

Smart Learning analytical model (SLAM) using LMS for Middle East College

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Abstract

This project aims to design a new technology that helps the college to analysis its network traffic, improve its functionality, and protect it. The design analysis network traffic allows network administrator to examine its components and discover the things that might impact the network overall performance, identify problems, discover its root causes, and get solutions. Network administrator can through it detect the slow network components that impact its functionality such as the overloaded server or the frozen server, failed routers switches, or it can be any other device that have problem.

The improvement that differentiates the proposed design is the usage of Machine Learning (ML) and artificial intelligence (AI), which helps in monitoring the network without adding active traffic. The usage of ML helps to identify the change in traffic by predicting the expected traffic and network behavior based on network historical traffic. Moreover, the technology allows the administrator to monitor the network by visualize its components and LAN/WAN connections.

Deployment the AI and the ML helps in decreasing the effort of tracking network functionality with the ability of pinpointing malfunction. Also, they will improve the business operation by granting high network service quality.

Keywords:

Artificial intelligent, Machine Learning, Artificial narrow intelligence, Artificial general intelligence, Artificial super intelligence, Statistical natural language processing, Robotic process automation, Application Programming Interface, Tab Separated Values.

Introduction:

In our delay life at universities, the business we are using a lot of electronic services, this service helps us doing a lot of things in a short time anywhere. One of the things that are happing nowadays is the eLearning with all the tools that been provided by the universities and colleges, one of this colleges is Middle East College (MEC) that offers to its student's lot of coursers online, where it provides viruses labs, and it provides the library over the internet. To assure of service that would not disturb the offer classes for the students and does not impact their teaching paths we need to assure the high network quality service, there are several methods used for assuring network high quality, that will assure its high continuity and its protection for viruses and attacking that will assure the low danger or low delay. Some of them are using active traffic, and some of them are using passive traffic each one of these methods are having its advantages and disadvantages, which will be added to the network or will be changing the online and offline analysis.

To do this, it used machine learning ML and artificial intelligence to improve the service or owner network. Using this technology based on the passive need of the technology itself, where there is no need for generating more traffic that will load the network, moreover, than this, this technology can produce the trend of the traffic can protect the behavior of its components, the disadvantage that it needs to collect lots of data for the machine to learn different scenarios, moreover than this it's detecting the signal threshold between the real and the malicious traffic. To do this one, I will start to study the network itself, the traffic during the days, the data for approximately one or two weeks to be collected, and based on this thing I will check exactly what's the best algorithm and the best threshold for detecting the machine learning ML.

Monitoring the network (analysis network): it's to exam the network components that are to discover the things that might be impacting the overall performance of the network. It's identifying the problems of the network and what is the root cause of the problem, the tools that are used to monitor the network are working to decode the data traversing of the network. The analysis of the network is helping the admins to get the solutions. The things that network analysis is working to give solutions are the network issue troubleshooting, determining the speed and the availability of the Wi-Fi, identifying if there any instance of spyware or network intrusion, etc.

Understanding the performing of the network is very important, that's not only for the technical peace of mind, but it is for the operation of the business itself. The results of analytics the network is they can make smarter data-driven decisions that are about their operations.

Artificial intelligence (AI): is machines or a robot that are programmed to do some actions that are similar to human, examples: thinking and mimic their actions. The AI can be given to any machine that will let the machine act as the human mind in solving the problems, learning, planning, reasoning, knowledge representation, perception, motion, and manipulation. Artificial intelligence is having the ability to take an action and to rationalize. AI is ubiquitous today, where it used to recommit the things that you should buy them online and understand the things that the virtual assistants say, example for the virtual assistants are Apple's Siri and Amazon's Alexa, they can detect credit card fraud, and they can know spot spam.

Using AI is helping to identify the problems of the network, and help to understand the network. The network analysis that is having AI is working to protect the network and it's giving all possibilities of the things that may happen in the network or to the devices that are connected to the network, also it's learning the users that are in the network and it's working to see the user's behavior in case if the user is trying to attack the network the AI is going to predict that's by sending notification to the admin before it happens.

Literature review:

Analytics network:

The network is the center of the world today, it is the consists of two or more devices linked together to share resources. Those resources can be exchanging the files or allowing electronic communications. There are lots of different ways that the devices can be linked together such as cable, radio waves, infrared light beams, telephone lines, or satellites. Understanding the performance of the network is very important, that's not only for the technical peace of mind, but it is for the operation of the business itself. For the pursuit of serving customers' purpose and more effectively where it's looking and searching for every possible competitive edge, the operators of the network are utilizing analytics that's of gain a deeper understanding of the network. The results of analytics the network is able to make smarter data-driven decisions that are about their operations, that's what's helping them to achieve their desired business outcomes. **(BluePlanet 2020)**

The network users need consistency, the most thing that the network is guaranteed to bring complaints is that the network is response times vary from lightning-fast, where some time while the screen is loading I can get a coffee. In most of the business's operations networks is the core of the business, where the slow and unresponsive network can reduce the business efficiencies and it is preventing them from attaining an edge over their competition. **(Anon. 2020)**

The following is showing the analytics of a network services

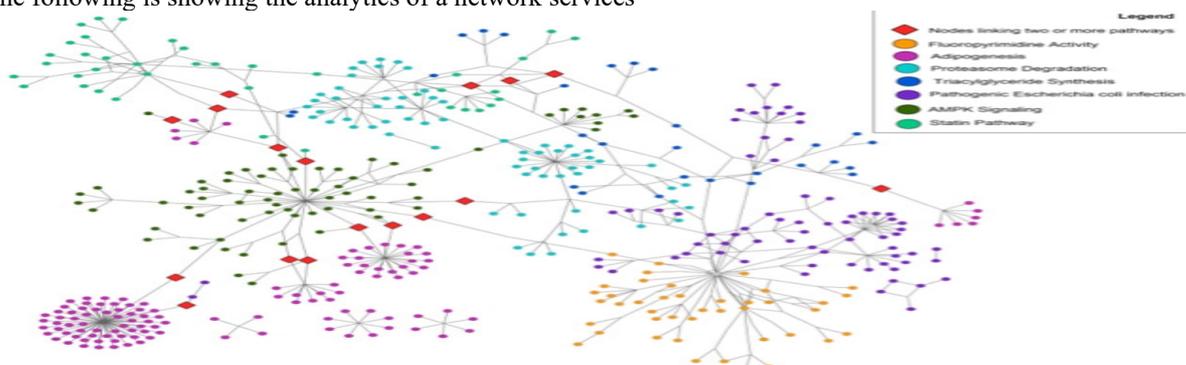


Figure 1: Network analytics.

The simple definition of network analytics involves the analytics of the network data and the statistics to identify the patterns and the trends. Once the network is identified, the operators are taking the next step of acting on the data, the data is typically involving a network operation or it is a set of operations. An example, the network operators are scanning the network traffic, in case if they find that there will be a congestion problem in a specific area of the network, they can solve this problem that's by routing the traffic through a different part of the network that's to meet the service performance objectives. The operation that is showing in the example is typically a manual process, but now the network providers are augmenting the traditional analytics with automation and artificial intelligence (AI) technologies, that's to enable the next generation of highly intelligent networks, that what makes the network as having the capabilities of dynamically self-optimizing or self-configuring on the changing of network condition. **(BluePlanet 2020)**

The network becomes increasingly complex and intertwined with the experience of the users, presence of devices, and critical applications, all those different devices requiring and share network resources, the network is able to dynamically adapt is crucial for maintaining and improving the quality of the services. The use of the network analytics is providing to the providers to act before the service is disruptions occur and penalties start accruing. This kind of intelligence that is used to analyze the network is not the only anticipation of dissipation before it even happens it's working to improve the metric by itself and improving the quality of the service. Also, it's working to results in higher net promotes scores, which is helping the providers to understand the customer's loyalty. **(BluePlanet 2020)**

Artificial intelligent:

AI is a science that is making the machine smart. The machines can be teaching to act like humans, where they are having the ability to see, move, write, speak, and hear. An example of AI is in the smartphone, where it's having the ability to unlock the phone whit the face ID, here the AI is having the ability to see. Another type is the voice assistants where it's using the AI to hear and speak. **(K. Mike 2019)**

Artificial intelligent AI is the collection of technologies that excel at extracting insights and patterns for large sets of data, then it's making the predictions that have based on the information. Nowadays the AI is working to exists that is helping to get more values out of the data that is collected, then it unifies the collected data and makes predictions the student behaviors based on it. **(K. Mike 2019)**

Machine learning is the power of AI that is impressive in the capabilities. AI is having many types, machine learning is one of the AI types that is using patterns to make predictions. The use of machine learning is for a set of large data to identify the patterns. The data collected and analytics are improving the predictions over time. **(K. Mike 2019)**

The result of using the powered technology by machine learning it's getting better over time, that's without the help of the human. AI is very different from traditional software. Machine learning is using some tools that are learning to act like humans, the first thing machine learning must know the basic things then it will have the ability to act like a human, and it's working to improve itself. Over time the machine will learn and it will get better to do the tasks. **(K. Mike 2019)**

The non-AI systems rely on human inputs to do the work, for example, the accounting software. The system is using hard codes with some rules that the people are giving. The software system must follow the given rules exactly to do the tasks, where the system is not having the ability to improve itself, it only depends on the human programmers to improve it. Machine learning is having tools that are working the opposite of the non-AI system, where it's having the ability to improve on its own. The machine is working to address itself to know the performance and the new data to improve them. **(K. Mike 2019)**

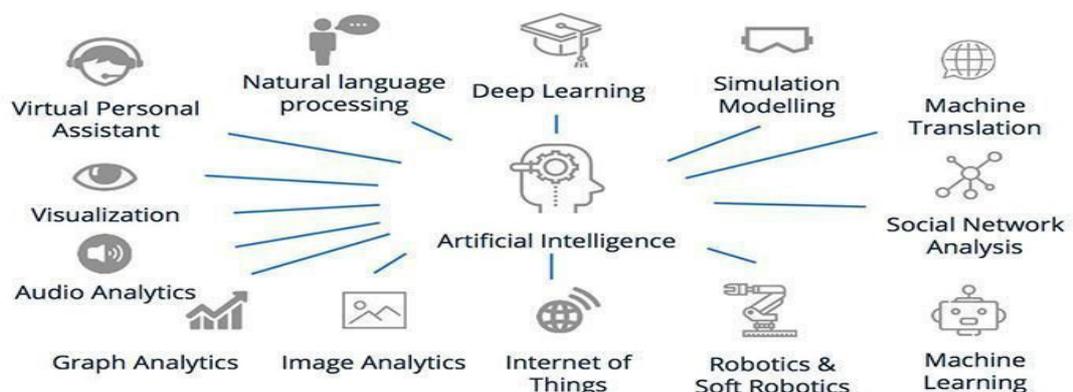


Figure 2: Applications of AI.

Analytical and non-analytical AI

The AI is having analytical and non-analytical AI those are the types of them:

- Deep learning: is also known as deep neural learning or deep neural network, it's a function of artificial intelligence (AI) that is imitating the work of the human brain, the data is processing and it's creating a pattern that to use as a decision making. In artificial intelligence a subset of machine learning is known as deep learning, it's having a network capable that's for learning unsupervised from the data that are unstructured or they are unlabeled, where it's having the ability to learn without the help of human supervision. Deep learning is using mimics for the work of the human brain for processing data that are used in detecting objects, making decisions, translating language, and recognizing speech. **(Investopedia 2020), (M. Amitha et al. 2020)**

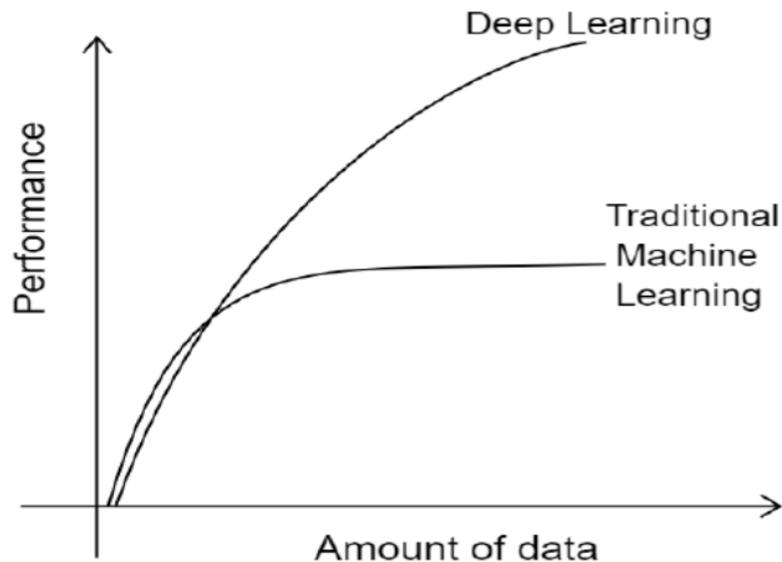


Figure 3: Deep learning.

The above figure it's showing the relationship between the performance and the amount of data. As the figure, there are two types of systems, deep learning, and traditional machine learning. Deep learning is better than traditional machine learning, wherein in deep learning the performance is increasing when the amount of data is increasing.

- Statistical natural language processing (NLP): this is a system that is extracting the information or the meanings (locations, sentiment, topics, and entities) the statistical patterns are from the text or speech. It's working to provide a rough assessment about the piece of text means, or it's making a refined view for the trends in the larger corpus. The statistical analysis that is used in NLP is for phrases or words for example: google translate and some deep learning applications that are used for speech recognition. The statistical NLP is based on machine learning and appears to have the ability in improving its capabilities faster than the semantic NLP. **(H. Thomas. 2018)**
- Robotic process automation (RPA): it's a computer software technology that is allowing anyone to configure, or a robot to act like a human. The RAP is collecting data and manipulate applications like the thing that humus is doing. Its triggering response and it communicate other systems to complete different tasks. This robotic mark zero mistakes and never sleeps. The performance of the technology is digital tasks that are working to automates them. There are some rules engines that the RPA used, orchestration tools, and workflow. It's commonly used in automating structures for back-office tasks, it's providing quick implementation and high levels of ROI. **(H. Thomas. 2018) (DYNATOS 2020)**
The following figure is showing the befits of the RPA:

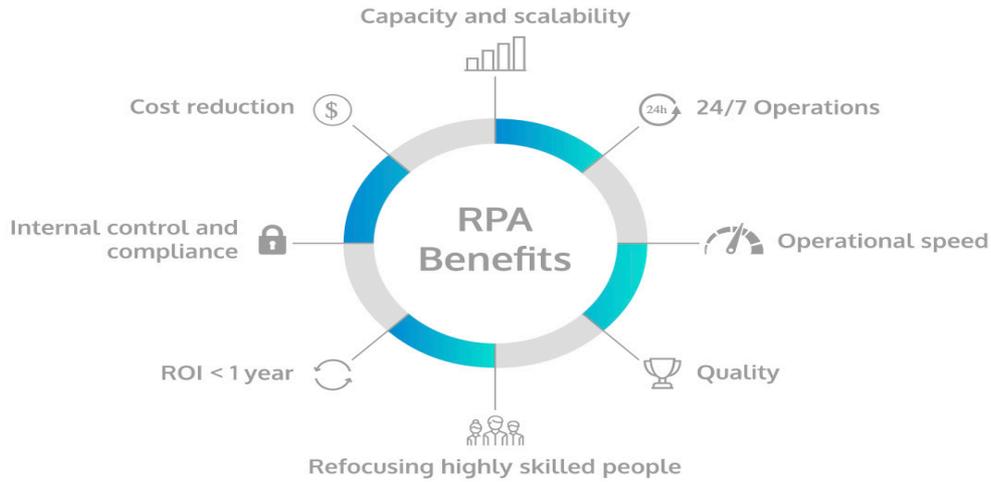


Figure 4: Benefits of the RPA.

- Machine Learning: it's a subset of artificial intelligence (AI), that it's analyzing the patterns in data that's to advance decision-making and learning. It's like the statistical models, the goal of machine learning is to understand the structure of the data. The based development of machine learning is that it's having the ability to use the computer to probe the data for the structure, and that's even if we don't know the theory of the structure looks like. Machine learning is using an iterative approach to learn the form of data that makes the learning easily automated, that what makes the test is a validation error on the new data. (SAS 2020)

The important about machine learning: the data is the life of all businesses, which allows us to automate the tasks and make data-driven decisions, which in turn eases our everyday lives. Before, the people are analyzing the data decisions manually, where it can be large data that will take lots of time and work. However, as the amount of data is expanding in this world, that what makes it increasingly important to utilize machine learning and AI to capture data fully. Machine learning is having the possibility to automatically and quickly produce the models, the organization is having a better chance for avoiding the unknown risks, or identifying the profitable opportunities. Machine learning is a simple term that is using massive amounts of data, that's to answer complex questions. (SAS 2020) (x. Aron 2020)

The following figure is an introduction of machine learning, where the way that it's working, the first thing there must be an ordinary system that's having AI in it the AI is having a subset Machine Learning (ML), the ML is working to leans, predicts, and improves the system.

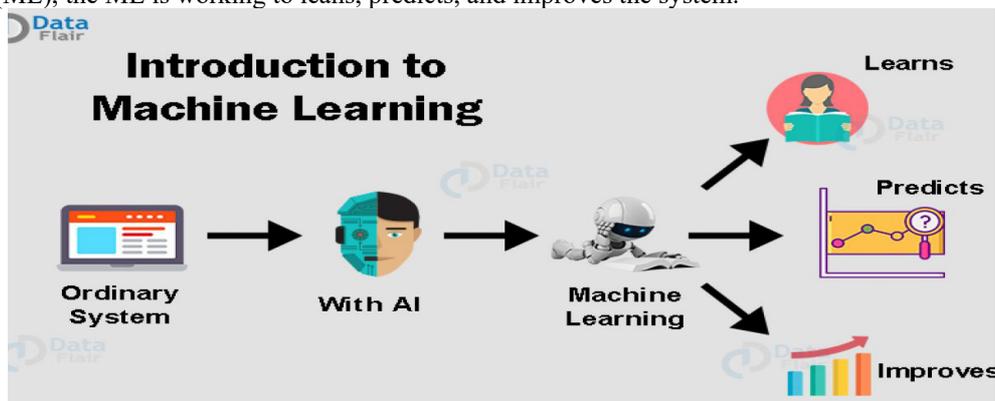


Figure 5: Introduction to machine learning.

The features and solution design that are supported by Machine Learning (ML):

- Easy to run the algorithm and execution it: Where it's supported by an application template, this application is working to encapsulates all the logic of data that is accessible and executions, it's called ML-template.

2. Effective data processing: it's of the large amounts of data efficiently, one of the tools is Microsoft Azure ML .net studio, which is powerful tools for the Machine Learning algorithms.
3. Ability to add some new data source: it's achieved by the separate microservice for the data management. The data service is responsible for downloading the new data, then it will be saved in the database.
4. Able to use different programming languages: it's providing by executor service, the microservice is for compiling algorithm source, downloading, training the model, and running algorithms.
5. Results comparison.
6. Web-interface for executions management.

As in the following figure the Machine learning is part from the artificial intelligent.

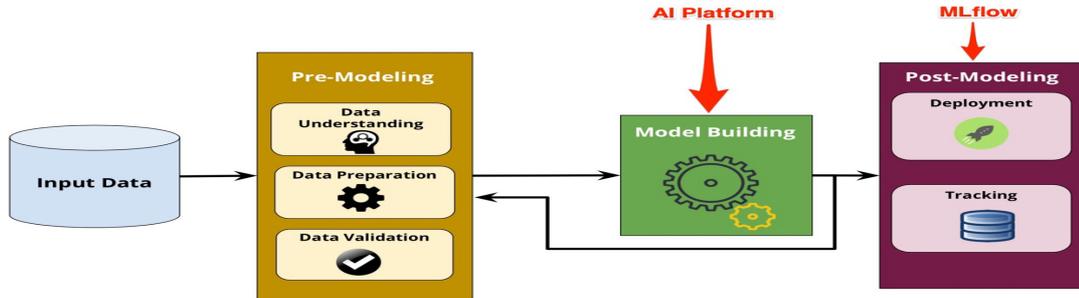


Figure 6: way to have the result.

From the figure, the first thing is to collect the data as input data, then it's going to the pre-modeling to do the following (understanding the data, preparing the data, and validating the data) the next step is the model building (this part is the platform of the artificially intelligent, the next thing the data will either go to the post-Modeling or to the pre-Modeling (the AL is going to decide), in the post-Modeling the machine learning is doing two things (deployment for the data, and tracking the data) to do the given task and to get the result.

Types of Machine Learning (ML):

There are three different types of Machine Learning(ML): Supervised Learning (the human train it), Unsupervised Learning (learning by itself), Reinforcement Learning (learning with its own rules).

The following figure is the type of machine learning:

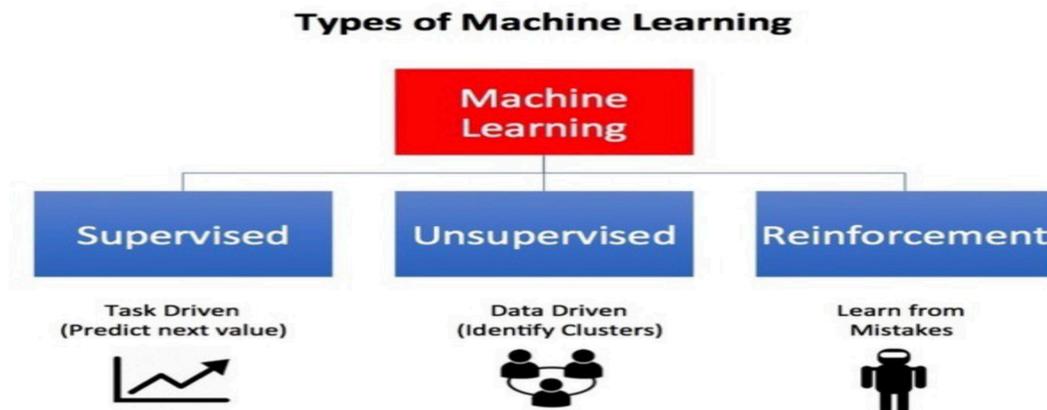


Figure 7: Type of the machine learning.

1. Supervised Learning: is a system that is guided by a teacher, there is a dataset that is acting as a teacher and working to train the machine or the model. After the machine is trained it will be able to start deciding or predicting when it's given some data. Supervised learning is a popular paradigm for machine learning. Also, it the simplest type to be implemented and the easiest to understand. Teaching the machine is like teaching a child. For example, the system is going to be a teacher where it's giving some image to know some items, after that the machine is allowing the algorithm to predict the label for each example, the next thing it will give the feedback to predicted if it's the right answer or not. The algorithm will learn over time to approximate the exact nature of the relationship that is between the labels and the examples. After the supervised machine learning is fully trained the algorithm will have the ability to observe a

new example or it can be never seen before, and it's predicting a goof label for it. Many applications support supervised Learning: Advertisement popularity, Spam Classification, and face recognition. (Atul 2020) (H. Hunter 2018)

The following figure is showing an example of supervised machine learning and the way that it's clarification the items and examples.

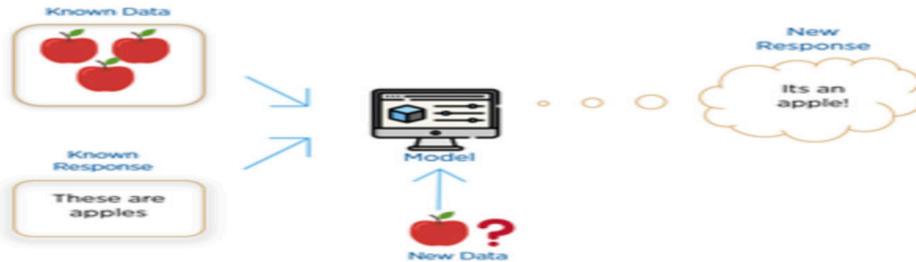


Figure 8: Supervised Learning example.

2. Unsupervised Learning: the machine is learning through observation and finding structures in the data. When the model is given to the dataset, the machine will automatically find patterns and relationships in the dataset that's by creating a cluster in it. An example: the machine is having the ability to group the things but it cannot label to the cluster like if there is a group of mangoes and apples it only can separate them but it's it can't name the group. (Atul 2020) (H. Hunter 2018)

The following figure is showing an example: if we suppose that there are some images of apples, mangoes, and bananas and we want the present them to the model, the way that it works is based on some relationships and patterns to create clutters and divide the dataset into clusters. In case of new data is added it will be fed to the model, and it adds to the created clusters.

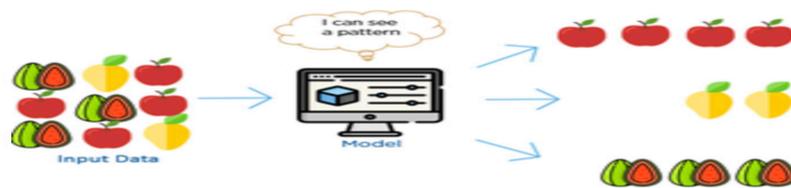


Figure 9: Unsupervised Learning example.

3. Reinforcement learning: the agent will be having the ability to interact with the environment, also it will have the ability to know what is the best outcome. Reinforcement learning is following the concept of the hit and trial method. The agent is responsible to rewarded or penalizing that is with the point for wrong or correct answer. The agent is giving the answer based on the basis of positive reward points that are gained by the modal trains themselves. After training it will get ready to predict the new data presented to it.

When we compare reinforcement learning with supervised and unsupervised learning is it different. As we can see there is a relationship between supervised and unsupervised. An example of reinforcement learning is to play the game, Mario. it needs an environment and an agent to connect the two through a feedback loop. The way to connect the agent to the environment is to give it a set of activities that action can take the affected the environment. the impotent thing is to continue the issue of two signals to the agent, were an updated state and a reward. (Atul 2020) (H. Hunter 2018)

The following is showing the way:

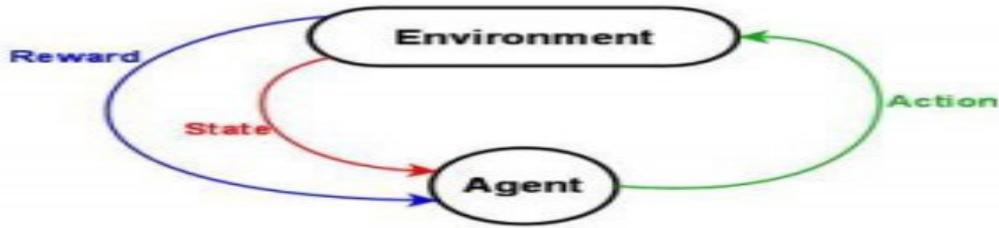


Figure 101: Reinforcement learning, in Mario game.

In the game of Mario, the agent is the learning algorithm and the agent is having a set of actions. The long as we connect all the components together it will set up a reinforcement learning scenario to play the Mario game. We can see reinforcement learning in the real world in different things for example video games, Industrial simulation, and Resource Management. (H. Hunter 2018)



Figure 11: Reinforcement learning example.

Summary for the Machine learning: there is a different algorithm that the machine learning is using, that's is depending on the type of data that is given of the dataset. If the data was linear then the thing that we will use is linear regression. In case if the data is showing non-linearity then, the better algorithm is bagging. If the dataset is consisting of images, audio, videos, in this case, the neural network is helpful to get the result accurately. So, deciding the algorithm is depending on the dataset that is given. And to choose the best algorithm the user needs to understand the purpose of using the dataset to give the best-fit algorithm.

The following figure is helping to know the algorithms.

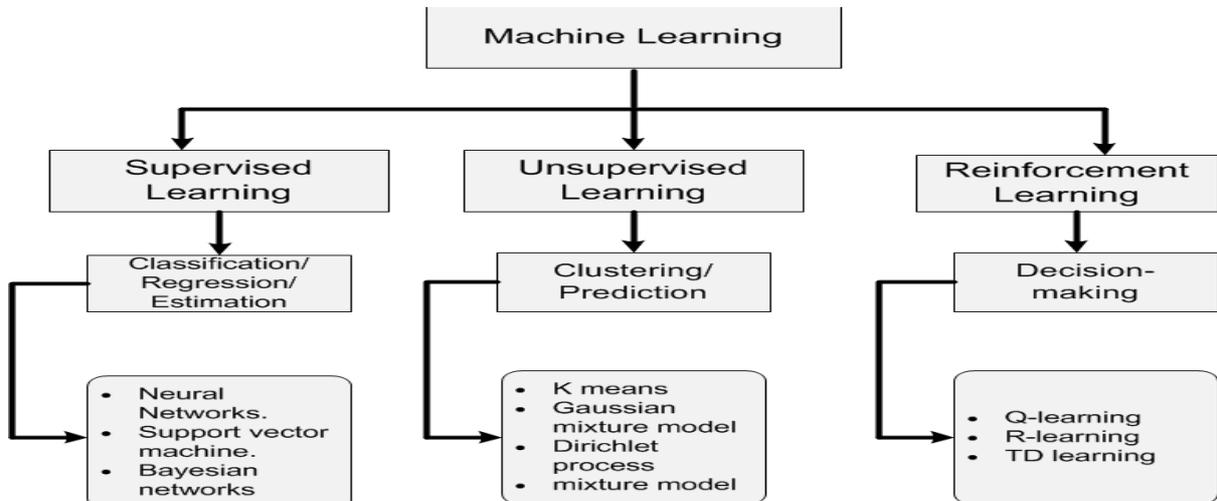


Figure 12: The algorithms of Machine learning.

Analytics data:

Data analytics is analyzing raw data that is in order to make an organized conclusion about the collected data. There are lots of processes and techniques that are used to analyze the data, nowadays the most used are automated that is inserted into the mechanical processes, and where they are algorithms that are working over raw data for human consumption. Those techniques of data analytics are having the ability to reveal trends and metrics that would otherwise be lost with other information. the collected information can be used to optimize the processes that will increase the overall efficiency of the business or the system.

The data analytics are discovering how the data are used, that's by using those data drawing a conclusion and solving the problems. The thing that data analytics is doing packaging that data for insights, creating and designing data reports that are by using various reporting tools.

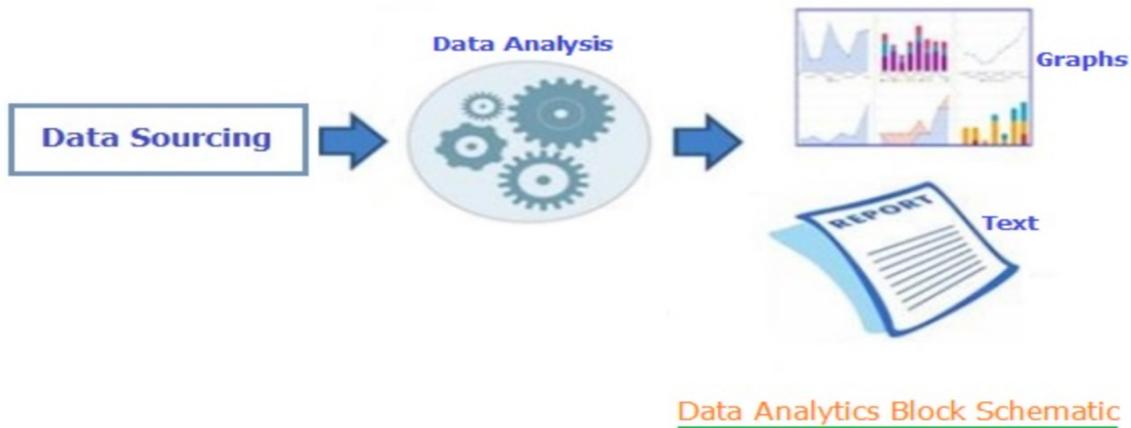


Figure 13:Data Analysis.

The data analytics software tools are:

There are lots of data analytics software tools that are mature and crowded with excellent products that are used for cases, deployment methods, and budgets. The traditional business intelligence the software's are providing continues to offer the report capabilities and the dashboard. Those software's are having lesser-known innovators with the interest projects, such as clear story data, thought spot, pyramid analytics. There are very large providers that are referring to mega-vendors, like SAP, Microsoft, IBM, and lots of others, here are some of the provider's software. The following are some kinds of software that can be used: **(K. Timothy 2018)**

1. Alteryx: it's a self-service analytics software, where the company specializes the data blending and data preparation. By using Alteryx software, you are allowed to organize, analyze, clean the data in the repeatable workflow. It's useful for connecting the data and clean the data from the data warehouses, spreadsheets, cloud applications, and other sources. This tool is having the ability to (spatial, predictive, statistical) that's inside a single interface. The specialties that Alteryx have is (data blending, self-service, data preparation). **(K. Timothy 2018)**

The following is a screenshot of Alteryx software:

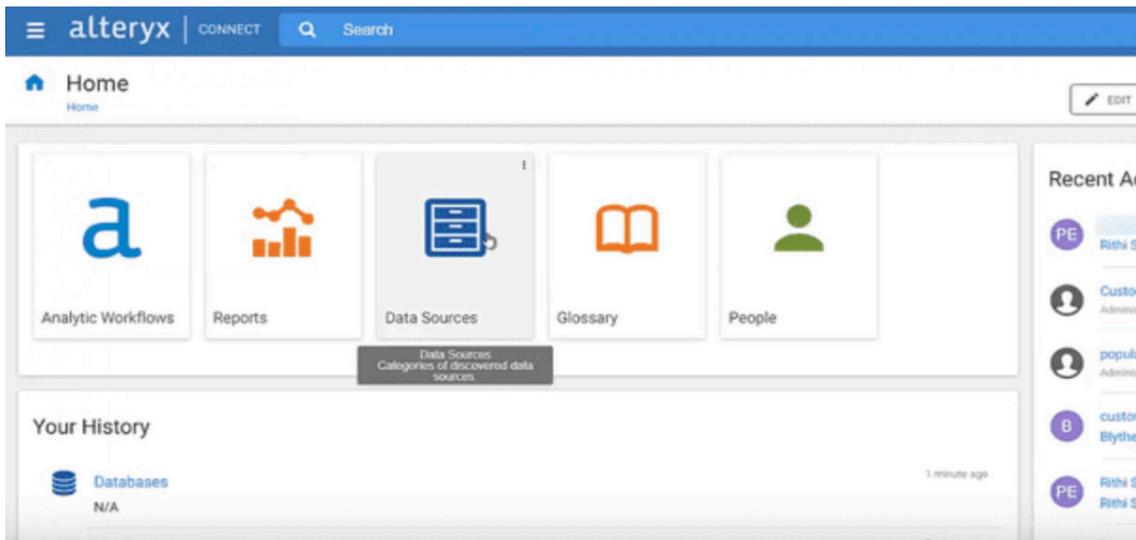


Figure 14: Alteryx

The following is a screenshot of IBM software:



Figure 15: IBM.

3. Microsoft: it's very handful for majoring players in analytics and BI. The flagship platform of Microsoft power BI is based on the cloud and delivered on the Azure Cloud. In Microsoft software, there is a capability to existing for individual users or for users that are authoring complex data that are using in-house data sources. The Power BI is unique that's because it's enabling the users to do dashboards with some design tools, data discovery, and data preparation. The platform is integrating with (Excel and office 365), moreover, it's having very active users to the community that extends the capabilities of tools. The specialties of Microsoft software are analytics, cloud computing, and office integration. Where the supporting markets for Microsoft are global. (K. Timothy 2018)
The following is a screenshot of Microsoft software:





Figure 16: Microsoft.

4. Oracle: This software can be in oracle Cloud, where oracle software is the range of BI and it's having analytic tools. The data in oracle is visualization provided for more advanced features that are allowing the user to automatically visualize the data as drag-and-drop attributes, graphs, and chats. The tools are enabling the user to save the snapshots for the analytical moment in time via points. Oracle software has greatly expanded some capability features that is including the discovery of data, and data science tools.
5. The specialties of Oracle software are storage systems, business intelligence, and database software. Where the supporting markets for Microsoft are global. **(K. Timothy 2018)**



The following is a screenshot of Oracle software:

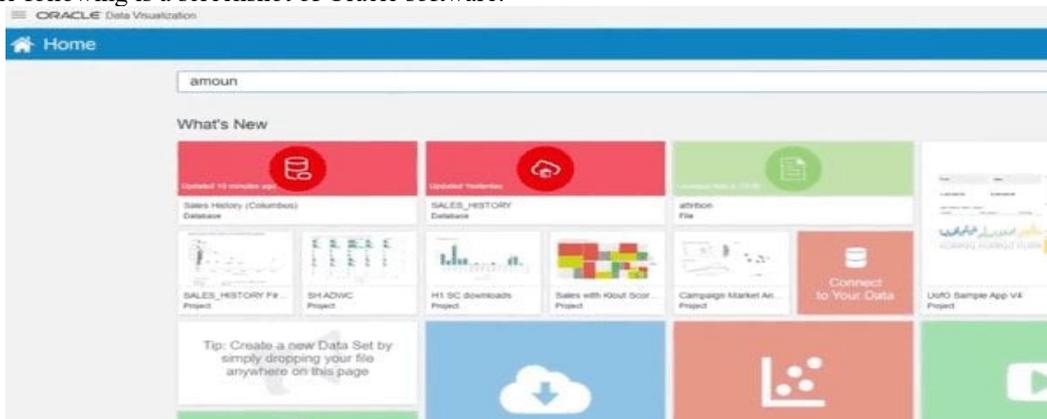


Figure 17: Oracle.

6. SAP: this software is for both business users and enterprise users, where the range of SAP software is analytics and BI tools. The portfolio is delivered via for business objects enterprise users and the cloud is deployed atop the SAP HANA Cloud. There is a traditional suite for the dashboard and the reporting for the BI capabilities. There is a self-service visualization that is available through the SAP Lumira tools sets. The software SAP is popularly chosen as a company-wide BI standard, especially if the company or the organization is planning to use its application offerings. The specialties of SAP software are reporting analytics and dashboards. Where the supporting markets for Microsoft are global. **(K. Timothy 2018)**



The following is a screenshot of SAP software:



Figure 18: SAP.

2.1.6 Data analytics tools

The top data analytic tools are open source, there are lots of data analytic tools most of those tools are popular, user-friendly and they don't require much or any coding where it's managing to deliver the best results. The following tools are open source and paid version, which is based on popularity, performance, and learning.

- R Programming: R is the leading analytics tool in the industry and is widely used for data modeling and statistics. It's having the ability to manipulate present and data in different ways. If we compare R programming with SAS, R has exceeded SAS in the performance, capacity of data, and outcome. This program can be run in MacOS, UNIX, and Windows. In the R program, 11,556 packages are allowing to browse the packages be categories. There are some tools in the R program that are allowing to the automatic installation of all packages as per the user's requirement. Also, it can be well assembled with big data. **(ProSchool 2020)**
- Python: is a programming language that is object-oriented scripting, the language is easy to maintain, read, write, and it's a free open source tool. This language is supporting both functional and structured programming methods. Python language is an easy program language to learn and it's very similar to PHP, Ruby, and JavaScript. In python, there is a very good machine learning library. The important features of the python language that it can be assembled on any platform for example MongoDB database, JSON, or SQL server. Also, python can be handling text data very well.
- The following figure is showing the advantages and disadvantages of the python language that will be used in this project:

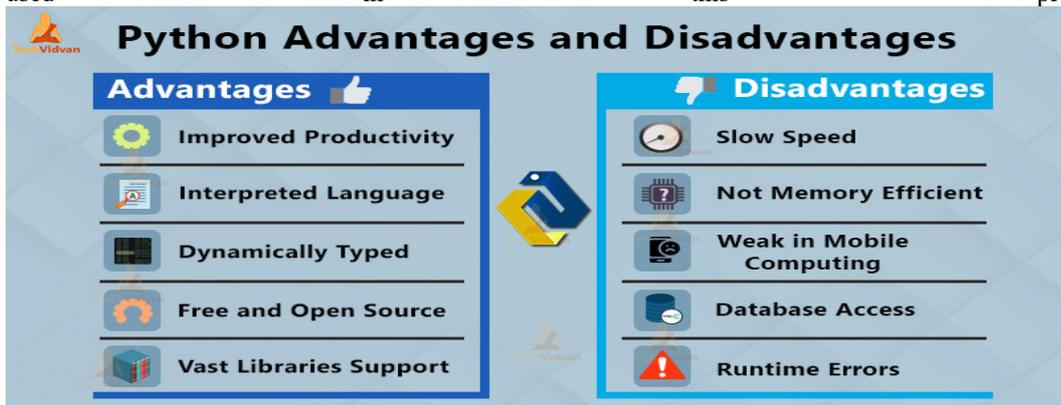


Figure 19: Advantages and disadvantages of python.

- SAS: it's a programming language and environment that is working to manipulation the data, leader in analytics. It's having the ability to analyze the data from any source, and it's easily accessible, also it's manageable. SAS programs are can predict behaviors, optimize communications, and manage data. **(ProSchool 2020)**



The following figure is from SAS graphs:

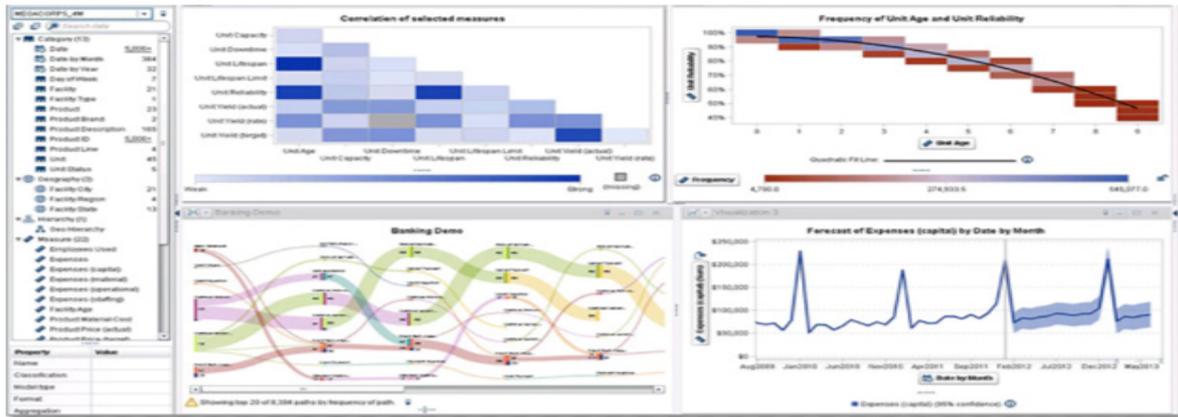


Figure 20: SAS.

- Excel: is the popular and widely used analytical tool that is almost in all industries. If the user is an expert in SAS, Tableau, or R, it still needs to use Excel. Microsoft Excel is important when there is a requirement of analytics on the client’s internal data. It’s having the advanced business analytics option which is helping in modeling the capabilities that are having prebuilt options like automatic relationship detection, time grouping, and creation of DAX matures. **(ProSchool 2020)**



The following figure is from Excel graphs:



Figure 21: Excel graphs.

- RapidMiner: is a data science platform that is developed by a company that is developing the performs predictive analysis and it’s having other advanced analytics such as text analytics, data mining, visual analytics without using any programming and machine learning. The RapidMiner can be incorporated with any data source types, that are including Access, Microsoft SQL, Excel, Oracle, IBM DB2, MYSQL, Tera, data, Sybase, Ingres, etc. this tool is powerful where it can generate analytics that is based on real-life data transformation settings, the formats and data sets can be controlled for predictive analysis. **(ProSchool 2020)**



The following figure is from RapidMiner graphs:

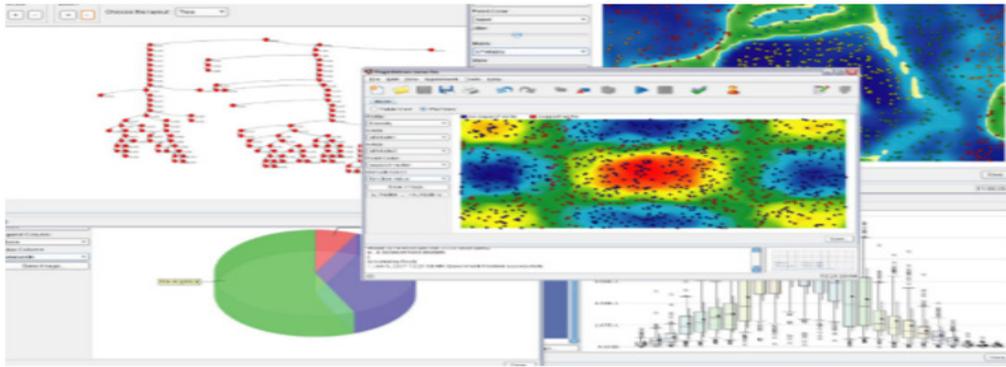


Figure 22: RapidMiner graphs.

Methods:

Dynamic Systems Development Method (DSDM):

A methodology that is used for the software and its agile. The framework is for project management. This kind of method is focusing on fast deliveries and it's involving the users throughout projects. The framework of the DSDM is complex in solving the problems of the tasks and helping to develop a dynamically system. The work of this method is not iteratively and incrementally, that what makes it possible for the teams(analysis, developing, etc.) are working at the same time. The users are able to do any change during the development where it's correctable throughout. (K. Aiman., etc. 2017)

The DSDM features are satisfied, and the concept is adjusted for resources and time. There are four phases of the DSDM, (Design and build iteration, implementation, Feasibility, and Functional model iteration) and in those phases, there are several sub-phases. (S. Abdullahi., etc. 2013)

The following figure is showing the DSDM Process Model

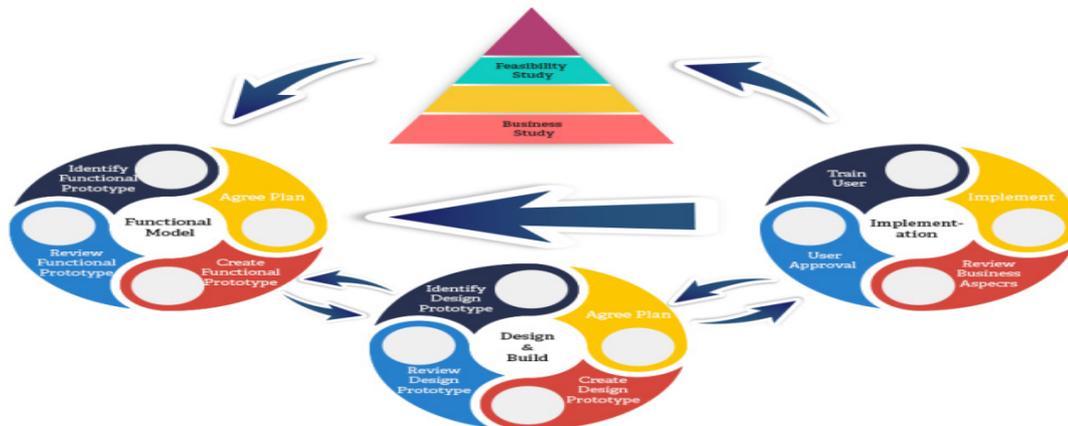


Figure 23: DSDM Process Model

Advantages of DSDM:

- Basic functionality is delivered within very short time.
- Users are highly involved in the development.
- Provide easy access for developers to end-users.
- The projects are delivered on time.

Disadvantages of DSDM:

- Costly sometimes.
- Not suitable for the small organizations.
- Not suitable for one-time projects.
- The developer and the users need to be trained.

DSDM is the best methodology to be used in this project and that's because the DSDM is simple, straight forwarding, and extendible. The DSDM method is working to impact agile on software project management. Machine learning is working to think prediction about the things that are possible to affect the project

management and providing a studied related to work, those are helping to identify the problems and to know the possible things that are going to happen before it happens. One of the things that are helping to do this method is to make an interview to know the things that are going to help in Implementing the project, to know the software's, hardware, and tools that are going to be developed in the project to be successful. This method is complex for solving the problem tasks and in developing the system dynamically that's by using machine learning. The important thing is that the teams that are working on this project can work at the same time that's because this method is not iteratively and incrementally. The users are able to do any change during the development where it's correctable throughout.

Framework and design of the proposed system:

The following figure is showing the pipeline of machine learning, where are first we will start to collect the data and to do the processing. From those data, we will do filtering to extract the features we want them for as input from the machine learning. Then the model is tested and trained to get the results and experience of the machine learning. (L. Shixia etc. 2018)

The main goal is to reduce the human effort when training a reliable and accurate model.

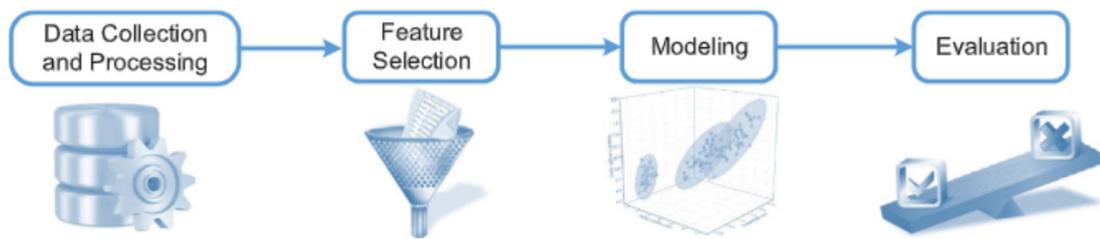


Figure 2: The pipeline of the machine learning.

The following figure is showing the architecture of the machine learning, it starts form collecting the data and ending with model testing to get the results:

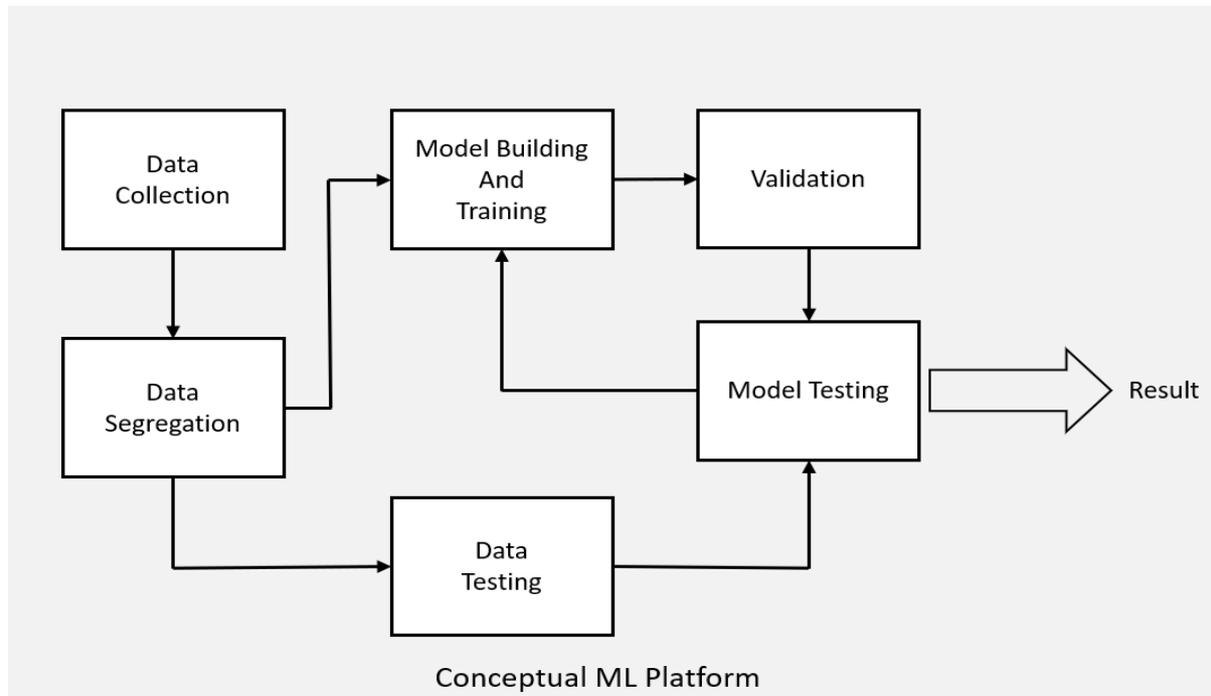


Figure 25: The architecture of machine learning (ML).

As we can see in the architecture, the data is collected, then it will be segregated into groups, those data that are segregated will either go to the model building and training or to the data testing. The data that went to the model building will go to the validation then to the model testing, in case if anything is not as required it will be sent back to the model building and taring, but if it was as required the result will come. The other data that want to the data testing is going to the model testing then immediately the result will come.

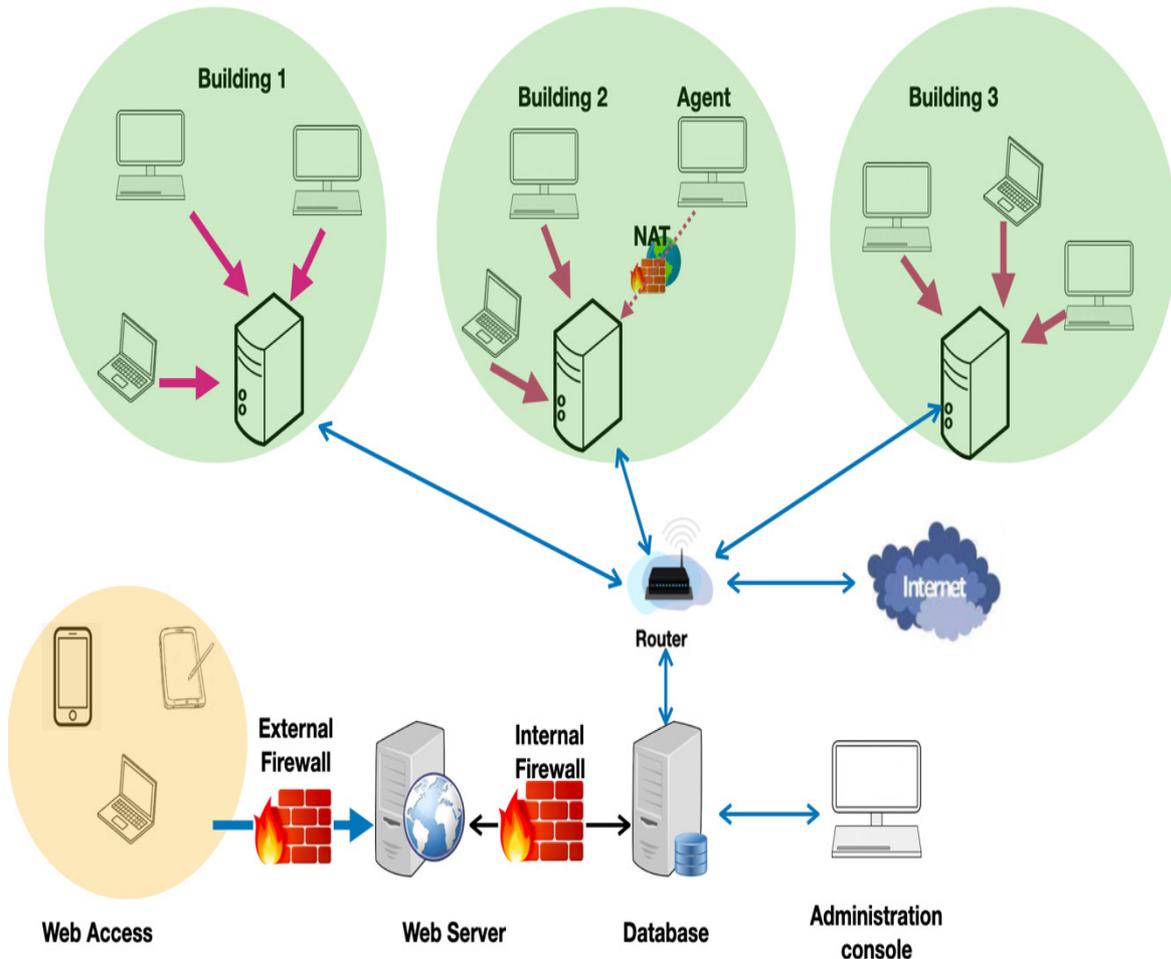


Figure 3: Proposed plan.

Conclusion

With the continuous advancement in science and technology, the world is competing in designing and developing the latest tools to facilitate life. Through this project, which depends on the idea of analyzing the network. To do this project to achieve security in the network and to filter the network, we used machine learning ML and artificial intelligence to improve the service or owner network. Using this technology based on the passive need of the technology itself, where there is no need for generating more traffic that will load the network, moreover than this, this technology can produce the trend of the traffic can protect the behavior of its components. The thing that this project is depending on is examining the network components that are to discovering the things that might be impacted the overall performance of the network. It's identifying the problems of the network and what is the root cause of the problem, and the tools that are used to monitor the network are working to decode the data traversing of the network. The analysis of the network is helping the admins to get the solutions. The things that network analysis is working to give solutions are the network issue troubleshooting, determining the speed and the availability of the Wi-Fi, identifying if there any instance of spyware or network intrusion, etc.

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