used technologies like **JDBC (Java DataBase Connectivity)** and **ODBC (Open DataBase Connectivity)**, Python's database access layers are a bit underdeveloped. Consequently, it is less often applied in huge enterprises.

5. Simple

No, we're not kidding. Python's simplicity can indeed be a problem. Take my example. I don't do Java; I'm more of a Python person. To me, its syntax is so simple that the verbosity of Java code seems unnecessary.

This was all about the Advantages and Disadvantages of Python Programming Language.

History of Python : -

What do the alphabet and the programming language Python have in common? Right, both start with ABC. If we are talking about ABC in the Python context, it's clear that the programming language ABC is meant. ABC is a general-purpose programming language and programming environment, which had been developed in the Netherlands, Amsterdam, at the CWI (Centrum Wiskunde &Informatica). The greatest achievement of ABC was to influence the design of Python.Python was conceptualized in the late 1980s. Guido van Rossum worked that time in a project at the CWI, called Amoeba, a distributed operating system. In an interview with Bill Venners[1], Guido van Rossum said: "In the early 1980s, I worked as an implementer on a team building a language called ABC at Centrum voor Wiskunde en Informatica (CWI). I don't know how well people know ABC's influence on Python. I try to mention ABC's influence because I'm indebted to everything I learned during that project and to the people who worked on it."Later on in the same Interview, Guido van Rossum continued: "I remembered all my experience and some of my frustration with ABC. I decided to try to design a simple scripting language that possessed some of ABC's better properties, but without its problems. So I started typing. I created a simple virtual machine, a simple parser, and a simple runtime. I made my own version of the various ABC parts that I liked. I created a basic syntax, used indentation for statement grouping instead of curly braces or begin-end blocks, and developed a small number of powerful data types: a hash table (or dictionary, as we call it), a list, strings, and numbers."

What is Machine Learning : -

Before we take a look at the details of various machine learning methods, let's start by looking at what machine learning is, and what it isn't. Machine learning is often categorized as a subfield of artificial intelligence, but I find that categorization can often be misleading at first brush. The study of machine learning certainly arose from research in this context, but in the data science application of machine learning methods, it's more helpful to think of machine learning as a means of *building models of data*.

Fundamentally, machine learning involves building mathematical models to help understand data. "Learning" enters the fray when we give these models *tunable parameters* that can be adapted to observed data; in this way the program can be considered to be "learning" from the data. Once these models have been fit to previously seen data, they can be used to predict and understand aspects of newly observed data. I'll leave to the reader the more philosophical digression regarding the extent to which this type of mathematical, model-based "learning" is similar to the "learning" exhibited by the human brain.Understanding the problem setting in machine learning is essential to using these tools effectively, and so we will start with some broad categorizations of the types of approaches we'll discuss here.

Categories Of Machine Leaning :-

At the most fundamental level, machine learning can be categorized into two main types: supervised learning and unsupervised learning.

Supervised learning involves somehow modeling the relationship between measured features of data and some label associated with the data; once this model is determined, it can be used to apply labels to new, unknown data. This is further subdivided into *classification* tasks and *regression* tasks: in classification, the labels are discrete categories, while in regression, the labels are continuous quantities. We will see examples of both types of supervised learning in the following section.

Unsupervised learning involves modeling the features of a dataset without reference to any label, and is often described as "letting the dataset speak for itself." These models include tasks such as *clustering* and *dimensionality reduction.* Clustering algorithms identify distinct groups of data, while dimensionality reduction algorithms search for more succinct representations of the data. We will see examples of both types of unsupervised learning in the following section.

Need for Machine Learning

Human beings, at this moment, are the most intelligent and advanced species on earth because they can think, evaluate and solve complex problems. On the other side, AI is still in its initial stage and haven’t surpassed human intelligence in many aspects. Then the question is that what is the need to make machine learn? The most suitable reason for doing this is, “to make decisions, based on data, with efficiency and scale”.

Lately, organizations are investing heavily in newer technologies like Artificial Intelligence, Machine Learning and Deep Learning to get the key information from data to perform several real-world tasks and solve problems. We can call it data-driven decisions taken by machines, particularly to automate the process. These data-driven decisions can be used, instead of using programing logic, in the problems that cannot be programmed inherently. The fact is that we can’t do without human intelligence, but other aspect is that we all need to solve real-world problems with efficiency at a huge scale. That is why the need for machine learning arises.

Challenges in Machines Learning:

While Machine Learning is rapidly evolving, making significant strides with cybersecurity and autonomous cars, this segment of AI as whole still has a long way to go. The reason behind is that ML has not been able to overcome number of challenges. The challenges that ML is facing currently are −

Quality of data − Having good-quality data for ML algorithms is one of the biggest challenges. Use of low-quality data leads to the problems related to data preprocessing and feature extraction.

Time-Consuming task − Another challenge faced by ML models is the consumption of time especially for data acquisition, feature extraction and retrieval.

Lack of specialist persons − As ML technology is still in its infancy stage, availability of expert resources is a tough job.

No clear objective for formulating business problems − Having no clear objective and well-defined goal for business problems is another key challenge for ML because this technology is not that mature yet.

Issue of overfitting & underfitting − If the model is overfitting or underfitting, it cannot be represented well for the problem.

Curse of dimensionality − Another challenge ML model faces is too many features of data points. This can be a real hindrance.

Difficulty in deployment − Complexity of the ML model makes it quite difficult to be deployed in real life.

Applications of Machines Learning: -

Machine Learning is the most rapidly growing technology and according to researchers we are in the golden year of AI and ML. It is used to solve many real-world complex problems which cannot be solved with traditional approach. Following are some real-world applications of ML −

- Emotion analysis
- Sentiment analysis
- Error detection and prevention
- Weather forecasting and prediction
- Stock market analysis and forecasting
- Speech synthesis
- Speech recognition
- Customer segmentation
- Object recognition
- Fraud detection
- Fraud prevention
- Recommendation of products to customer in online shopping

How to Start Learning Machine Learning?

Arthur Samuel coined the term **"Machine Learning"** in 1959 and defined it as a **"Field of study that gives computers the capability to learn without being explicitly programmed".**

And that was the beginning of Machine Learning! In modern times, Machine Learning is one of the most popular (if not the most!) career choices. According to Indeed, Machine Learning Engineer Is The Best Job of 2019 with a *344%* growth and an average base salary of **$146,085** per year.

But there is still a lot of doubt about what exactly is Machine Learning and how to start learning it? So this article deals with the Basics of Machine Learning and also the path you can follow to eventually become a full-fledged Machine Learning Engineer. Now let's get started!!!

How to start learning ML?

This is a rough roadmap you can follow on your way to becoming an insanely talented Machine Learning Engineer. Of course, you can always modify the steps according to your needs to reach your desired end-goal!

Step 1 – Understand the Prerequisites

In case you are a genius, you could start ML directly but normally, there are some prerequisites that you need to know which include Linear Algebra, Multivariate Calculus, Statistics, and Python. And if you don't know these, never fear! You don't need a Ph.D. degree in these topics to get started but you do need a basic understanding.

(a) Learn Linear Algebra and Multivariate Calculus

Both Linear Algebra and Multivariate Calculus are important in Machine Learning. However, the extent to which you need them depends on your role as a data scientist. If you are more focused on application heavy machine learning, then you will not be that heavily focused on maths as there are many common libraries available. But if you want to focus on R&D in Machine Learning, then mastery of Linear Algebra and Multivariate Calculus is very important as you will have to implement many ML algorithms from scratch.

(b) Learn Statistics

Data plays a huge role in Machine Learning. In fact, around 80% of your time as an ML expert will be spent collecting and cleaning data. And statistics is a field that handles the collection, analysis, and presentation of data. So it is no surprise that you need to learn it!!! Some of the key concepts in statistics that are important are Statistical Significance, Probability Distributions, Hypothesis Testing, Regression, etc. Also, Bayesian Thinking is also a very important part of ML which deals with various concepts like Conditional Probability, Priors, and Posteriors, Maximum Likelihood, etc.

(c) Learn Python

Some people prefer to skip Linear Algebra, Multivariate Calculus and Statistics and learn them as they go along with trial and error. But the one thing that you absolutely cannot skip is Python! While there are other languages you can use for Machine Learning like R, Scala, etc. Python is currently the most popular language for ML. In fact, there are many Python libraries that are specifically useful for Artificial Intelligence and Machine Learning such as Keras, TensorFlow, Scikit-learn, etc.
So if you want to learn ML, it’s best if you learn Python! You can do that using various online resources and courses such as **Fork Python** available Free on GeeksforGeeks.

Step 2 – Learn Various ML Concepts

Now that you are done with the prerequisites, you can move on to actually learning ML (Which is the fun part!!!) It’s best to start with the basics and then move on to the more complicated stuff. Some of the basic concepts in ML are:

(a) Terminologies of Machine Learning

- **Model** – A model is a specific representation learned from data by applying some machine learning algorithm. A model is also called a hypothesis.

- **Feature –** A feature is an individual measurable property of the data. A set of numeric features can be conveniently described by a feature vector. Feature vectors are fed as input to the model. For example, in order to predict a fruit, there may be features like color, smell, taste, etc.
- **Target (Label) –** A target variable or label is the value to be predicted by our model. For the fruit example discussed in the feature section, the label with each set of input would be the name of the fruit like apple, orange, banana, etc.
- **Training –** The idea is to give a set of inputs(features) and it's expected outputs(labels), so after training, we will have a model (hypothesis) that will then map new data to one of the categories trained on.
- **Prediction –** Once our model is ready, it can be fed a set of inputs to which it will provide a predicted output(label).

(b) Types of Machine Learning

- **Supervised Learning –** This involves learning from a training dataset with labeled data using classification and regression models. This learning process continues until the required level of performance is achieved.
- **Unsupervised Learning –** This involves using unlabeled data and then finding the underlying structure in the data in order to learn more and more about the data itself using factor and cluster analysis models.
- **Semi-supervised Learning –** This involves using unlabeled data like Unsupervised Learning with a small amount of labeled data. Using labeled data vastly increases the learning accuracy and is also more cost-effective than Supervised Learning.
- **Reinforcement Learning –** This involves learning optimal actions through trial and error. So the next action is decided by learning behaviors that are based on the current state and that will maximize the reward in the future.

Advantages of Machine learning: -

1. Easily identifies trends and patterns -

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviors and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them.

2. No human intervention needed (automation)

With ML, you don't need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own. A common example of this is anti-virus softwares; they learn to filter new threats as they are recognized. ML is also good at recognizing spam.

3. Continuous Improvement

As **ML algorithms** gain experience, they keep improving in accuracy and efficiency. This lets them make better decisions. Say you need to make a weather forecast model. As the amount of data you have keeps growing, your algorithms learn to make more accurate predictions faster.

4. Handling multi-dimensional and multi-variety data

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments.

5. Wide Applications

You could be an e-tailer or a healthcare provider and make ML work for you. Where it does apply, it holds the capability to help deliver a much more personal experience to customers while also targeting the right customers.

Disadvantages of Machine Learning :-

1. Data Acquisition

Machine Learning requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality. There can also be times where they must wait for new data to be generated.

2. Time and Resources

ML needs enough time to let the algorithms learn and develop enough to fulfill their purpose with a considerable amount of accuracy and relevancy. It also needs massive resources to function. This can mean additional requirements of computer power for you.

3. Interpretation of Results

Another major challenge is the ability to accurately interpret results generated by the algorithms. You must also carefully choose the algorithms for your purpose.

4. High error-susceptibility

Machine Learning is autonomous but highly susceptible to errors. Suppose you train an algorithm with data sets small enough to not be inclusive. You end up with biased predictions coming from a biased training set. This leads to irrelevant advertisements being displayed to customers. In the case of ML, such blunders can set off a chain of errors that can go undetected for long periods of time. And when they do get noticed, it takes quite some time to recognize the source of the issue, and even longer to correct it.

Python Development Steps : -

Guido Van Rossum published the first version of Python code (version 0.9.0) at alt.sources in February 1991. This release included already exception handling, functions, and the core data types of list, dict, str and others. It was also object oriented and had a module system. Python version 1.0 was released in January 1994. The major new features included in this release were the functional programming tools lambda, map, filter and reduce, which Guido Van Rossum never liked.Six and a half years later in October 2000, Python 2.0 was introduced. This release included list comprehensions, a full garbage collector and it was supporting unicode.Python flourished for another 8 years in the versions 2.x before the next major release as Python 3.0 (also known as "Python 3000" and "Py3K") was released. Python 3 is not backwards compatible with Python 2.x. The emphasis in Python 3 had been on the removal of duplicate programming constructs and modules, thus fulfilling or coming close to fulfilling the 13th law of the Zen of Python: "There should be one -- and preferably only one -- obvious way to do it."Some changes in Python 7.3:

- Print is now a function
- Views and iterators instead of lists
- The rules for ordering comparisons have been simplified. E.g. a heterogeneous list cannot be sorted, because all the elements of a list must be comparable to each other.
- There is only one integer type left, i.e. int. long is int as well.

- The division of two integers returns a float instead of an integer. "//" can be used to have the "old" behaviors.
- Text Vs. Data Instead of Unicode Vs. 8-bit

Purpose :-

We demonstrated that our approach enables successful segmentation of intra-retinal layers—even with low-quality images containing speckle noise, low contrast, and different intensity ranges throughout—with the assistance of the ANIS feature.

Python

Python is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented, imperative, functional and procedural, and has a large and comprehensive standard library.

- Python is Interpreted − Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.
- Python is Interactive − you can actually sit at a Python prompt and interact with the interpreter directly to write your programs.

Python also acknowledges that speed of development is important. Readable and terse code is part of this, and so is access to powerful constructs that avoid tedious repetition of code. Maintainability also ties into this may be an all but useless metric, but it does say something about how much code you have to scan, read and/or understand to troubleshoot problems or tweak behaviors. This speed of development, the ease with which a programmer of other languages can pick up basic Python skills and the huge standard library is key to another area where Python excels. All its tools have been quick to implement, saved a lot of time, and several of them have later been patched and updated by people with no Python background - without breaking.

Modules Used in Project-

TensorFlow

TensorFlow is a free and open-source software library for dataflow and differentiable programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks. It is used for both research and production at Google.

TensorFlow was developed by the Google Brain team for internal Google use. It was released under the Apache 2.0 open-source license on November 9, 2015.

NumPy

NumPy is a general-purpose array-processing package. It provides a high-performance multidimensional array object, and tools for working with these arrays.

It is the fundamental package for scientific computing with Python. It contains various features including these important ones:

- A powerful N-dimensional array object
- Sophisticated (broadcasting) functions
- Tools for integrating C/C++ and Fortran code
- Useful linear algebra, Fourier transform, and random number capabilities

Besides its obvious scientific uses, Numpy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined using Numpy which allows Numpy to seamlessly and speedily integrate with a wide variety of databases.

Pandas

Pandas is an open-source Python Library providing high-performance data manipulation and analysis tool using its powerful data structures. Python was majorly used for data munging and preparation. It had very little contribution towards data analysis. Pandas solved this problem. Using Pandas, we can accomplish five typical steps in the processing and analysis of data, regardless of the origin of data load, prepare, manipulate, model, and analyze. Python with Pandas is used in a wide range of fields including academic and commercial domains including finance, economics, Statistics, analytics, etc.

Matplotlib

Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shells, the Jupyter Notebook, web application servers, and four graphical user interface toolkits. Matplotlib tries to make easy things easy and hard things possible. You can generate plots, histograms, power spectra, bar charts, error charts, scatter plots, etc., with just a few lines of code. For examples, see the sample plots and thumbnail gallery.

For simple plotting the pyplot module provides a MATLAB-like interface, particularly when combined with IPython. For the power user, you have full control of line styles, font properties, axes properties, etc, via an object oriented interface or via a set of functions familiar to MATLAB users.

Scikit – learn

Scikit-learn provides a range of supervised and unsupervised learning algorithms via a consistent interface in Python. It is licensed under a permissive simplified BSD license and is distributed under many Linux distributions, encouraging academic and commercial use.

Python

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Install Python Step-by-Step in Windows and Mac :

Python a versatile programming language doesn't come pre-installed on your computer devices. Python was first released in the year 1991 and until today it is a very popular high-level programming language. Its style philosophy emphasizes code readability with its notable use of great whitespace.

The object-oriented approach and language construct provided by Python enables programmers to write both clear and logical code for projects. This software does not come pre-packaged with Windows.

How to Install Python on Windows and Mac

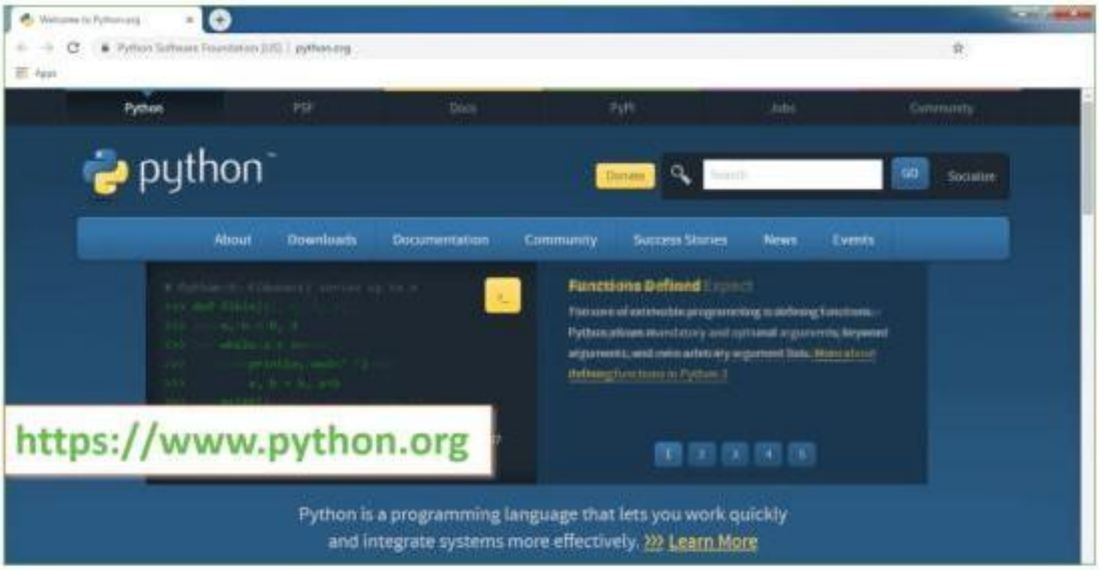
There have been several updates in the Python version over the years. The question is how to install Python? It might be confusing for the beginner who is willing to start learning Python but this tutorial will solve your query. The latest or the newest version of Python is version 3.7.4 or in other words, it is Python 3.

Note: The python version 3.7.4 cannot be used on Windows XP or earlier devices.

Before you start with the installation process of Python. First, you need to know about your **System Requirements**. Based on your system type i.e. operating system and based processor, you must download the python version. My system type is a **Windows 64-bit operating system**. So the steps below are to install python version 3.7.4 on Windows 7 device or to install Python 3. Download the Python Cheat sheet here.The steps on how to install Python on Windows 10, 8 and 7 are **divided into 4 parts** to help understand better.

Download the Correct version into the system

Step 1: Go to the official site to download and install python using Google Chrome or any other web browser. OR Click on the following link: **https://www.python.org**



https://www.python.org

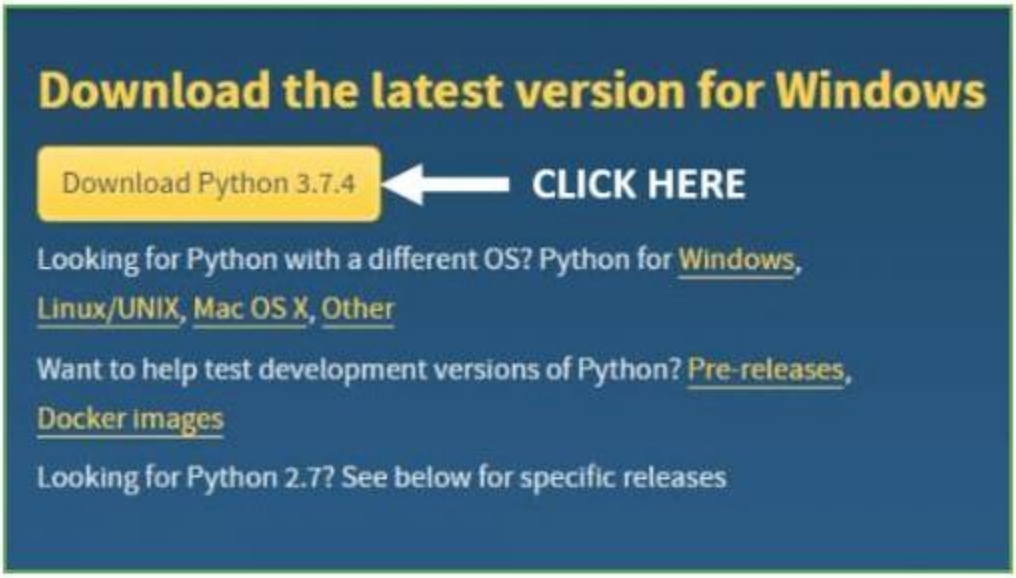
Functions Defined

The core of extensible programming is defining functions. Python allows mandatory and optional arguments, keyword arguments, and even arbitrary argument lists. More about defining functions in Python 3

Python is a programming language that lets you work quickly and integrate systems more effectively. >>> Learn More

Now, check for the latest and the correct version for your operating system.

Step 2: **Click on the Download Tab.**



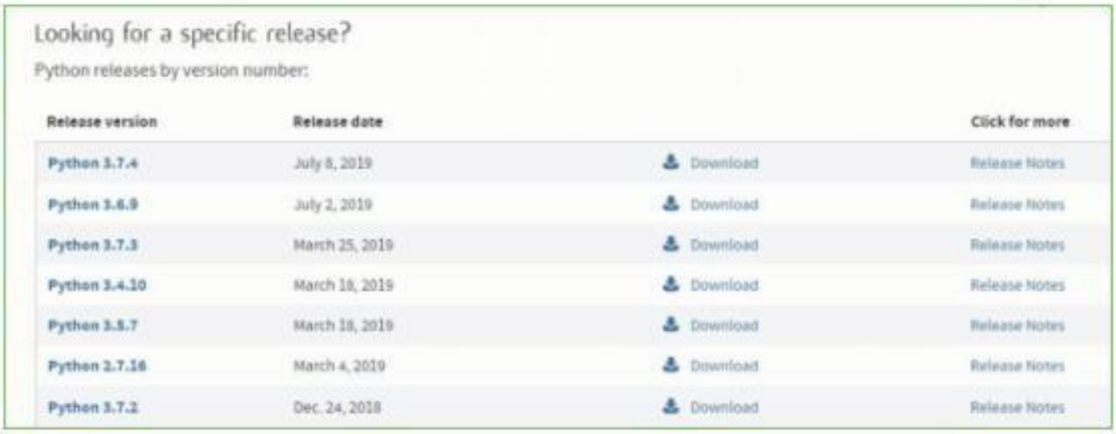
Download the latest version for Windows

Looking for Python with a different OS? Python for Windows, Linux/UNIX, Mac OS X, Other

Want to help test development versions of Python? Pre-releases, Docker images

Looking for Python 2.7? See below for specific releases

Step 3**:** You can either select the Download Python for windows 3.7.4 button in Yellow Color or you can scroll further down and click on download with respective to their version. Here, we are downloading the most recent python version for windows 3.7.4



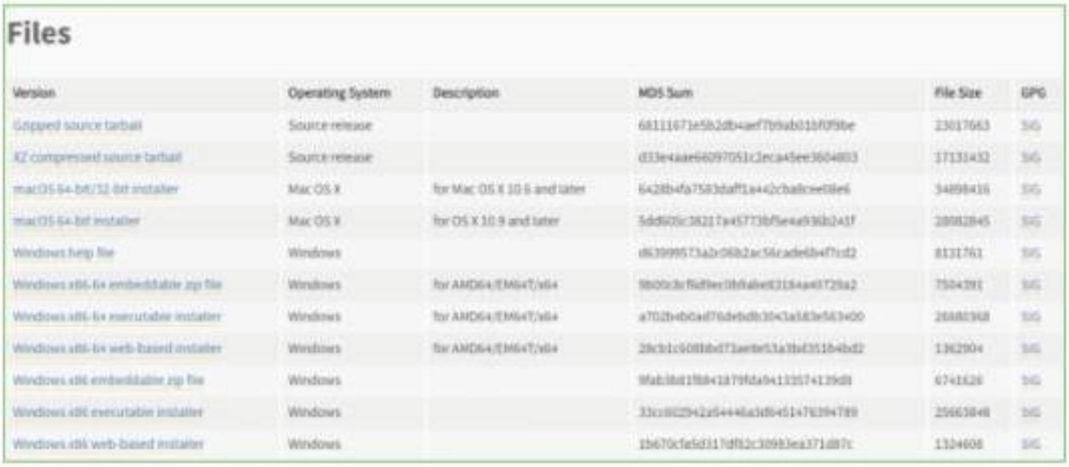
Looking for a specific release?

Python releases by version number:

Release version	Release date		Click for more
Python 3.7.4	July 8, 2019	Download	Release Notes
Python 3.6.9	July 2, 2019	Download	Release Notes
Python 3.7.3	March 25, 2019	Download	Release Notes
Python 3.4.10	March 18, 2019	Download	Release Notes
Python 3.5.7	March 18, 2019	Download	Release Notes
Python 2.7.16	March 4, 2019	Download	Release Notes
Python 3.7.2	Dec. 24, 2018	Download	Release Notes

Step 4: Scroll down the page until you find the Files option.

Step 5: Here you see a different version of python along with the operating system.



Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		68111671e5b2db4aef7b9ab01bf0f9be	23017663	SIG
XZ compressed source tarball	Source release		d33e4aae66097051c2eca45ee3604803	17131432	SIG
macOS 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	6428b4fa7583daff1a442cba8cee08e6	34898416	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	5dd605c38217a45773bf5e4a936b241f	28082845	SIG
Windows help file	Windows		d63999573a2c06b2ac56cade6b4f7cd2	8131761	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	9b00c8cf6d9ec0b9abe83184a40729a2	7504391	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	a702b4b0ad76debdb3043a583e563400	26680368	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	28cb1c608bbd73ae8e53a3bd351b4bd2	1362904	SIG
Windows x86 embeddable zip file	Windows		9fab3b81f8841879fda94133574139d8	6741626	SIG
Windows x86 executable installer	Windows		33cc602942a54446a3d6451476394789	25663848	SIG
Windows x86 web-based installer	Windows		1b670cfa5d317df82c30983ea371d87c	1324608	SIG

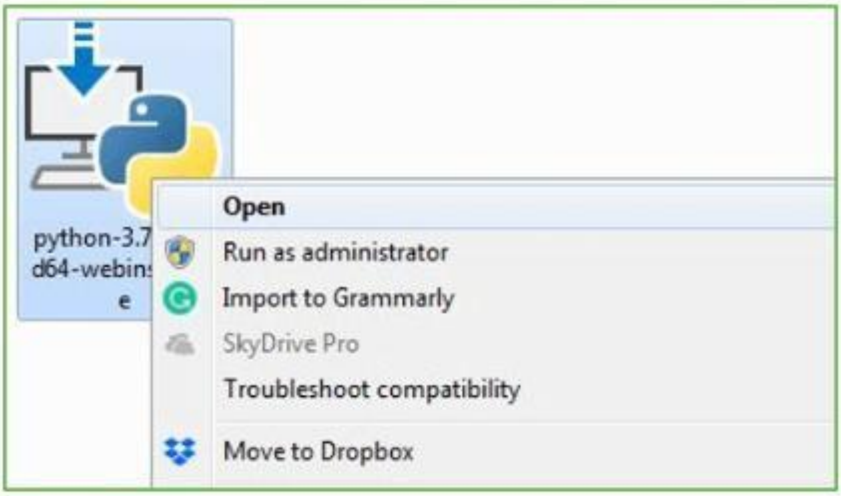
- To download Windows 32-bit python, you can select any one from the three options: Windows x86 embeddable zip file, Windows x86 executable installer or Windows x86 web-based installer.
- To download Windows 64-bit python, you can select any one from the three options: Windows x86-64 embeddable zip file, Windows x86-64 executable installer or Windows x86-64 web-based installer.

Here we will install Windows x86-64 web-based installer. Here your first part regarding which version of python is to be downloaded is completed. Now we move ahead with the second part in installing python i.e. Installation

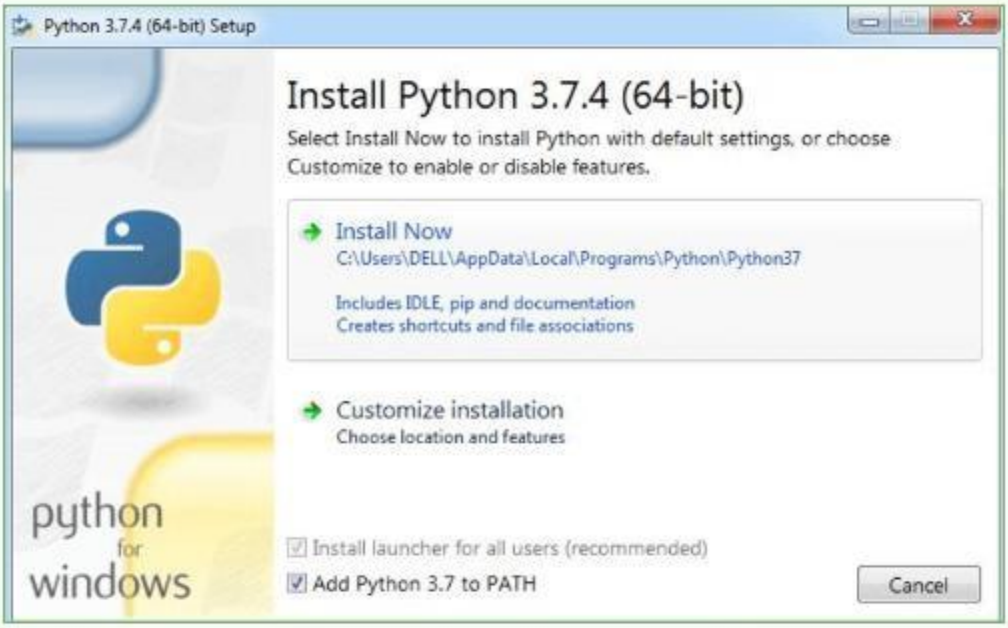
Note: To know the changes or updates that are made in the version you can click on the Release Note Option.

Installation of Python

Step 1: Go to Download and Open the downloaded python version to carry out the installation process.



Step 2: Before you click on Install Now, make sure to put a tick on Add Python 3.7 to PATH.



Python 3.7.4 (64-bit) Setup

Install Python 3.7.4 (64-bit)

Select Install Now to install Python with default settings, or choose Customize to enable or disable features.

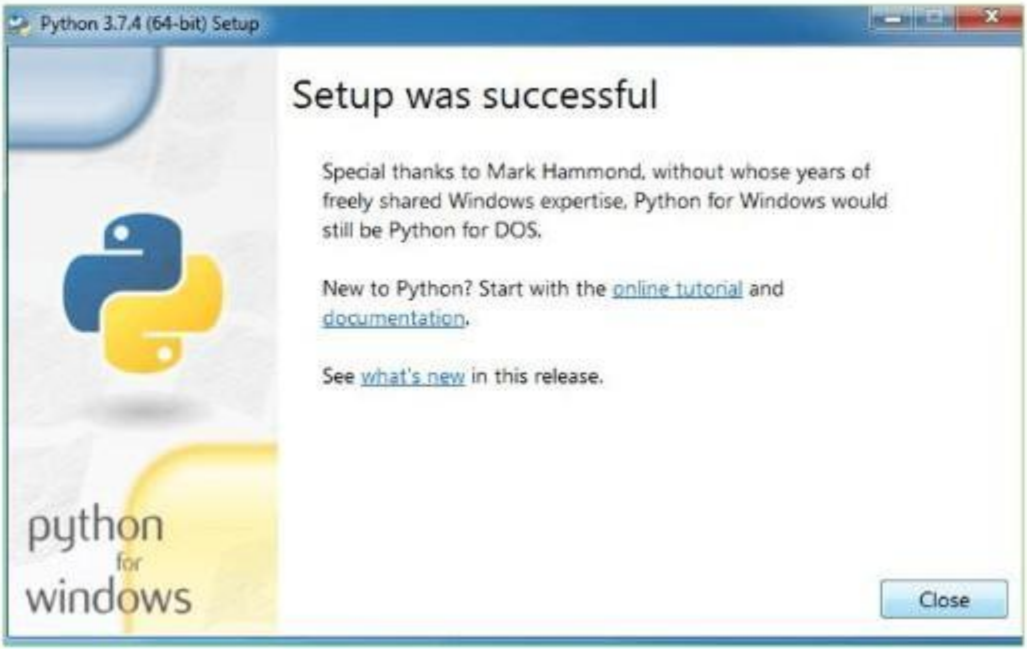
→ Install Now
C:\Users\DELL\AppData\Local\Programs\Python\Python37

Includes IDLE, pip and documentation
Creates shortcuts and file associations

→ Customize installation
Choose location and features

☑ Install launcher for all users (recommended)
☑ Add Python 3.7 to PATH

Step 3: Click on Install NOW After the installation is successful. Click on Close.



Python 3.7.4 (64-bit) Setup

Setup was successful

Special thanks to Mark Hammond, without whose years of freely shared Windows expertise, Python for Windows would still be Python for DOS.

New to Python? Start with the online tutorial and documentation.

See what's new in this release.

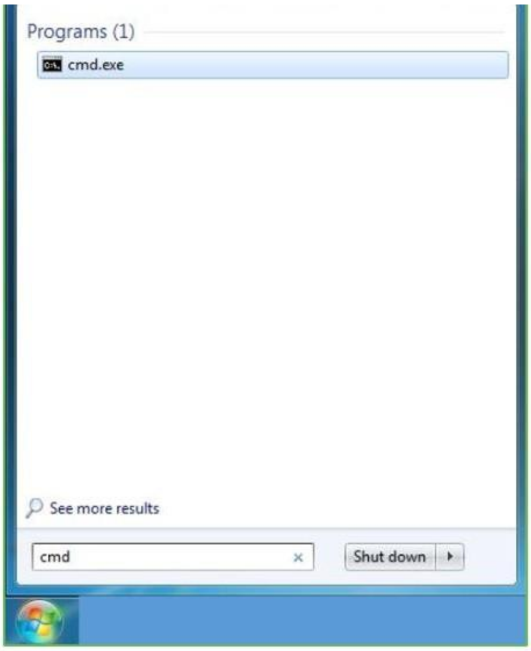
With these above three steps on python installation, you have successfully and correctly installed Python. Now is the time to verify the installation.

Note: The installation process might take a couple of minutes.

Verify the Python Installation

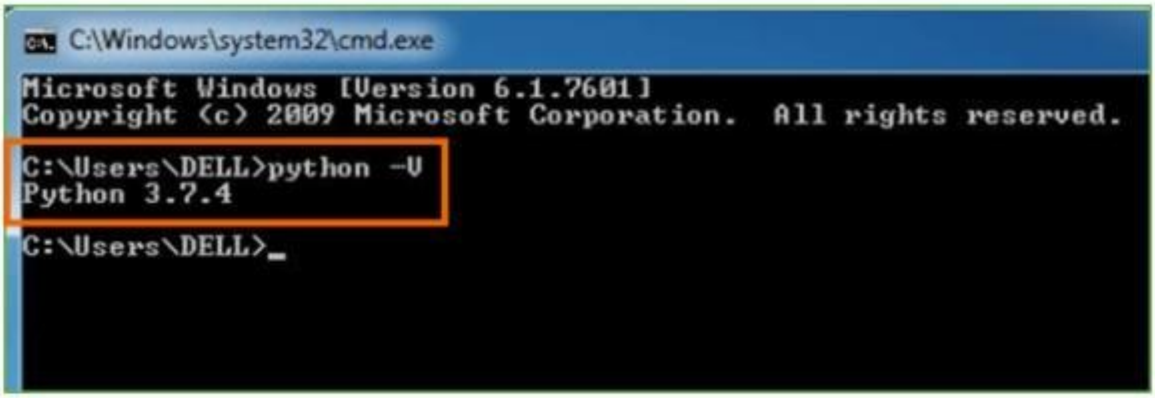
Step 1: Click on Start

Step 2: In the Windows Run Command, type “cmd”.



Step 3: Open the Command prompt option.

Step 4: Let us test whether the python is correctly installed. Type **python –V** and press Enter.



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\DELL>python -V
Python 3.7.4

C:\Users\DELL>_
```

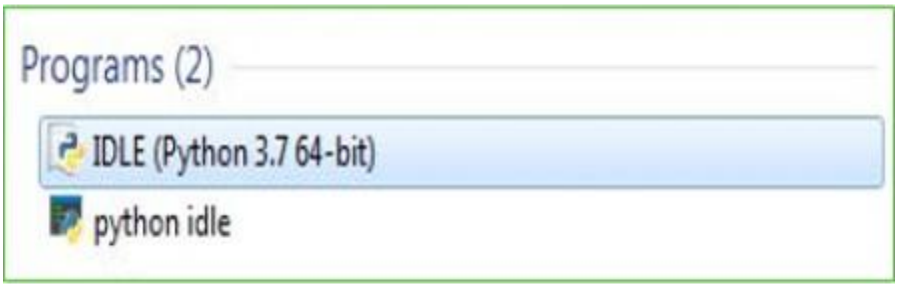
Step 5: You will get the answer as 3.7.4

Note: If you have any of the earlier versions of Python already installed. You must first uninstall the earlier version and then install the new one.

Check how the Python IDLE works

Step 1: Click on Start

Step 2: In the Windows Run command, type "python idle".



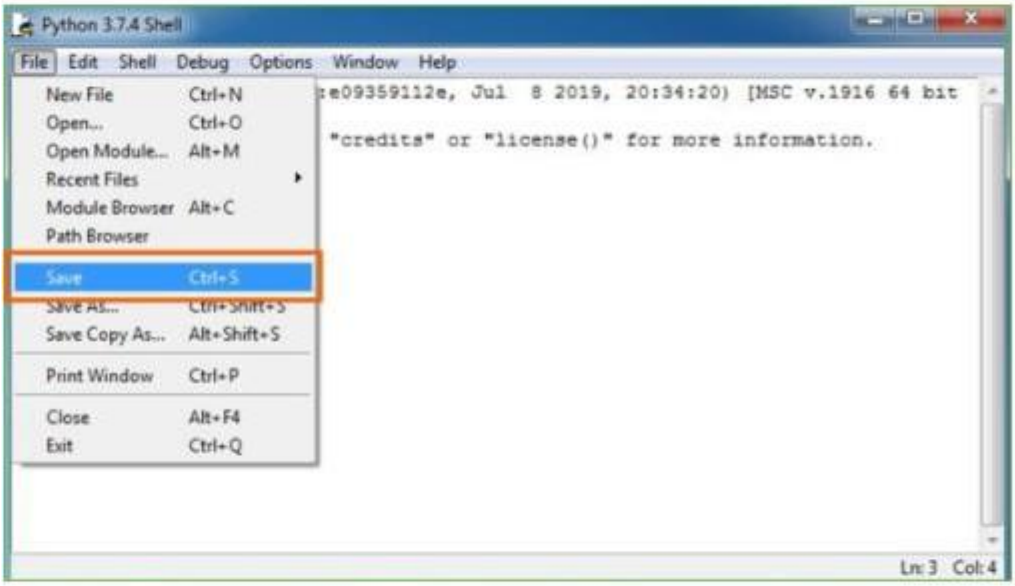
Programs (2)

IDLE (Python 3.7 64-bit)

python idle

Step 3: Click on IDLE (Python 3.7 64-bit) and launch the program

Step 4: To go ahead with working in IDLE you must first save the file. **Click on File > Click on Save**

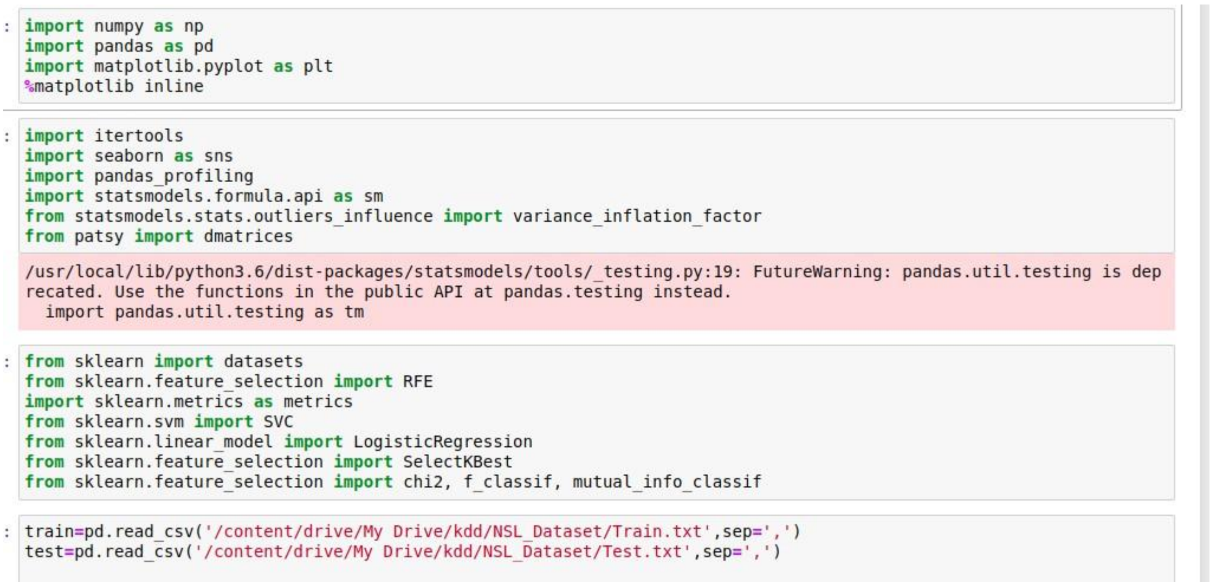


```
:e09359112e, Jul  8 2019, 20:34:20) [MSC v.1916 64 bit

 "credits" or "license()" for more information.
```

Step 5: Name the file and save as type should be Python files. Click on SAVE. Here I have named the files as Hey World.

Step 6: Now for e.g. **enter print**

CODING



```
: import numpy as np
  import pandas as pd
  import matplotlib.pyplot as plt
  %matplotlib inline
```

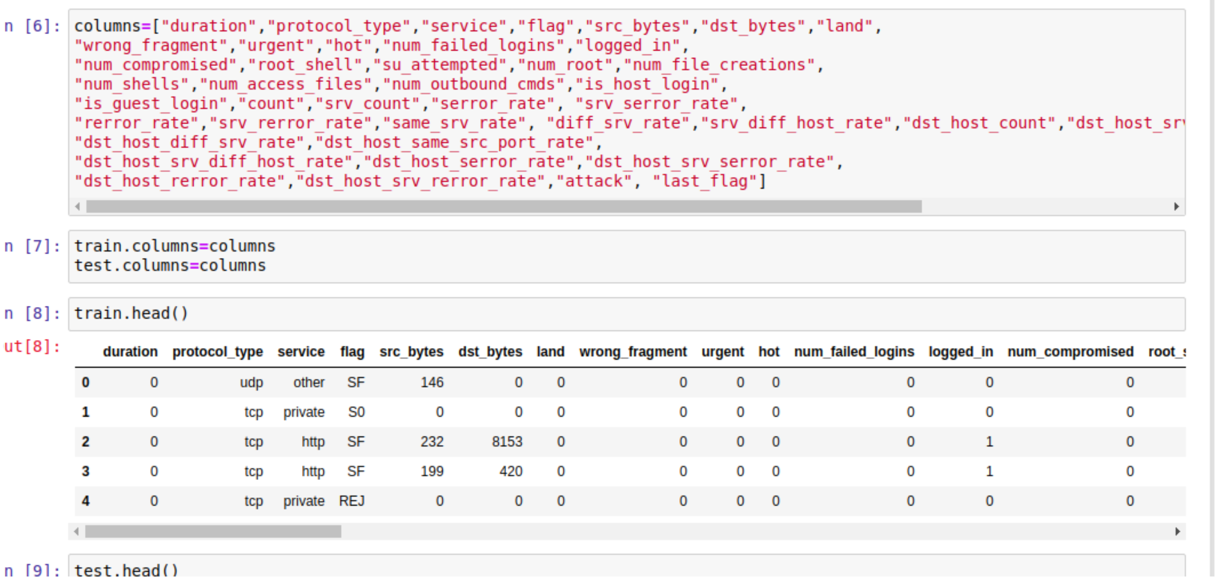
```
: import itertools
  import seaborn as sns
  import pandas_profiling
  import statsmodels.formula.api as sm
  from statsmodels.stats.outliers_influence import variance_inflation_factor
  from patsy import dmatrices
```

```
/usr/local/lib/python3.6/dist-packages/statsmodels/tools/_testing.py:19: FutureWarning: pandas.util.testing is dep
recated. Use the functions in the public API at pandas.testing instead.
  import pandas.util.testing as tm
```

```
: from sklearn import datasets
  from sklearn.feature_selection import RFE
  import sklearn.metrics as metrics
  from sklearn.svm import SVC
  from sklearn.linear_model import LogisticRegression
  from sklearn.feature_selection import SelectKBest
  from sklearn.feature_selection import chi2, f_classif, mutual_info_classif
```

```
: train=pd.read_csv('/content/drive/My Drive/kdd/NSL_Dataset/Train.txt',sep=',')
  test=pd.read_csv('/content/drive/My Drive/kdd/NSL_Dataset/Test.txt',sep=',')
```

Data preprocessing



```
n [6]: columns=["duration","protocol_type","service","flag","src_bytes","dst_bytes","land",
       "wrong_fragment","urgent","hot","num_failed_logins","logged_in",
       "num_compromised","root_shell","su_attempted","num_root","num_file_creations",
       "num_shells","num_access_files","num_outbound_cmds","is_host_login",
       "is_guest_login","count","srv_count","serror_rate", "srv_serror_rate",
       "rerror_rate","srv_rerror_rate","same_srv_rate", "diff_srv_rate","srv_diff_host_rate","dst_host_count","dst_host_sr
       "dst_host_diff_srv_rate","dst_host_same_src_port_rate",
       "dst_host_srv_diff_host_rate","dst_host_serror_rate","dst_host_srv_serror_rate",
       "dst_host_rerror_rate","dst_host_srv_rerror_rate","attack", "last_flag"]
```

```
n [7]: train.columns=columns
       test.columns=columns
```

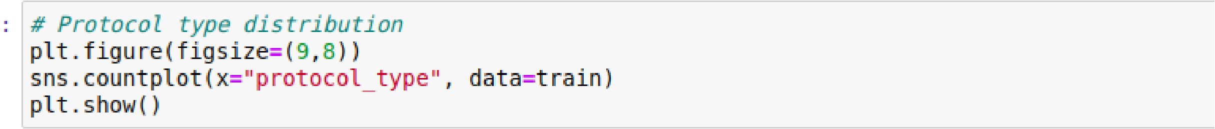
```
n [8]: train.head()
```

ut[8]:

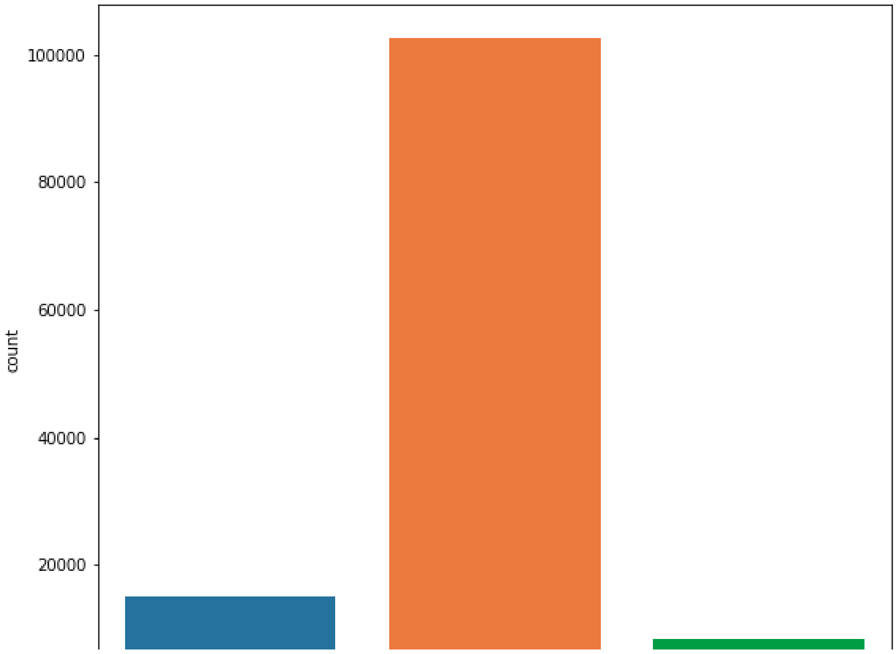
	duration	protocol_type	service	flag	src_bytes	dst_bytes	land	wrong_fragment	urgent	hot	num_failed_logins	logged_in	num_compromised	root_s
0	0	udp	other	SF	146	0	0	0	0	0	0	0	0	
1	0	tcp	private	S0	0	0	0	0	0	0	0	0	0	
2	0	tcp	http	SF	232	8153	0	0	0	0	0	1	0	
3	0	tcp	http	SF	199	420	0	0	0	0	0	1	0	
4	0	tcp	private	REJ	0	0	0	0	0	0	0	0	0	

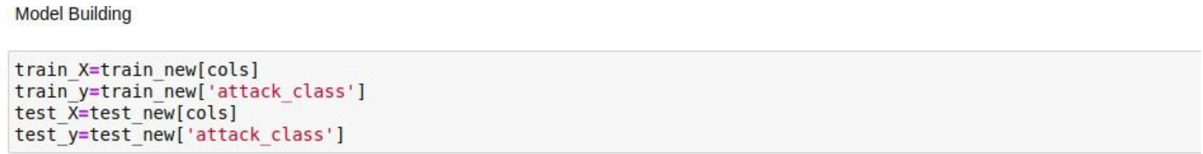
```
n [9]: test.head()
```

Data EDA



```
# Protocol type distribution
plt.figure(figsize=(9,8))
sns.countplot(x="protocol_type", data=train)
plt.show()
```

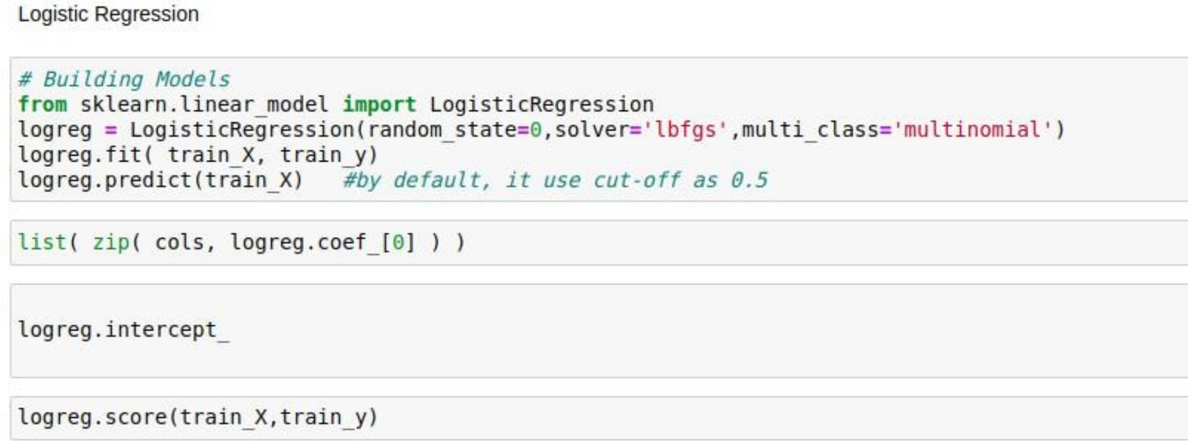




Model Building

```
train_X=train_new[cols]
train_y=train_new['attack_class']
test_X=test_new[cols]
test_y=test_new['attack_class']
```

ML Deploy



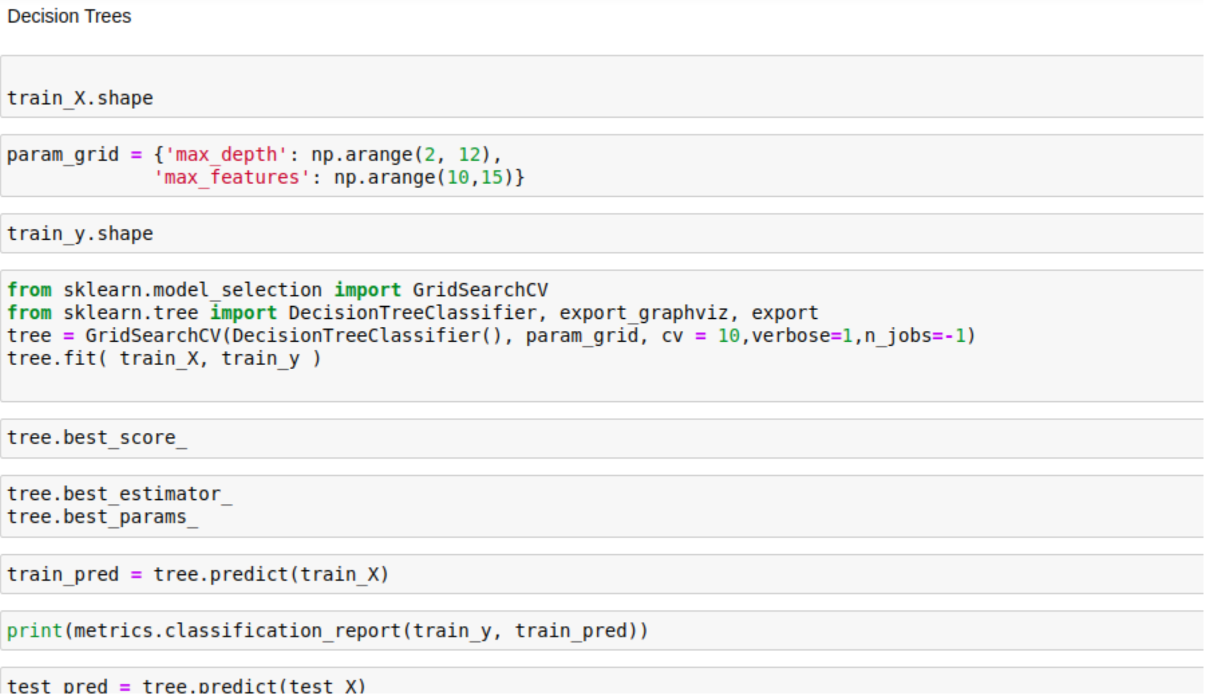
Logistic Regression

```
# Building Models
from sklearn.linear_model import LogisticRegression
logreg = LogisticRegression(random_state=0,solver='lbfgs',multi_class='multinomial')
logreg.fit( train_X, train_y)
logreg.predict(train_X)   #by default, it use cut-off as 0.5
```

```
list( zip( cols, logreg.coef_[0] ) )
```

```
logreg.intercept_
```

```
logreg.score(train_X,train_y)
```



Decision Trees

```
train_X.shape
```

```
param_grid = {'max_depth': np.arange(2, 12),
             'max_features': np.arange(10,15)}
```

```
train_y.shape
```

```
from sklearn.model_selection import GridSearchCV
from sklearn.tree import DecisionTreeClassifier, export_graphviz, export
tree = GridSearchCV(DecisionTreeClassifier(), param_grid, cv = 10,verbose=1,n_jobs=-1)
tree.fit( train_X, train_y )
```

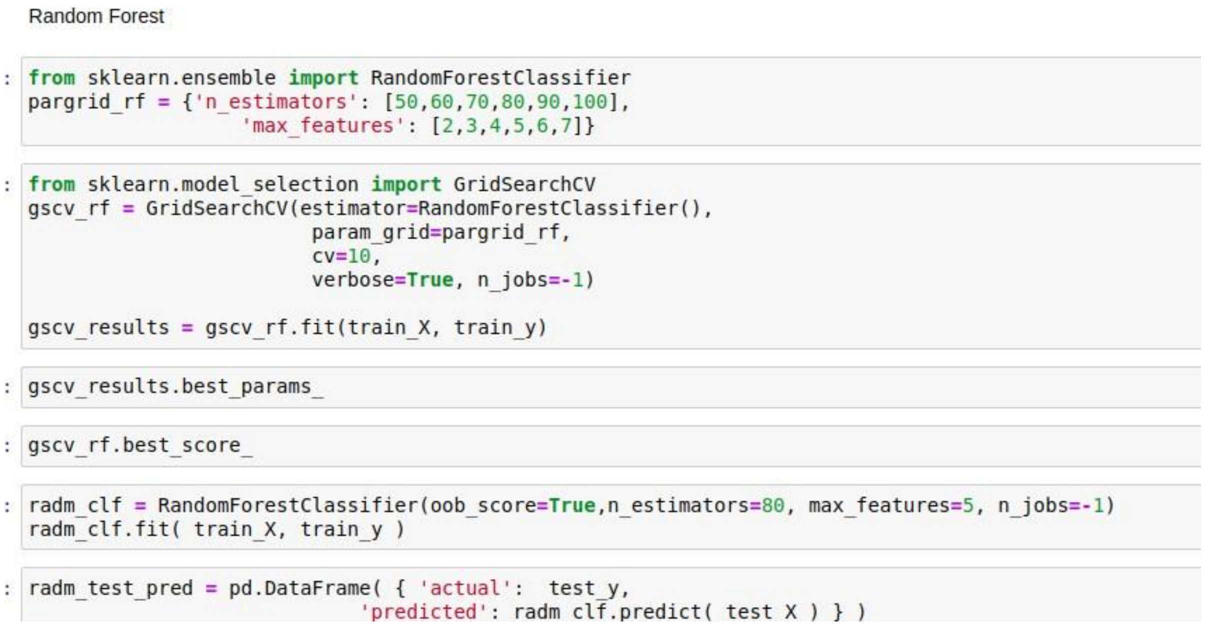
```
tree.best_score_
```

```
tree.best_estimator_
tree.best_params_
```

```
train_pred = tree.predict(train_X)
```

```
print(metrics.classification_report(train_y, train_pred))
```

```
test_pred = tree.predict(test_X)
```



Random Forest

```
: from sklearn.ensemble import RandomForestClassifier
  pargrid_rf = {'n_estimators': [50,60,70,80,90,100],
                'max_features': [2,3,4,5,6,7]}
```

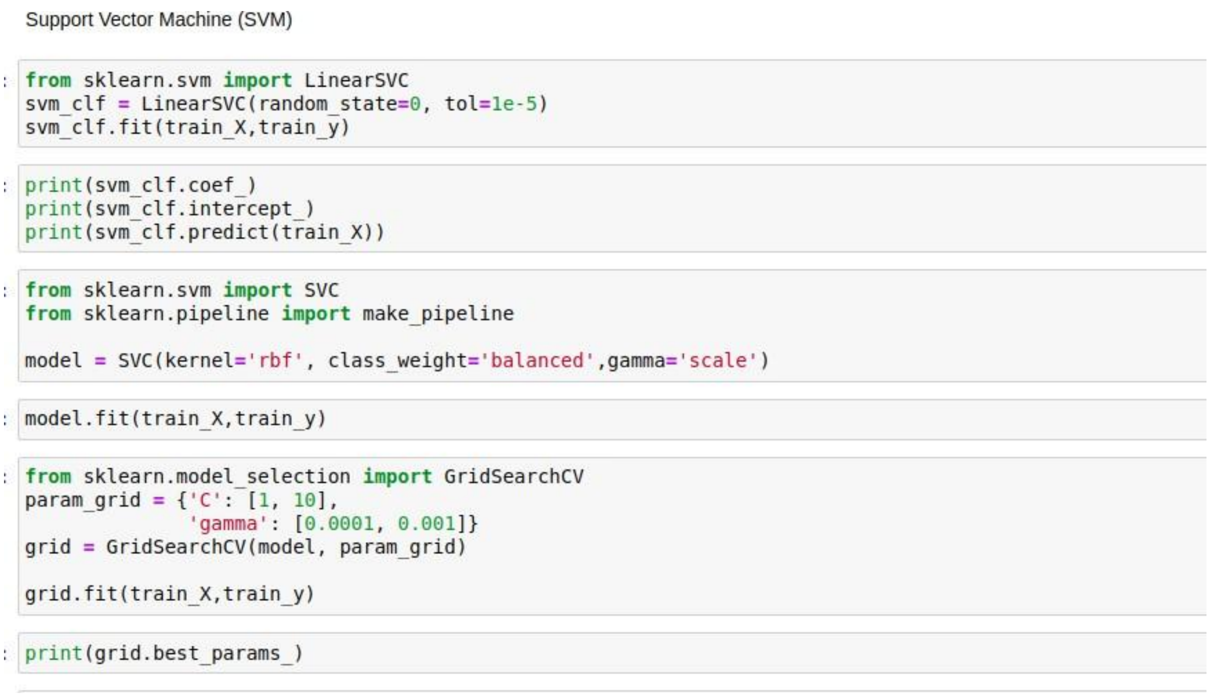
```
: from sklearn.model_selection import GridSearchCV
  gscv_rf = GridSearchCV(estimator=RandomForestClassifier(),
                          param_grid=pargrid_rf,
                          cv=10,
                          verbose=True, n_jobs=-1)

  gscv_results = gscv_rf.fit(train_X, train_y)
```

```
: gscv_results.best_params_
```

```
: gscv_rf.best_score_
```

```
: radm_clf = RandomForestClassifier(oob_score=True,n_estimators=80, max_features=5, n_jobs=-1)
  radm_clf.fit( train_X, train_y )
```

```
: radm_test_pred = pd.DataFrame( { 'actual':  test_y,
                              'predicted': radm_clf.predict( test_X ) } )
```



Support Vector Machine (SVM)

```
from sklearn.svm import LinearSVC
svm_clf = LinearSVC(random_state=0, tol=1e-5)
svm_clf.fit(train_X,train_y)
```

```
print(svm_clf.coef_)
print(svm_clf.intercept_)
print(svm_clf.predict(train_X))
```

```
from sklearn.svm import SVC
from sklearn.pipeline import make_pipeline

model = SVC(kernel='rbf', class_weight='balanced',gamma='scale')
```

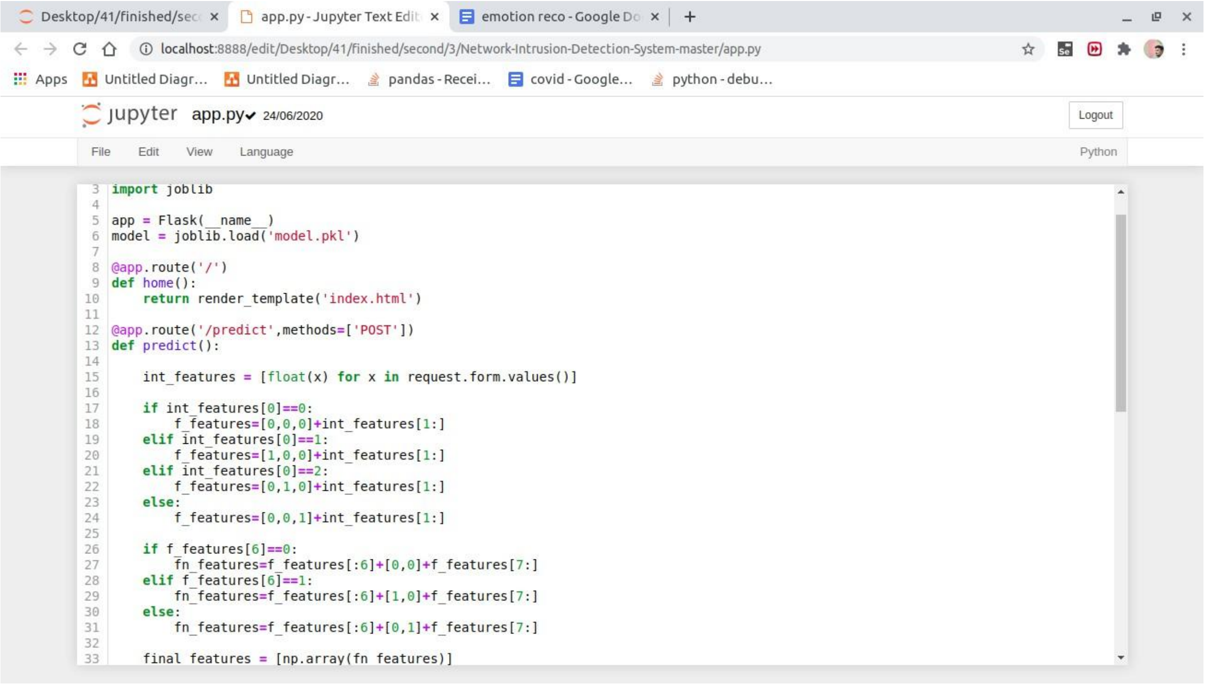
```
model.fit(train_X,train_y)
```

```
from sklearn.model_selection import GridSearchCV
param_grid = {'C': [1, 10],
              'gamma': [0.0001, 0.001]}
grid = GridSearchCV(model, param_grid)

grid.fit(train_X,train_y)
```

```
print(grid.best_params_)
```

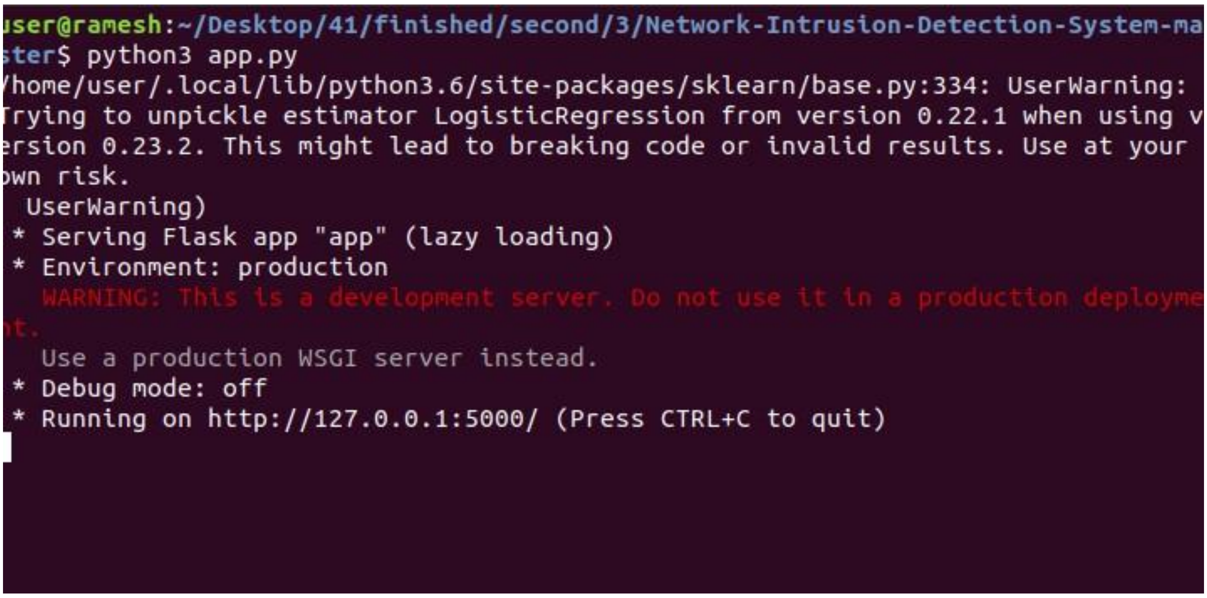
From the score accuracy we concluding the DT & RF give better accuracy and building pickle file for predicting the user input

Application

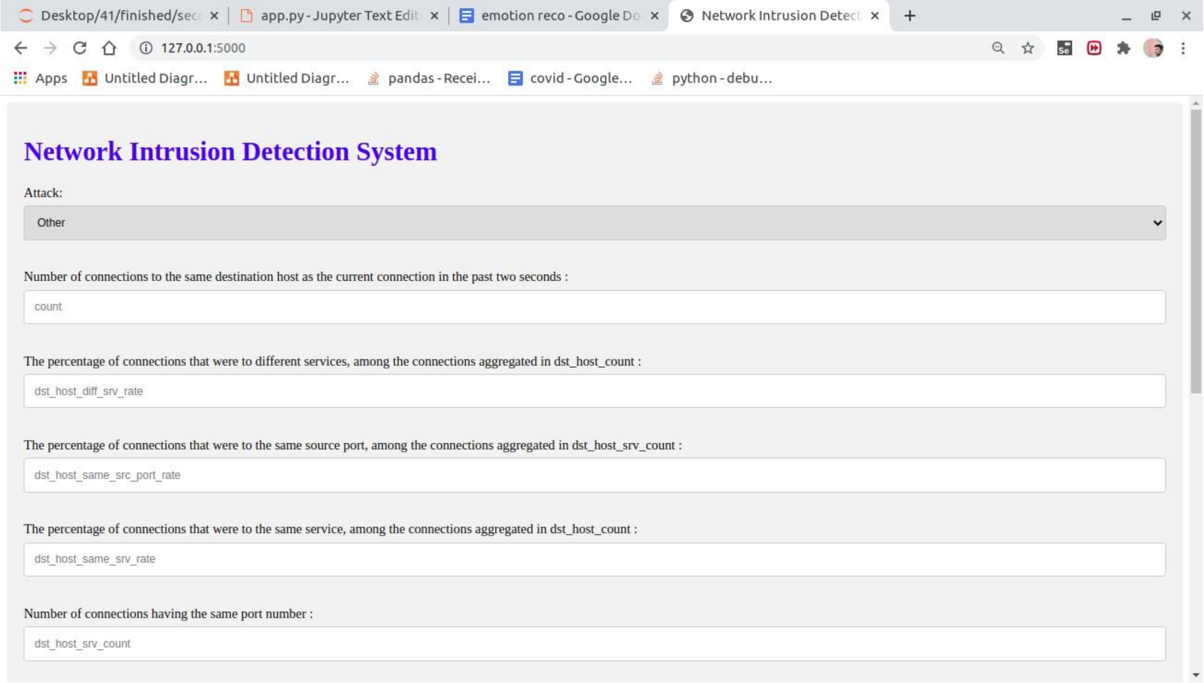


```
import joblib

app = Flask(__name__)
model = joblib.load('model.pkl')

@app.route('/')
def home():
    return render_template('index.html')

@app.route('/predict',methods=['POST'])
def predict():

    int_features = [float(x) for x in request.form.values()]

    if int_features[0]==0:
        f_features=[0,0,0]+int_features[1:]
    elif int_features[0]==1:
        f_features=[1,0,0]+int_features[1:]
    elif int_features[0]==2:
        f_features=[0,1,0]+int_features[1:]
    else:
        f_features=[0,0,1]+int_features[1:]

    if f_features[6]==0:
        fn_features=f_features[:6]+[0,0]+f_features[7:]
    elif f_features[6]==1:
        fn_features=f_features[:6]+[1,0]+f_features[7:]
    else:
        fn_features=f_features[:6]+[0,1]+f_features[7:]

    final_features = [np.array(fn_features)]
```

Localhost - in cmd python app.py



```
user@ramesh:~/Desktop/41/finished/second/3/Network-Intrusion-Detection-System-ma
ster$ python3 app.py
/home/user/.local/lib/python3.6/site-packages/sklearn/base.py:334: UserWarning:
Trying to unpickle estimator LogisticRegression from version 0.22.1 when using v
ersion 0.23.2. This might lead to breaking code or invalid results. Use at your
own risk.
  UserWarning)
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployme
nt.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```



Network Intrusion Detection System

Attack:

Other

Number of connections to the same destination host as the current connection in the past two seconds :

count

The percentage of connections that were to different services, among the connections aggregated in dst_host_count :

dst_host_diff_srv_rate

The percentage of connections that were to the same source port, among the connections aggregated in dst_host_srv_count :

dst_host_same_src_port_rate

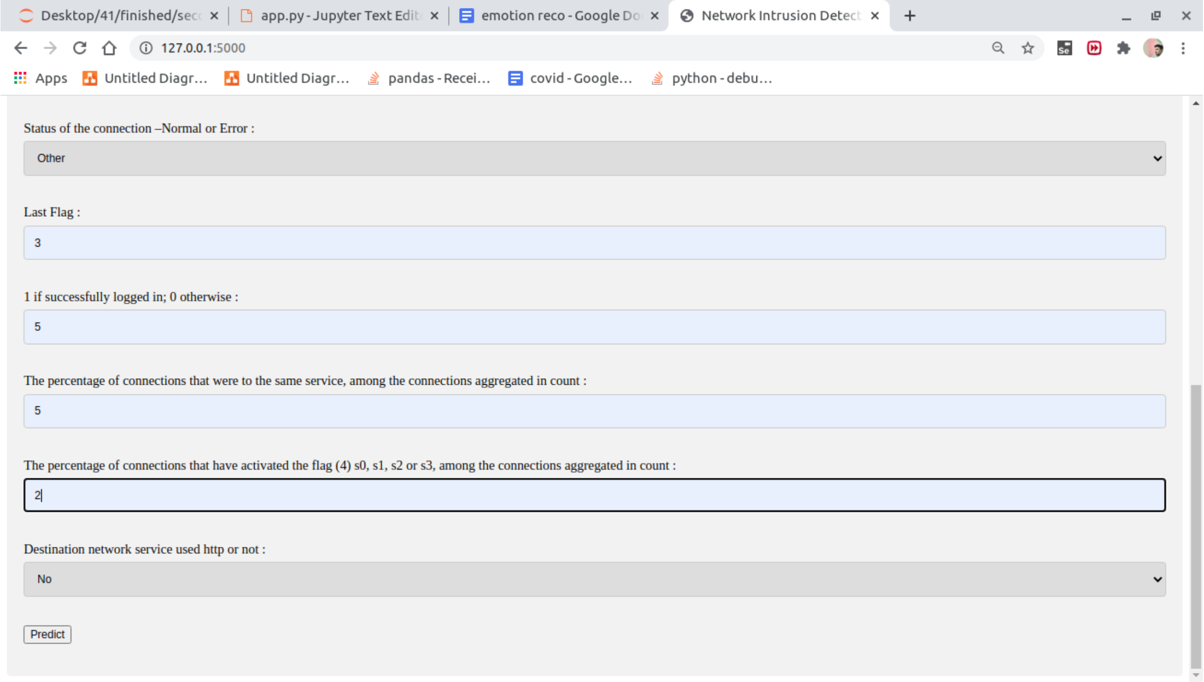
The percentage of connections that were to the same service, among the connections aggregated in dst_host_count :

dst_host_same_srv_rate

Number of connections having the same port number :

dst_host_srv_count

Enter the input



Status of the connection –Normal or Error :

Other

Last Flag :

3

1 if successfully logged in; 0 otherwise :

5

The percentage of connections that were to the same service, among the connections aggregated in count :

5

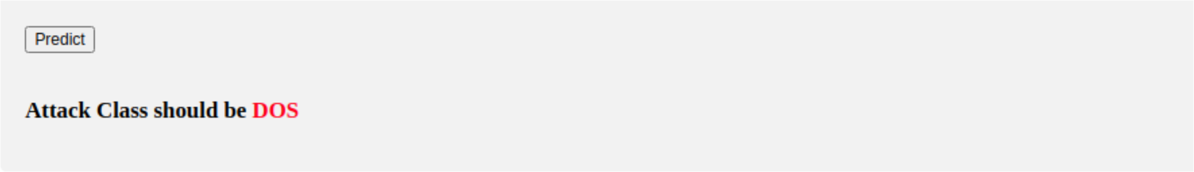
The percentage of connections that have activated the flag (4) s0, s1, s2 or s3, among the connections aggregated in count :

2

Destination network service used http or not :

No

Predict attack -



Attack Class should be DOS

SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

TYPES OF TESTS

Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input	: identified classes of valid input must be accepted.
Invalid Input	: identified classes of invalid input must be rejected.

Functions	: identified functions must be exercised.
Output	: identified classes of application outputs must be exercised.
Systems/Procedures	: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

System Test

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration-oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

Unit Testing

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Black box Testing

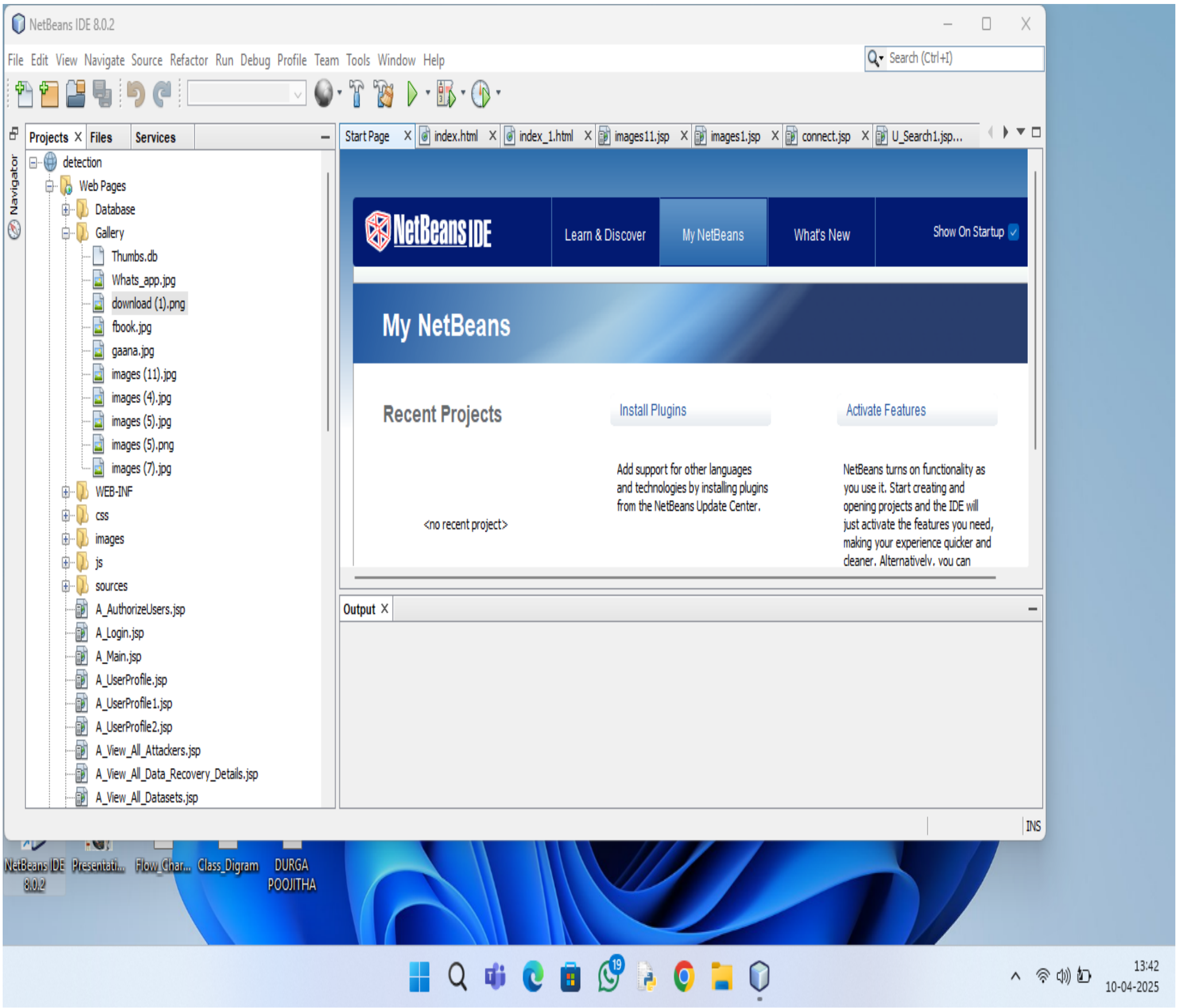
Table.4.1: Black box Testing

Input	**Actual Output**	**Predicted Output**
[16,6,324,0,0,0,22,0,0,0,0,0,0]	0	0
[16,7,263,7,0,2,700,9,10,1153,832,9,2]	1	1

The model gives out the correct output when different inputs are given which are mentioned in Table 4.1. Therefore, the program is said to be executed as expected or correct program

Test Case Id	Test Case Name	Test Case Description	Test Steps			Test Case Status	Test Priority
			Step	Expected	Actual		
01	Start the Application	Host the Application and test if it Starts making sure the required software is Available	If it doesn't Start	We cannot run the application.	The application hosts success.	High	High
02	Home Page	Check the deployment environment for Properly loading the application.	If it doesn’t load.	We cannot access the application.	The application is running successfully.	High	High
03	User Mode	Verify the working of The Application in freestyle Mode	If it doesn’t Respond	We cannot use the Freestyle mode.	The application displays the Freestyle Page	High	High
04	Data Input	Verify if the Application takes input and updates	If it fails to take the input or store in The Database	We cannot proceed further	The application updates the input to application	High	High

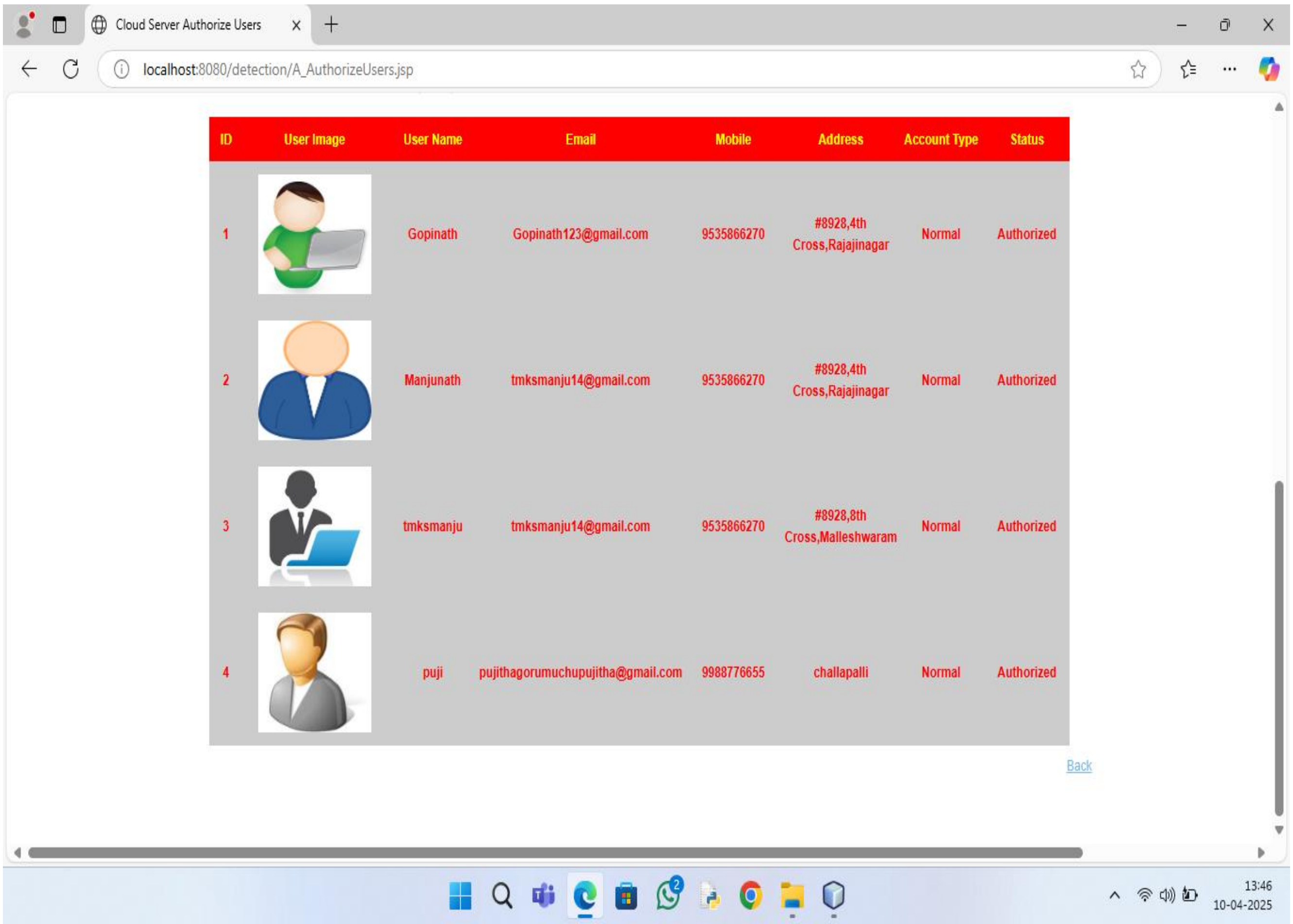
SCREEN SHOTS



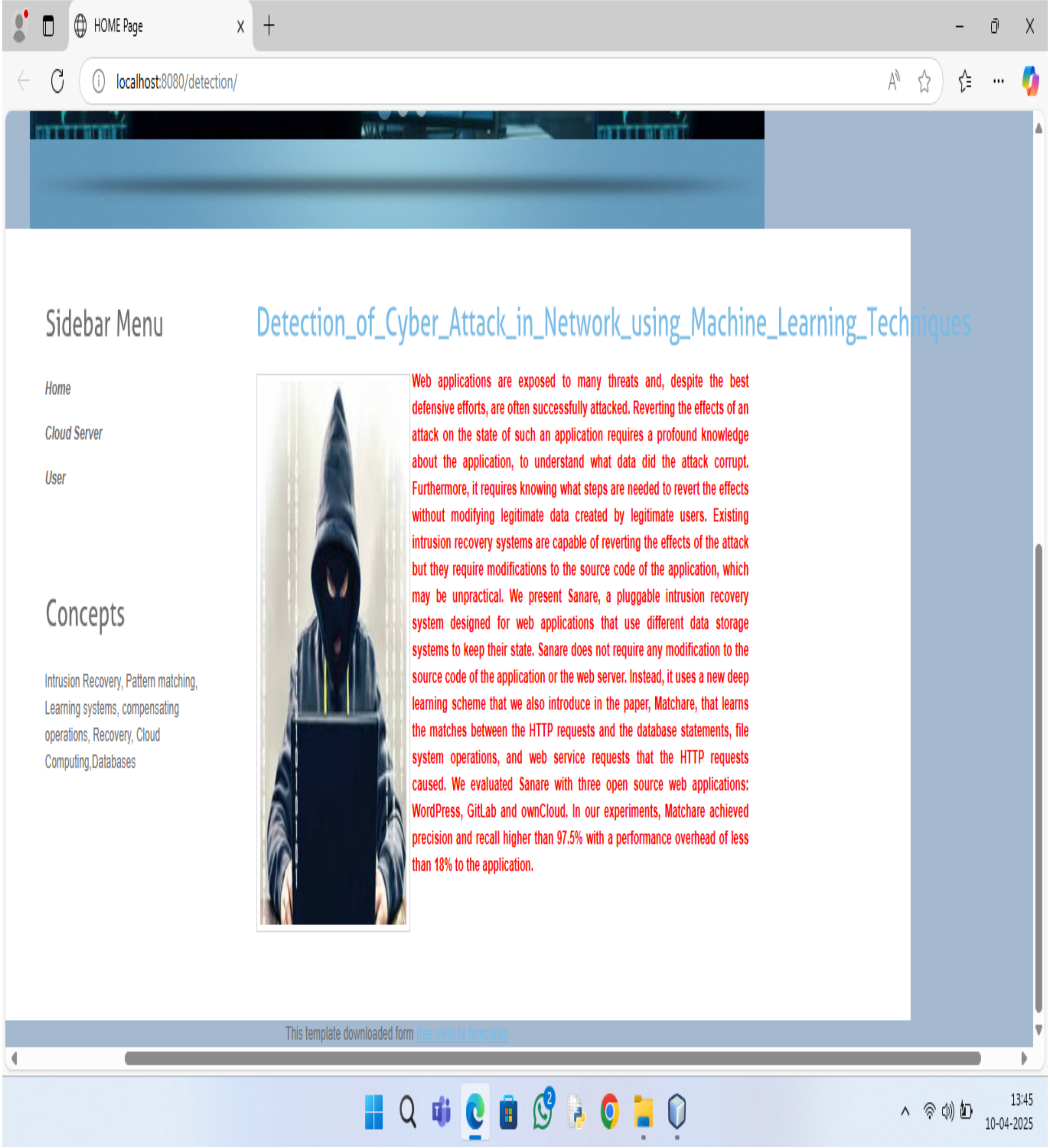
<no recent project>

Add support for other languages and technologies by installing plugins from the NetBeans Update Center.

NetBeans turns on functionality as you use it. Start creating and opening projects and the IDE will just activate the features you need, making your experience quicker and cleaner. Alternatively, you can


Cloud Server Authorize Users
localhost:8080/detection/A_AuthorizeUsers.jsp

ID	User Image	User Name	Email	Mobile	Address	Account Type	Status
1		Gopinath	Gopinath123@gmail.com	9535866270	#8928,4th Cross,Rajajinagar	Normal	Authorized
2		Manjunath	tmksmanju14@gmail.com	9535866270	#8928,4th Cross,Rajajinagar	Normal	Authorized
3		tmksmanju	tmksmanju14@gmail.com	9535866270	#8928,8th Cross,Malleshwaram	Normal	Authorized
4		puji	pujithagorumuchupujitha@gmail.com	9988776655	challapalli	Normal	Authorized



Sidebar Menu

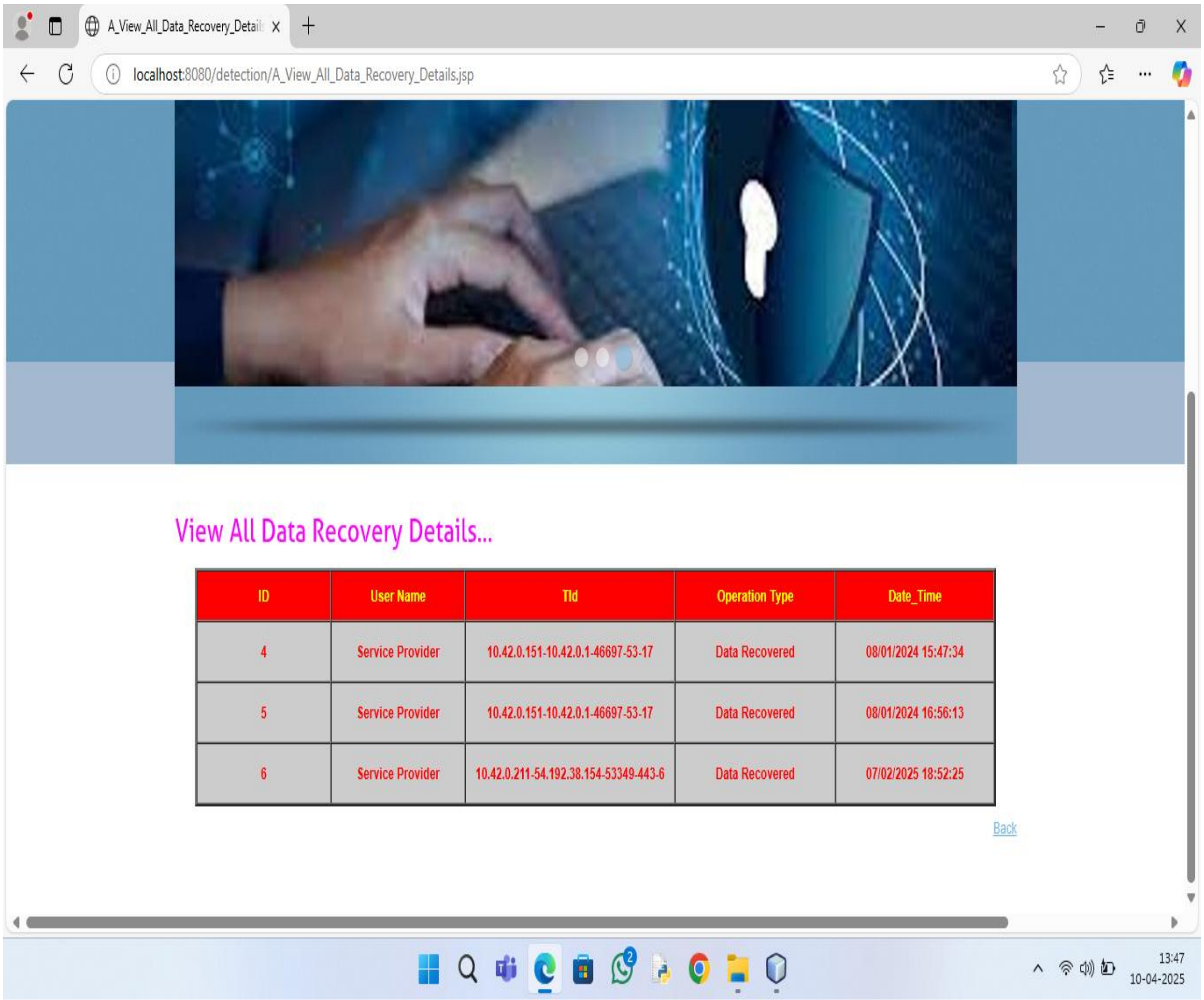
Detection_of_Cyber_Attack_in_Network_using_Machine_Learning_Techniques

Web applications are exposed to many threats and, despite the best defensive efforts, are often successfully attacked. Reverting the effects of an attack on the state of such an application requires a profound knowledge about the application, to understand what data did the attack corrupt. Furthermore, it requires knowing what steps are needed to revert the effects without modifying legitimate data created by legitimate users. Existing intrusion recovery systems are capable of reverting the effects of the attack but they require modifications to the source code of the application, which may be unpractical. We present Sanare, a pluggable intrusion recovery system designed for web applications that use different data storage systems to keep their state. Sanare does not require any modification to the source code of the application or the web server. Instead, it uses a new deep learning scheme that we also introduce in the paper, Matchare, that learns the matches between the HTTP requests and the database statements, file system operations, and web service requests that the HTTP requests caused. We evaluated Sanare with three open source web applications: WordPress, GitLab and ownCloud. In our experiments, Matchare achieved precision and recall higher than 97.5% with a performance overhead of less than 18% to the application.

Concepts

Intrusion Recovery, Pattern matching, Learning systems, compensating operations, Recovery, Cloud Computing,Databases

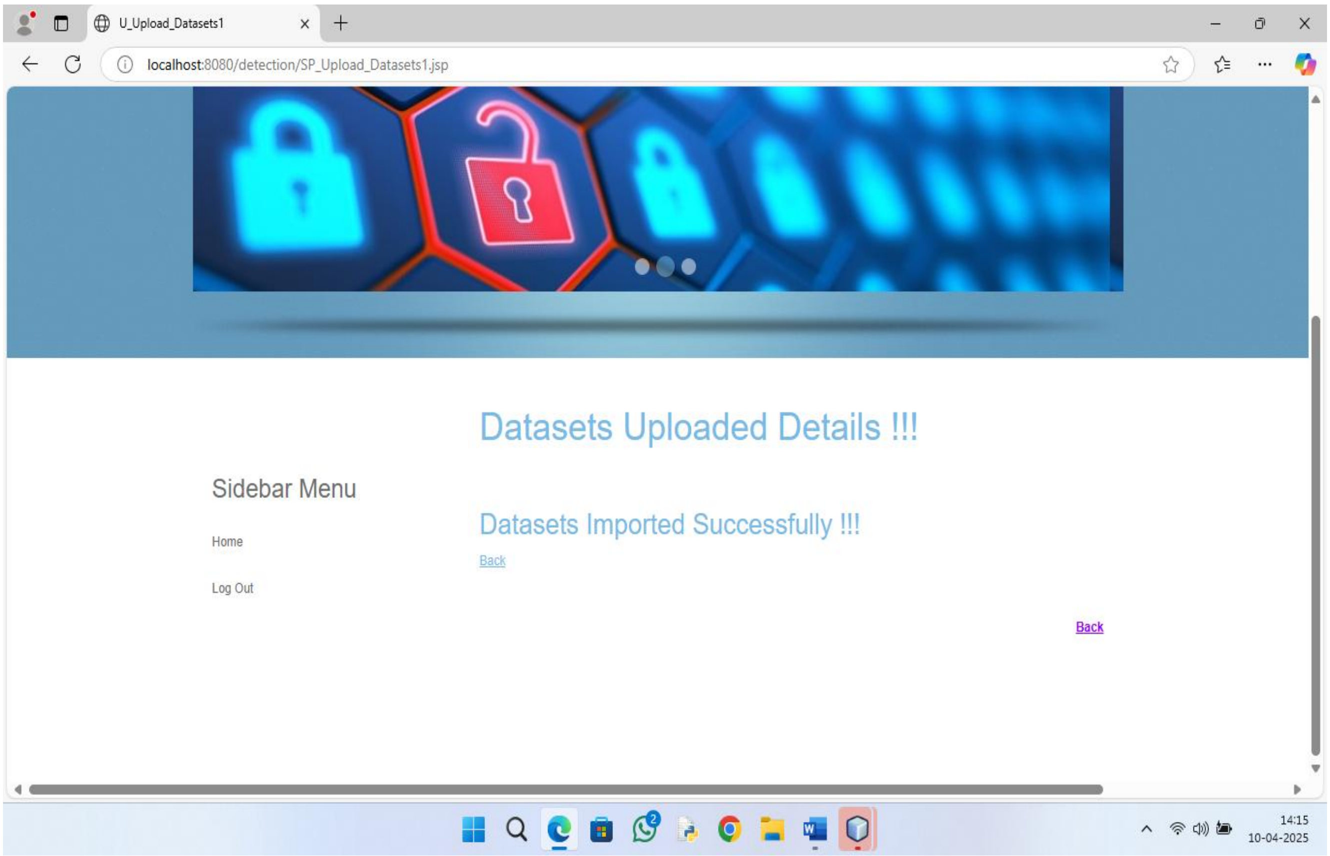
This template downloaded form free website templates



A_View_All_Data_Recovery_Detail
localhost:8080/detection/A_View_All_Data_Recovery_Details.jsp
13:47
10-04-2025

View All Data Recovery Details...

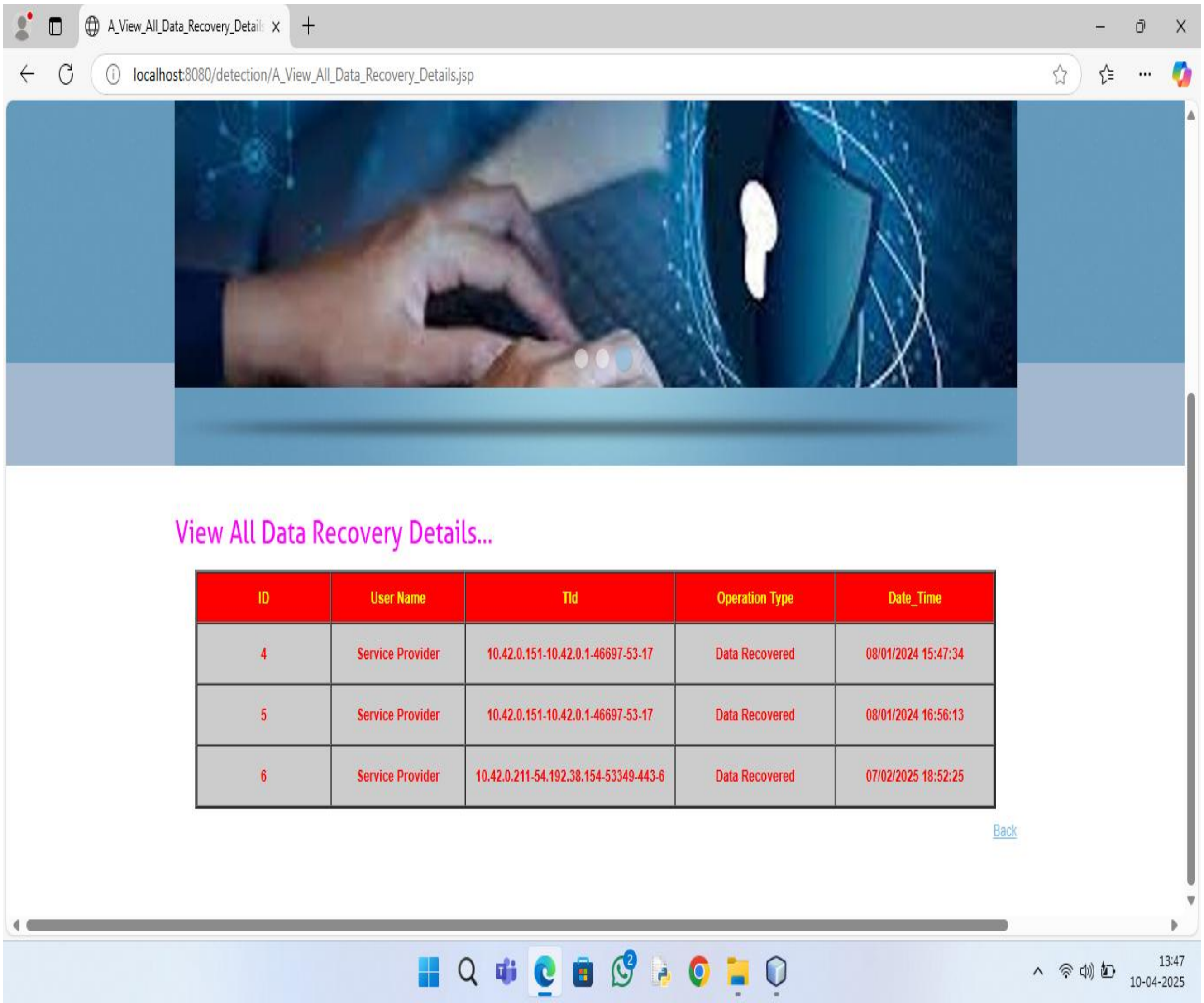
ID	User Name	TId	Operation Type	Date_Time
4	Service Provider	10.42.0.151-10.42.0.1-46697-53-17	Data Recovered	08/01/2024 15:47:34
5	Service Provider	10.42.0.151-10.42.0.1-46697-53-17	Data Recovered	08/01/2024 16:56:13
6	Service Provider	10.42.0.211-54.192.38.154-53349-443-6	Data Recovered	07/02/2025 18:52:25



Datasets Uploaded Details !!!

Sidebar Menu

Datasets Imported Successfully !!!


A_View_All_Data_Recovery_Detail
localhost:8080/detection/A_View_All_Data_Recovery_Details.jsp
13:47
10-04-2025

View All Data Recovery Details...

ID	User Name	TId	Operation Type	Date_Time
4	Service Provider	10.42.0.151-10.42.0.1-46697-53-17	Data Recovered	08/01/2024 15:47:34
5	Service Provider	10.42.0.151-10.42.0.1-46697-53-17	Data Recovered	08/01/2024 16:56:13
6	Service Provider	10.42.0.211-54.192.38.154-53349-443-6	Data Recovered	07/02/2025 18:52:25

CONCLUSION

Right now, estimations of help vector machine, ANN, CNN, Random Forest and profound learning calculations dependent on modern CICIDS2017 dataset were introduced relatively. Results show that the profound learning calculation performed fundamentally preferable outcomes over SVM, ANN, RF and CNN. We are going to utilize port sweep endeavors as well as other assault types with AI and profound learning calculations, apache Hadoop and sparkle innovations together dependent on this dataset later on. All these calculation helps us to detect the cyber-attack in network. It happens in the way that when we consider long back years there may be so many attacks happened so when these attacks are recognized then the features at which values these attacks are happening will be stored in some datasets. So by using these datasets we are going to predict whether cyber-attack is done or not. These predictions can be done by four algorithms like SVM, ANN, RF, CNN this paper helps to identify which algorithm predicts the best accuracy rates which helps to predict best results to identify the cyber-attacks happened or not.

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