ABSTRACT

Python is a programming language that is preferred for programming due to its vast features, applicability, and simplicity.

Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without being explicitly programmed. Learning algorithms in many applications that we make use of daily. Every time a web search engine like Google is used to search the internet, one of the reasons that work so well is because a learning algorithm that has learned how to rank web pages. These algorithms are used for various purposes like data mining, image processing, predictive analytics, etc. to name a few. The main advantage of using machine learning is that, once an algorithm learns what to do with data, it can do its work automatically. In this paper, a brief review and future prospect of the vast applications of machine learning algorithms has been made. Popular apps such as Amazon's Alexa, Apple's Siri and Google Maps employ speech recognition. Machine learning (ML) software can make measurements of spoken words through a set of numbers that represent the speech signal. Machine Learning is defined as an application of artificial intelligence where available information is used through algorithms to process or assist the processing of statistical data. While Machine Learning involves concepts of automation, it requires human guidance. The abstract should begin with a brief but precise statement of the problem or issue, followed by a description of the research method and design, the major findings, and the conclusions reached. A machine learning model can, therefore, extract the dominant audio per time frame in a waveform by finding patterns in the spectrogram.

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CHAPTER 1

INTRODUCTION:

Real estate property is nor only the basic need of a man but today it's also representing the riches and prestige of a person. Investment in real estate generally seems to be profitable because their property values do not decline rapidly. The race for digital transformation is on. In this globally connected on-demand world with rapid advancements in internet technologies, businesses worldwide are under constant pressure to add innovative real-time capabilities to their applications to respond to market opportunities. Every business worldwide is building event-driven, real-time applications - from financial services, transportation, and energy, to retail, healthcare, and Gaming companies. Our endeavour is to make it easy to develop innovative real-time applications and efficient to operate them in production. We have a proven record of building highly scalable, world-class consulting processes that offer tremendous business advantages to our clients in the form of huge cost-benefits, definitive results and consistent project deliveries across the globe.

Financial Industry, Transportation, Supply Chain Management, Insurance, Retail, Manufacturing, Java, J2EE, Web Service, SOAP, JMS, MDB, EJB, Adobe Flex, Dreamweaver, XML, XSD, XSLT, SAX, DOM, SAAJ, JAXB, Oracle EBS Month End Closing, Oracle Application Framework, ADF, SAP Materials Management (MM), Oracle BPEL Processing, SAP Sales & Distribution (SD), Weblogic, Web Sphere, JBOSS, TOMCAT.

Comsoft Technologies provide both online and in-person training in various technologies with hands-on experience. The candidates successfully completed the training and the tests will receive a plaque of "Certificate of Completion" . Whether you are scheduling training for your organization's employees or you are an individual who is looking to learn new technologies, we can schedule training in your convenient time to make it more effective for you. Please give us a call and let us explain how our training helps you to develop quality software in the most efficient way!

About:

The race for digital transformation is on. In this globally connected on-demand world with rapid advancements in internet technologies, businesses worldwide are under constant pressure to add innovative real-time capabilities to their applications to respond to market opportunities.

Every business worldwide is building event-driven, real-time applications - from financial services, transportation, and energy, to retail, healthcare, and Gaming companies.
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We have a proven record of building highly scalable, world-class consulting processes that offer tremendous business advantages to our clients in the form of huge cost-benefits, definitive results and consistent project deliveries across the globe.

We prominently strive to improve your business by delivering the full range of competencies including operational performance, developing, and applying business strategies to improve financial reports, defining strategic goals and measure and manage those goals along with measuring and managing them.

Vision:
We are committed to going the extra mile to bring success to the clients consistently

We are dedicated to delivering the right people, solutions, and services to the clients that they require to meet their technology challenges and business goals.

Mission:
Optimizing client satisfaction with quality services

Delivering the most efficient and the best solution to our clients to every client leveraging leading technologies & industry best practices.

Services:

- It is believed that service and quality is the key to success, enabling business success driven by technology
- Harnessing the power of technology, we create a measurable difference for our clients across various industries & multiple geographies

Development:

We develop responsive, functional, and super-fast websites. We keep User Experience in mind while creating websites. A website should load quickly and should be accessible even on a small view-port and slow internet connection.

Branding and design:

We offer professional Graphic design, Brochure design & Logo design. We are experts in crafting visual content to convey the right message to the customers. We also design custom wraps for your products(also known as package designing).

Search engine optimisation:

We help you manage your SEO campaign more efficiently and effectively. We help you gain market share by leveraging our expertise. our holistic approach to identify anything that may be hurting your traffic or rankings and show you just how to outrank the competition.

Research:

We equip business leaders with indispensable insights, advice and tools to achieve their goals, our main area of research is in sentimental analysis, having published multiple papers on the same, we are in the process of creating a virtual bot that is intended to use our sentimental analysis data to provide real time replies.

Embedded system and IOT:

CST works with Consumer Electronics, Lighting, Home Automation, Metering, Sensor-Technology, Home Appliance and Medical Device companies to help them create smart and connected products.

Through its integrated Embedded and IoT services, Techno soft helps build intelligent & connected devices that can be remotely monitored and controlled while leveraging edge and cloud computing for a host of intelligent applications and analytics.

CHAPTER 2:

Introduction about machine learning:

Machine learning is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of Computer Programs that can change when exposed to new data. In this article, we will see basics of Machine Learning, and implementation of a simple machine learning algorithm using python.

Python community has developed many modules to help programmers implement machine learning. In this article, we will be using numpy, scipy and scikit-learn modules.
Machine learning involves a computer to be trained using a given data set, and use this training to predict the properties of a given new data. For example, we can train a computer by feeding it 1000 images of cats and 1000 more images which are not of a cat, and tell each time to the computer whether a picture is cat or not. Then if we show the computer a new image, then from the above training, the computer should be able to tell whether this new image is a cat or not. The process of training and prediction involves the use of specialized algorithms.

We feed the training data to an algorithm, and the algorithm uses this training data to give predictions on a new test data. One such algorithm is KNearest-Neighbor classification (KNN classification). It takes a test data, and finds k nearest data values to this data from test data set. Then it selects the neighbor of maximum frequency and gives its properties as the prediction result.

Machine learning is programming computers to optimize a performance criterion using example data or experience. We have a model defined up to some parameters, and learning is the execution of a computer program to optimize the parameters of the model using the training data or pastexperience. The model may be predictive to make predictions in the future, or descriptive to gain knowledge from data. The field of study known as machine learning is concerned with the question of how to construct computer programs that automatically improve with experience.

Types of machine learning:

1. ***Supervised Machine Learning***

As its name suggests, Supervised machine learning is based on supervision. It means in the supervised learning technique, we train the machines using the "labelled" dataset, and based on the training, the machine predicts the output. Here, the labelled data specifies that some of the inputs are already mapped to the output. More preciously, we can say; first, we train the machine with the input and corresponding output, and then we ask the machine to predict the output using the test dataset.

The main goal of the supervised learning technique is to map the input variable(x) with the output variable(y). Some real-world applications of supervised learning are Risk Assessment, Fraud Detection, Spam filtering, etc.

Advantages and Disadvantages of Supervised Learning

Advantages:

- Since supervised learning work with the labelled dataset so we can have an exact idea about the classes of objects.
- These algorithms are helpful in predicting the output on the basis of prior experience.

Disadvantages:

- These algorithms are not able to solve complex tasks.
- It may predict the wrong output if the test data is different from the training data.
- It requires lots of computational time to train the algorithm

Applications of Supervised Learning

- **Image Segmentation:**
  Supervised Learning algorithms are used in image segmentation. In this process, image classification is performed on different image data with pre-defined labels.
- **Medical Diagnosis:**
  Supervised algorithms are also used in the medical field for diagnosis purposes. It is done by using medical images and past labelled data with labels for disease conditions. With such a process, the machine can identify a disease for the new patients.

- **Fraud Detection** - Supervised Learning classification algorithms are used for identifying fraud transactions, fraud customers, etc. It is done by using historic data to identify the patterns that can lead to possible fraud.

- **Spam detection -** In spam detection & filtering, classification algorithms are used. These algorithms classify an email as spam or not spam. The spam emails are sent to the spam folder.
- **Speech Recognition -** Supervised learning algorithms are also used in speech recognition. The algorithm is trained with voice data, and various identifications can be done using the same, such as voice-activated passwords, voice commands, etc.

Unsupervised Machine Learning

Unsupervised learning is different from the Supervised learning technique; as its name suggests, there is no need for supervision. It means, in unsupervised machine learning, the machine is trained using the unlabeled dataset, and the machine predicts the output without any supervision.

In unsupervised learning, the models are trained with the data that is neither classified nor labelled, and the model acts on that data without any supervision.

The main aim of the unsupervised learning algorithm is to group or categories the unsorted dataset according to the similarities, patterns, and differences. Machines are instructed to find the hidden patterns from the input dataset.

Let's take an example to understand it more preciously; suppose there is a basket of fruit images, and we input it into the machine learning model. The images are totally unknown to the model, and the task of the machine is to find the patterns and categories of the objects.

So, now the machine will discover its patterns and differences, such as colour difference, shape difference, and predict the output when it is tested with the test dataset.

Advantages and Disadvantages of Unsupervised Learning

Advantages:

- These algorithms can be used for complicated tasks compared to the supervised ones because these algorithms work on the unlabeled dataset.
- Unsupervised algorithms are preferable for various tasks as getting the unlabeled dataset is easier as compared to the labelled dataset.

Disadvantages:

- The output of an unsupervised algorithm can be less accurate as the dataset is not labelled, and algorithms are not trained with the exact output in prior.
- Working with Unsupervised learning is more difficult as it works with the unlabelled dataset that does not map with the output.

Applications of Unsupervised Learning

- **Network Analysis:** Unsupervised learning is used for identifying plagiarism and copyright in document network analysis of text data for scholarly articles.

- **Recommendation Systems:** Recommendation systems widely use unsupervised learning techniques for building recommendation applications for different web applications and e-commerce websites.
- **Anomaly Detection:** Anomaly detection is a popular application of unsupervised learning, which can identify unusual data points within the dataset. It is used to discover fraudulent transactions.
- **Singular Value Decomposition:** Singular Value Decomposition or SVD is used to extract particular information from the database. For example, extracting information of each user located at a particular location.

Semi-Supervised Learning

Semi-Supervised learning is a type of Machine Learning algorithm that lies between Supervised and Unsupervised machine learning. It represents the intermediate ground between Supervised (With Labelled training data) and Unsupervised learning (with no labelled training data) algorithms and uses the combination of labelled and unlabeled datasets during the training period. **To overcome the drawbacks of supervised learning and unsupervised learning algorithms, the concept of Semi-supervised learning is introduced**. The main aim of semi-supervised learning is to effectively use all the available data, rather than only labelled data like in supervised learning. Initially, similar data is clustered along with an unsupervised learning algorithm, and further, it helps to label the unlabeled data into labelled data. It is because labelled data is a comparatively more expensive acquisition than unlabeled data.

Advantages and disadvantages of Semi-supervised Learning

Advantages:

- It is simple and easy to understand the algorithm.
- It is highly efficient.
- It is used to solve drawbacks of Supervised and Unsupervised Learning algorithms.

Disadvantages:

- Iterations results may not be stable.
- We cannot apply these algorithms to network-level data.
- Accuracy is low.

Reinforcement Learning

Reinforcement learning works on a feedback-based process, in which an AI agent (A software component) automatically explore its surrounding by hitting & trail, taking action, learning from experiences, and improving its performance. Agent gets rewarded for each good action and get punished for each bad action; hence the goal of reinforcement learning agent is to maximize the rewards.
In reinforcement learning, there is no labelled data like supervised learning, and agents learn from their experiences only.

The reinforcement learning process is similar to a human being; for example, a child learns various things by experiences in his day-to-day life. An example of reinforcement learning is to play a game, where the Game is the environment, moves of an agent at each step define states, and the goal of the agent is to get a high score. Agent receives feedback in terms of punishment and rewards.

Due to its way of working, reinforcement learning is employed in different fields such as **Game theory, Operation Research, Information theory, multi-agent systems.**

A reinforcement learning problem can be formalized using **Markov Decision Process(MDP).** In MDP, the agent constantly interacts with the environment and performs actions; at each action, the environment responds and generates a new state.

Advantages and Disadvantages of Reinforcement Learning

Advantages

- It helps in solving complex real-world problems which are difficult to be solved by general techniques.
- The learning model of RL is similar to the learning of human beings; hence most accurate results can be found.
- Helps in achieving long term results.

Disadvantage

- RL algorithms are not preferred for simple problems.
- RL algorithms require huge data and computations.
- Too much reinforcement learning can lead to an overload of states which can weaken the results.

About Python:

Python is a popular high-level, general-purpose programming language. It was developed by the Python Software Foundation after being initially developed by Guido van Rassum in 1991. Programmers may convey their ideas in less code because to its syntax, which was created with code readability in mind. Python is a programming language that enables quicker work and more efficient system integration.

Python is an interpreted, object-oriented, high-level, dynamically semantic programming language. It is particularly desirable for Rapid Application Development as well as for usage as a scripting or glue language to tie existing components together due to its high-level built-in data structures, dynamic typing, and dynamic binding. Python's straightforward syntax prioritizes readability and makes it simple to learn, which lowers the cost of program maintenance. Python's support for modules and packages promotes the modularity and reuse of code in programs. For all popular platforms, the Python interpreter and the comprehensive standard library are freely distributable and available in source or binary form.

Python's ease of use, huge framework library, flexibility, and other advantages make it the best choice for creating machine learning models.

Python offers machine learning settings a remarkable level of power and customization. The language's straightforward syntax makes it easier to validate data and speeds the scraping, processing, refining, cleaning, arranging, and analyzing operations, which reduces the difficulty of working with other programmers. Additionally, Python provides a wide ecosystem of libraries that do a lot of the boring, repetitive work of building functions, freeing developers to concentrate on writing code and lowering the likelihood of programming errors.

The language's straightforward syntax makes data validation easier and speeds up the operations of data scraping, processing, refinement, cleaning, arrangement, and analysis.

CHAPTER 3

SYSTEM ANALYSIS:

Proposed system: Voice classification using machine learning with python application.

1 **Existing System:**

The present has fewer emotions than the past.
The accuracy falls short of expectations.
Less data is available in the current system, which results in less precise categorization.
In order to acquire the highest level of precision, the training technique is not repeatedly used.

2 **Proposed System:**

The proposed technology is designed for highest accuracy possible.
The system's vast dataset allows the model to continually train on new voice classifications.
This proposed system has four huge datasets with various speech tones.
To accurately determine each sound categorization parameter, our method uses RNN and several feature exactions.

3 **Objective of the System:**

The system's goal is to maximize accuracy depending on the dataset.
To classify the voice or speech is to try to predict the outcome as accurately as possible.
To make our model more broad and invariant to those perturbations, we used Data Augmentation to provide a clear dataset.
To train our model, every feature was carefully extracted, including the Zero Crossing Rate, MFCC, Chroma Vector, and RMS value.
To create and train the optimal module by using several strategies to fit the entire dataset.

CHAPTER 4

REQUIREMENT ANALYSIS:

Hardware Requirement Specification

The necessary hardware It was simple to create this system.

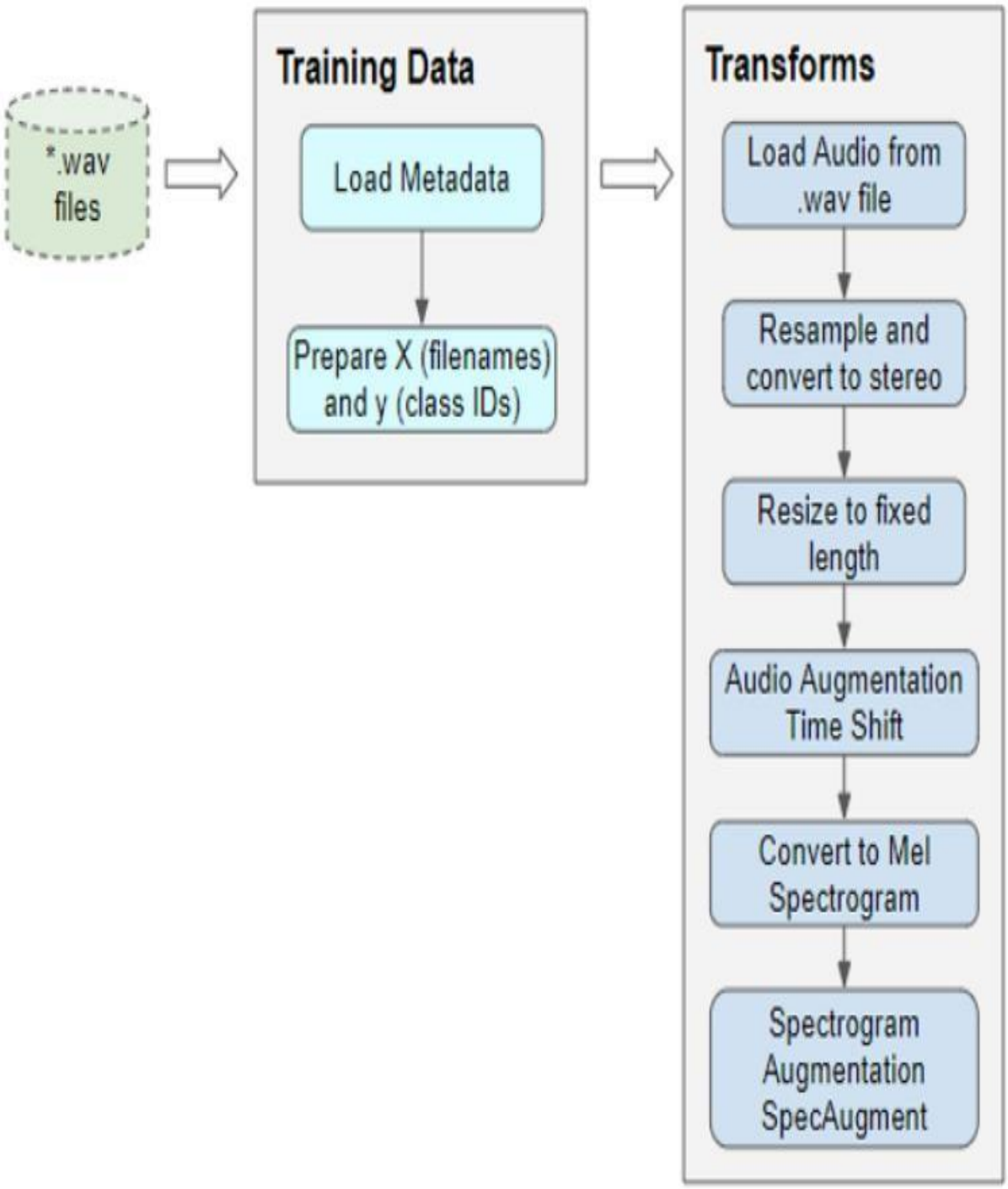
Voice Recorder.
Intel i5 or equivalent AMD processor.
8 GB RAM minimum.
256 GB solid state (SSD) hard drive minimum.
2GB GPU minimum.

Software Requirement Specification

Python 3.10.7.
Jupyter 6.4.12.
Required Python libraries like numpy, pandas, librosa, keras etc.
Dataset with enough size.

CHAPTER 5

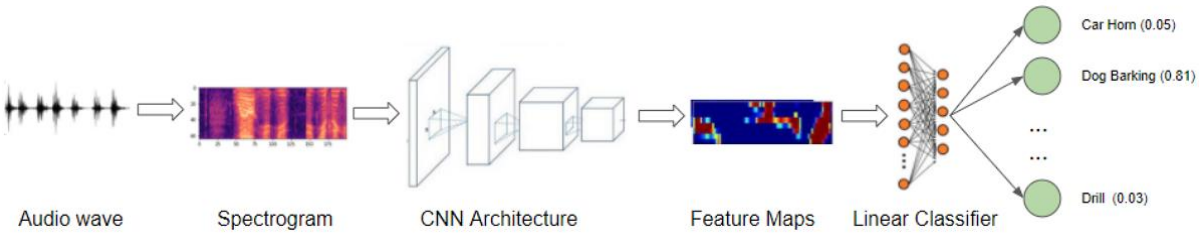
Design analysis:



The system will show how to use machine learning and deep learning techniques to categorize environmental sounds, concentrating on the recognition of a certain voice or speech. We want to be able to ascertain whether an audio sample of a few seconds of duration and in a computer-readable format (like a.wav file) contains one of the sounds from the target dataset with a matching Classification Accuracy score.

Audio/Voice Classification:

We might think of this application as the "Hello World" type problem for audio deep learning, just as identifying hand-written digits using the MNIST dataset is supposed to be for computer vision. Starting with sound recordings, we will spectrograph them, add them to a CNN plus Linear Classifier model, and then generate predictions about the class to which the sound belongs.



Audio wave:

Sound propagates through the air as an audio wave, which is caused by air molecule vibration. A waveform plots the displacement of an air molecule over time to describe a wave. The power of a wave's action is measured by its amplitude; the greater the amplitude, the more the air molecules are moved.

Spectrogram:

A spectrogram is a visual representation of the "loudness" or signal strength over time at different frequencies contained in a specific waveform. One may observe the amount of energy at different frequencies, such as 2 Hz vs. 10 Hz, as well as how it changes with time.

CNN Architecture:

It has three layers: a fully connected layer, a pooling layer, and a convolutional layer. It processes data using a grid-like architecture and belongs to the class of neural networks.

Feature maps:

One such method for displaying features on a graph together with their relevance is feature mapping. This guarantees that the characteristics are visible and that the information they correspond to is visible. In this way, just the important aspects are included and the unimportant ones are left out.

Linear classifier:

A model known as a linear classifier decides which discrete class to assign a collection of data points based on a linear combination of its explanatory factors. As an illustration, a model would be used to determine the species of a dog by combining information about the dog such as weight, height, colour, and other traits.

CHAPTER 6

Algorithms:

1 **Pandas:**

- Python's Pandas package is used to manipulate data sets.
- It has tools for data exploration, cleaning, analysis, and manipulation.
- Wes McKinney came up with the name "Pandas" in 2008. It refers to both "Panel Data" and "Python Data Analysis."

2 **Numpy:**

- The Python library NumPy is used to manipulate arrays.
- It also provides matrices, fourier transform, and functions for working in the area of linear algebra.
- By Travis Oliphant in 2005, NumPy was born. You can use it for free because it is an open-source project.
- Numerical Python is referred to as NumPy.

3 **Kera's:**

- Google created the high-level Kera's deep learning API to implement neural networks.
- It is made to make the implementation of neural networks simple and is implemented in Python.
- Kera's is used to build deep models that can be produced on mobile devices.
- Deep learning model distributed training also uses Keras.

4 **Seaborn:**

- Seaborn is a matplotlib-based Python data visualization package.
- Seaborn in Python is available to build graphics that are simple to control.
- Python's Seaborn package essentially helps to visualize the data and make it easier for the user to understand.

Implementation:

The process of turning a theoretical design into a functional system is known as implementation. The most important step in creating a new successful system and in providing users confidence that the new system will operate effectively and efficiently.

Only after extensive testing is completed and if it is determined that the system operates in accordance with the specification can it be put into use. In addition to meticulous planning, it necessitates research into the existing system and its implementation limitations, the design of techniques to effect the change, and an assessment of the approaches.

The system testing and user education and training are two of the main preparation tasks for the implementation. The effort required for system analysis and design, just for implementation, will increase with the complexity of the system being implemented.

Several activities make up the implementation phase.

The necessary hardware and software purchases are made. It could be necessary to design some software for the system.

Programs are created and tested for this. The old system is then retired and the user switches to his newly installed and thoroughly tested system.

Testing:

An essential step in the software development process is the testing phase. The information-zed system will assist in automating the process of identifying faults and missing operations as well as a thorough verification to ascertain whether the goals are achieved and the needs of the users are met.

Software testing is carried out in three steps:

The first is unit testing, in which each module is examined for correctness and validity as well as for any missing operations and the achievement of the objectives. Errors are recorded and fixed right away.

The most crucial and significant component of the project is unit testing.

As a result, problems in a specific module can be readily fixed, and program clarity is improved. The system as a whole is broken down into numerous modules in this project, each of which is created separately.

So, separate modules are subjected to unit testing.

Integration testing is done in the second step. It need not be the case; software whose components perform flawlessly when run separately will also perform flawlessly when run collectively.

CHAPTER 7

Conclusion:

- It might be useful in creating new programs#
- Code for any program can be easily read because it is the fundamentals of machine learning
- The fundamentals of Python machine learning are all that machine learning
- When compared to the current system, it offers a user-friendly graphical interface that is superior
- It successfully gets around the communications delay
- Information updating has never been so simple
- The System can be modified appropriately in the future, if that becomes necessary
- Some applications, such as those that classify voices, images, emotions, and sentiments, are simple to construct
- The package was created in a way that makes future customization simple. The project's evolution allows us to draw the following conclusion
- When compared to the current system, it offers the following advantages
- It offers a user-friendly graphical user interface
- It grants authorized users the proper access based on their permissions
- It successfully gets rid of the everyday in communications
- Information updating becomes simpler
- The most notable characteristics are system security, data security, and dependability
- The system provides sufficient room for future change if necessary

References:

- An understanding of TensorFlow and Scikit-learn.
- A Kaggle account.
- We can also use github.com for any code of the programs

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