VSIT | Vidyalankar School of Information Technology

V-Tech

Technical Magazine of Information Technology and Data Science Department

Academic year

2022-23

Preface

I am pleased to present the V-Tech issue, the technical magazine by the Department of Information Technology and Data Science of VSIT, for academic year 2022-23.

This magazine presents the articles on various trending topics like Text Analytics, Machine Learning for Trading, Auto ML, Image Classification, Metaverse and Decision Intelligence, AI Tools and ChaptGPT etc.

I hope you will find this issue as interesting as I did. It will help all the readers in enriching their IT knowledge and hopefully strike a chord in at least one area where they can take a deep dive for their research activities.

Prof. Makarand Deshpande

Adjunct Faculty

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Text Analytics in NLP

Text analytics means processing that refers to the analysis, manipulation, and generation of text, and natural language processing refers to the ability of a computer to understand human language in a valuable way. Natural Language Processing (NLP) is the next step after text processing.

Why is text processing important? Since text processing is one of the machine learning that uses that average technology. Since customer's interactions with brands have become increasingly online and text-based, text data is one of the most important ways for companies to derive business insights. Text data can show a business how their customers search, buy, and interact with their brand, products, and competitors online. Text processing with machine learning allows enterprises to handle these large amounts of text data.

The steps involved in text processing are:
 a. Pre-Processing
First step is: Text cleaning, where use of regular expressions, removal of URL, Hashtag is done & replace all characters with " " which are not A-Z, a-z, comma, match anything within [] including the brackets. Regular expressions can be:

After the use of regular expressions, we need to split the text. Then use of English stop words which are: [a, an, are, was, were, she, do, does, doing, did, is, a, yours, if, but, that, there, their, itself, themselves, have had, has, having, because, while, very, what, who, whom, them, then, until, till, this, these, those, at, been, being, its, it's, for, on etc.] If word is not present in stop words, then consider the word in the text.

 b. Tokenization is applied where splitting the input data into meaningful parts. For example- gift, play, holiday, season etc. Then finding the frequent occurrence of words from the corpus.

 c. Stop words removal and Keywords Extraction: The stop words are the division of natural languages that offer a better knowledge regarding the chats, if they are illegal or legal. Usually, the stop words are articles and pronouns that do not offer meaning to the sentence. When the stop words are recognized to be malicious, they must be eliminated. This removal minimizes the term space dimensionality. Thereby, the key words are extracted.

Removal of stop words:

Text with Stop words	Text after Stop words removal
After careful consideration, bush recommends oil drilling	careful consideration bush recommends oil drilling
Tupperware will never truly recover from red curry leftovers	Tupperware never truly recover red curry leftovers

d. Stemming: It is a process of removing the last few characters of the given word, to obtain ashorter form, even if it does not have any meaning. In NLP, stemming helps in getting the baseword (feature) which is either positive or negative. It essentially chops off letters from the enduntil the stem is reached.

Original Word	Stemmed Word
Finally, Final, Finalized	Fina

e. Lemmatization: It should give a meaningful word. Root word is called as Lemma is a dictionary form.

Original Word	Lemmatized Word
Responsible	Response
Finally, Final, Finalized	Final

Difference:

Stemming	Lemmatization
Stemming helps in getting the base word with or without meaningful word	It helps in getting a base/root word having meaningful word.
Simple & Speedy	This scans the entire corpus which is time & space consuming.
It is a process of reducing inflection (variation) in words to their root forms such as mapping a group of words to the same.	It reduces the inflected (modified) words ensuring that the root word belongs to the language.
Eg: history, historical – histori	Eg: Finally, Final, Finalized- Final

F. Part of Speech (POS) Tagging: is a supervised learning solution that converts a sentence toform list of words, list of tuples (where each tuple has a form (word, tag). Tag signifies whetherthe word is a noun, adverb, adjective, verb etc. POS are: Noun, Pronouns, Adjectives, verbs, Adverbs, Prepositions, Conjunctions, Interjections.

- Noun (N)- Boehner, Trump, Biden, Lawyer, President, Marilu Henner, Facebook, etc.
- Verb (V)- praises, urges, frightened, confused, see, freaking,
- Adjective (ADJ)- two, young, happy, angry….
- Adverb (ADV)- slowly, quietly, always, truly,
- Prepositions (P)-at, on, in, from, with, under….
- Conjunctions (CON)- and, or, but, because, if…….
- Pronoun (PRO)- I, you, we, he, she, they, me, us…
- Interjections (INT)-ouch! Wow! Great! Help!

g. Count vectorization: Count vectorizer is a method to convert text to numerical data. Count vectorizer makes it easy for text data to be used directly in machine learning and deep learningmodels such as text classification.

Geeta Sahu
Assistant Professor

Impact of Deepfake Technologies on Children.

Deepfakes are videos that have been manipulated via Artificial Intelligence tools and machine learning techniques, which allow for the superimposition of existing images and videos onto other pieces of content. For example, deepfake manipulators could potentially create "anti-footage," showing the opposite of what really occurred in certain situations such as an outcome of a war.

This article offers insights into Deepfakes that can help you engage children in meaningful conversations and guard their safety online.

Deepfake technologies can distort reality. If used to bully, defame or victimize children (or adults), the situation can damage a child's mental health and well-being.

How Can Children Identify Deepfakes

To date, many Deepfake videos have signs of indicating manipulation. For example:

- The audio and video speeds may not align fully.
- Videos may be pixelated.
- The ideas expressed appear incongruent with what is known about a certain person or topic.

To help children think more deeply about deepfake content, these questions can be included in either formal or informal discussions:

- Why might a person want to create "fake" videos?
- Why would a person feel as though "fake" or manipulated content might help them achieve their goals?
- How is it possible for Deepfake videos to look so real?
- Why is it difficult to discern real information from misinformation in some cases?
- Is there a difference between a Deepfake video of a politician and identity theft?

The precise questions used in any discussion and the nature of the discussion itself should, of course, vary based on the ages and interests of the children with whom we are speaking.

The responsibility for identifying Deepfakes is not solely on the individual, nor should it be. Deepfake detection technologies and laws regarding Deepfakes remain under continued development. All could potentially benefit from continuous improvement as Deepfake technologies advance.

Akshatha Jain
Assistant Professor

Fall Detection System for the Elderly

Background

As per the survey, carried by WHO, falls are the second leading cause of deaths by unintentional injury globally. All around the world, every year around 646000 individuals die because of falls. Especially adults more than 65 years of age suffer from falls which may lead to fatal injury. The diagram below indicates leading causes of deaths worldwide in all age groups. Falls contribute around 55% deaths caused due to unintentional injuries.

The risks due to fall are higher among adults aged 65 years and above. It is estimated by research that in upcoming 30 to 35 years more than one out of five people will be aged 65 or over. According to the World Health Organization (WHO), by 2050, the current population of elderly people will increase, representing 20% of the world's population. Falling can be one of the most serious and life-threatening events for this age group. A significant number of adults are treated for fall-related injuries in emergency rooms every year suffering fractures, loss of independence and even death. Risks of Falls include bone fracture, hip fracture, internal bleeding, embolism, and severe head injuries.

Different Fall Detection Systems

Fall detection systems can be classified in two main categories- Wearable and Non-wearable. There are many Wearable devices which are available in market to detect the fall. These devices are cheap and reliable. The main problem of wearable devices is they must be removed while taking bath. And many falls happen in the bathroom, especially in elderly. These falls remain unnoticed leading to severe injuries and other risks. Hence, non-wearable fall detection systems play vital role in such scenario.
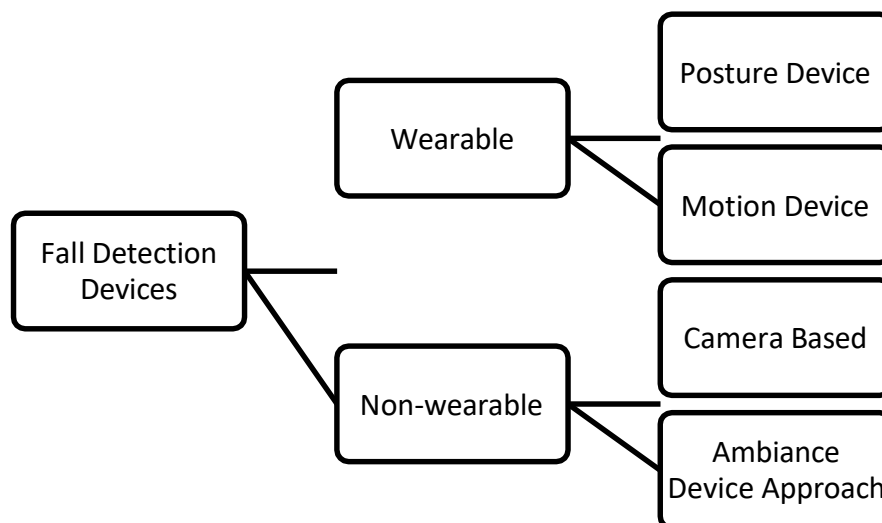
Wearable Devices- Posture and Motion Detection

Human's posture and motion can be detected with the help of electronic sensors- Accelerometer, Gyroscope, and magnetometer. When a human body experiences fall, the posture and motion changes suddenly. We can capture this sudden change in posture with the help of sensors and in turn the fall can be detected.
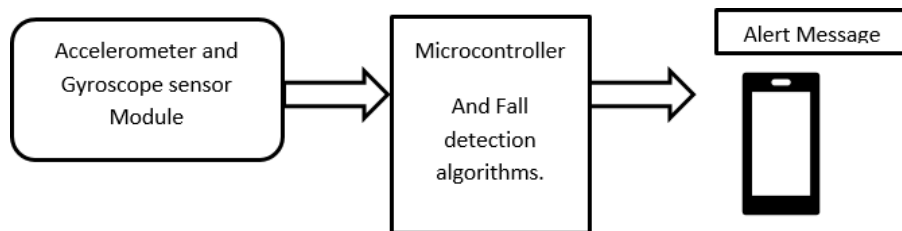

Algorithm for fall detection reading sensor data

Non-Wearable Fall Detection Devices- Camera Based Approach

Camera or Vision based devices are in demand due to their multiple advantages over other sensor-based devices. Some of the reasons are - cameras can detect multiple events simultaneously and it also can avoid the discomfort of wearing devices for fall detection. Most importantly the recorded video from camera can be used for verification after a fall has occurred. Though this vision-based approach provides an extra factor of "Security", but it does have a disadvantage of not preserving the users' "Privacy". If the fall detection is to be done in bathroom, then camera-based devices have some limitations.

Non-Wearable Fall Detection Devices- Ambient Based Approach

Ambient based approach comprises of an array of multiple sensors to configure a simple and fast human fall/activity detection/recognition system. In this approach a human fall can be detected based on various parameters that can be measured with the help of multimodal sensors like – Pressure transducers fixed in bathroom tiles, PIR motion sensors on walls, Vibration/Shock sensors on walls and tiles, single far-field microphone etc. The biggest advantage of this system is they do not breach the privacy of an individual as there will not be any camera used for the detection of fall, also they do not cause any discomfort of wearing any device during routine activities. This makes the ambient-based approach the best suited to be implemented in the places like bathrooms, where the help reaches late as fall is not visible due to the closed doors.
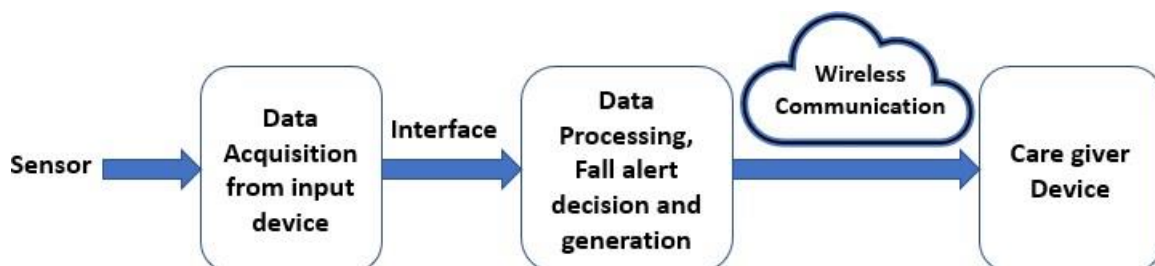
Flow of fall detection using Ambient-based approach

Conclusion

As people get older, their bodies go through multiple physical changes hence making them more fragile, and more prone to falls. There are many medical conditions like vitamin D deficiency, poor vision, weakness, use of certain medicines which may cause fall. To minimize the chances of fall, these conditions can be treated. Most of the times, fall remains unnoticed and as a result injury due to fall become severe. So, it is very important to detect the fall as soon as it happens to get the treatment immediately and reduce the further risks.

Maitreyi Joglekar
Assistant Professor

Dimension of The Smallest Subspace Containing Two Subspaces

This article describes the formula of the subspace containing two subspaces of a vector space. To understand this concept, it is expected to have a thorough knowledge of basic concepts like Vector Space, Subspace and Dimension.

If there are two subspaces, then the question arises about the bigger space which contains those two subspaces. It can be proved that the bigger space is indeed the smallest one which contains two subspaces. This article defines the dimension of that bigger space andillustrate the formula with the proof.

Statement: If W_1 and W_2 are two finite-dimensional subspaces of a vector space V, then $W_1 + W_2$ is also a finite-dimensional and
dim $(W_1 + W_2) =$ dim $W_1 +$ dim $W_2 -$ dim $(W_1 \cap W_2)$.

Proof:

As W_1 and W_2 are two subspaces of a vector space V then $W_1 \cap W_2$ is also a subspace of V. Let

$\{a_1, a_2, \dots, a_k\}$ is a basis of $W_1 \cap W_2$. So, dim $(W_1 \cap W_2) = k$ ... (I)

Extend this basis to basis of W_1 and W_2.

Let $\{a_1, a_2, \dots, a_k, \beta_1, \beta_2, \dots, \beta_m\}$ be a basis of W_1, So, dim $(W_1) = k + m$ ... (II)

And

Let $\{a_1, a_2, \dots, a_k, \gamma_1, \gamma_2, \dots, \gamma_n\}$ be a basis of W_2, So dim $(W_2) = k + n$ ... (III)

So, the Subspace $W_1 + W_2$ is spanned by the linear combination of vectors $a_1, a_2, \dots, a_k, \beta_1, \beta_2, \dots, \beta_m, \gamma_1, \gamma_2, \dots, \gamma_n$.

Suppose $\sum a_i \alpha_i + \sum b_j \beta_j + \sum c_r \gamma_r = 0$ .... (1)

$\therefore \sum a_i \alpha_i + \sum b_j \beta_j = - \sum c_r \gamma_r$

Implies $\sum c_r \gamma_r \in W_1$ ... (As it is linear combination of α_i and β_j)

Also, $\sum c_r \gamma_r \in W_2$ ... (As $\gamma_r \in W_2$)

Implies $\sum c_r \gamma_r \in W_1 \cap W_2$.

But $W_1 \cap W_2$ is generated by $\{a_1, a_2, \dots, a_k\}$

$\therefore \sum c_r \gamma_r = \sum x_i \alpha_i$

$\therefore \sum c_r \gamma_r - \sum x_i \alpha_i = 0$

But $\{a_1, a_2, \dots, a_k, \gamma_1, \gamma_2, \dots, \gamma_m\}$ is an independent set (As it is a basis)

So, $c_r = x_i = 0$ for all i and r. ….(∗)

As $c_r = 0$, Equation (1) reduces to

$\sum a_i \alpha_i + \sum b_j \beta_j = 0$

But $\{a_1, a_2, \dots, a_k, \beta_1, \beta_2, \dots, \beta_m\}$ is also an independent set (As it is a basis)

So, $\alpha_i = \beta_j = 0.$ ….(∗∗)

From (∗) and (∗∗)

$\alpha_i = \beta_j = c_r = 0.$

Implies $\{a_1, a_2, \dots, a_k, \beta_1, \beta_2, \dots, \beta_m, \gamma_1, \gamma_2, \dots, \gamma_n\}$ is an independent set.

Also $\{a_1, a_2, \dots, a_k, \beta_1, \beta_2, \dots, \beta_m, \gamma_1, \gamma_2, \dots, \gamma_n\}$ spans $W_1 + W_2$.

$\therefore \dim(W_1 + W_2) = k + m + n$

$$= k + m + n + k - k$$

$$= (k + m) + (k + n) - k$$

$$= \dim W_1 + \dim W_2 - \dim(W_1 \cap W_2) \qquad \dots \text{From } (I), (II) \text{ and } (III)$$

$\therefore \dim(W_1 + W_2) = \dim W_1 + \dim W_2 - \dim(W_1 \cap W_2)$

Hence the Statement has been Proved.

Rahul Sonar

Assistant Professor

Improve Students learning with Interactive Panel

Interactive touch screen displays in education are poised to make unprecedented changesin how teachers teach, and learners learn.

There are many reasons to use interactive classroom and those range from student engagement and performance to teacher and administrator efficiency. And they also come in with a fewunexpected benefits as well. An interactive touch screen display can improve your students' learning journey and yourclassroom's effectiveness.

There's no one-size-fits-all answer for ideal classroom display solutions. Fortunately, schoolshave options. Most classrooms benefit (hugely) from at least one interactive whiteboard. Many find that more than one display is ideal for flexible classrooms that maximize active learning. Interactive touchscreen displays – what some call smart flat-screen TVs – deliverloads of benefits. Here are ten of the top advantages of using an interactive touch screen display in your school or Colleges. Interactive touch screen displays are meant to assist with active learning. It's one of the greatest advantages these dynamic devices bring to the classroom.

As the name implies, active learning is learning through engaging with content. By becominginvolved in the learning process. That it works so well should come as no surprise to seasoned educators. Countless activities facilitate active learning but many – if not most – areenhanced when instructors and students use interactive whiteboards. Interactive touch screen displays are masterful at enabling collaboration, especially with the multitouch feature that lets several students write onscreen content at the same time. It's an ideal way to brainstorm, present, analyze text or images. Work through an experiment or engage with a learning game.

When students show, explain, and teach, their minds are actively engaged in the learning process. Do these things on a large interactive screen and the benefits blossom? Have a process to demonstrate? Step up to the interactive touch screen and diagram it out. Create a presentation with teammates and present together on the big screen. Break into workgroups tolearn about different aspects of a topic, then teach the rest of the class.

Interactive whiteboards help students of all ages develop critical life skills. The jobs of today and tomorrow demand greater adaptability, problem-solving and critical thinking. To prepare students for career and college readiness they need to be using tech tools. And they need to beusing these classroom tech tools in ways that develop these critical skills.

Students in classes that leverage an interactive touch screen display are more engaged. Theypay more attention. They're more positive about learning. Teachers often report that increased attentiveness and engagement are the top benefits of teaching with interactive display technology. Students need feedback to know when they're on the right track. Decadesof research have shown that less instruction plus more feedback creates greater learning. In fact, it doubles how quickly students learn. Harvard Physics professor Eric Mazur was one ofthe first to figure this out.

Finally, experienced teachers know that developing a cohesive classroom community is half the

classroom management battle. (Or more.) The classroom interactive touch screen displayprovides a central space around which to build that community. Use it to conduct your morning meetings. Even better, let students earn the role of morning moderator at the big screen. Take a break from traditional Star Student posters. Let students create multimedia presentations that express themselves in a dynamic new way. Challenge them to join forceswith cooperative gameplay apps.
The more you use your interactive touch screen display the more it becomes a central gathering point. A visible means of creating common ground among classmates.

Collaborative projects, presentations, and gamified learning all do the trick. Or take a group break from the pressures of the day. Interactive whiteboards help teachers offer more learningopportunities to more students. Lessons that bring students to the board let kinesthetic learners get up and move. Videos and multimedia presentations appeal to visual and auditory learners. And for those that learn best by reading. Teachers can capture and save on-screen notes and distribute the files for independent review.

IT departments are big fans of interactive touch screen display. Compared to traditional interactive whiteboards and projector-based technology, they offer big benefits. Because they're all-in-one solutions, they're faster to implement. They require virtually no maintenance. Plus, teachers get up and running with their dynamic displays with minimaltraining. All of which saves IT time and reduces related costs.

Administrative benefits of interactive whiteboards:
- An all-in-one solution
- Easy installation
- Reduced maintenance
- No bulbs
- No filters or calibration
- Greater reliability
- Longer lifespan
- Lower energy consumption
- Wall or cart-mount for resource sharing
- Often no software licensing fees

Remote management is a big benefit when it comes to interactive whiteboards. But not allboards have the same remote management systems. Some may require you to download multiple different apps, while others are just plain complicated.

<div align="right">

Rajendra Ramesh Patole

Assistant Professor

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Machine Learning for Trading – Can It Predict the Trend?

Artificial intelligence's field of machine learning studies how computers analyse huge datasets and draw conclusions and predictions from them. A broad notion, machine learning can be divided into supervised and unsupervised-based learning.

Several strategies are available for training machines using the data that is supplied. Simple and Multi Linear Regression, Logistic Regression, Decision Tree Classification, and many others are a few examples. Depending on the kind of datasets that are supplied into the system, the algorithm is taught in various ways. In today's environment, machine learning is practically ubiquitous. Machine learning is already used in many different industries across many different sectors, including Netflix's search engine, sales forecasting, supply chain management, manufacturing, healthcare, and more.

Machine learning algorithms are also used in the trade and banking sectors in various ways. The way we view banking and insurance is changing as a result of fintech. Numerous AI-based apps on the crypto market enable users to trade cryptocurrencies with the help of cutting-edge algorithms.

The trading market is another area where AI and ML are useful. Although there isn't yet complete automation, ML algorithms let stockbrokers provide investors with better services. The development, personalization, and fine-tuning of the algorithms as well as the automation of statistical labour are all services provided by AI and ML consulting firms to traders and trading organisations.

Trading with Machine Learning

The trading business heavily relies on patterns and trends. Large data sets can be processed effectively by machine learning algorithms to find patterns that are difficult for people to see. The stock market is erratic and susceptible to being impacted by a few variables (social, political, economic, demographic, etc.).

The risk of market collapses will be reduced, and returns will improve for traders if they can accurately identify the trends in advance. Because of this, machine learning is a useful tool in trading. Additionally, ML methods can be applied to:

Sentiment Analysis

Traders may be able to predict whether a brand's stock prices will rise or fall by examining market sentiment. Information is gathered from a variety of places, including social media, websites, forums, news platforms, and more. To comprehend the context of the data and ascertain the mood of the market, Natural Language Processing (NLP) is applied. Traders can use this information to modify their holdings and determine whether to buy additional stock, sell what they currently possess, or hold off until the patterns become more pronounced.

Pattern Detection

Most stock market forecasts are the result of countless hours of manual processing and years of expertise. By automating the analysis, machine learning in stock trading decreases the requirement for arduous labour. However, gaining insights still need human knowledge. In order to find the patterns, the trader should know where to search.

Human expertise and intuition are crucial for the algorithm to produce correct results, whetherit be when creating an automated trading system or utilising ML to find patterns. Although MLexpedites the laborious processes of information gathering and processing, individuals are ultimately responsible for using the insights to make decisions.

Real-Time Data Forecasting

More data can be provided to the machine learning algorithms in real-time. In order to improveforecast accuracy, the algorithms are trained to learn and make adjustments. Real-world challenges that directly affect the trading business include things like the state of the world's weather, political upheaval, climate change and its effects on renewable energy, etc.

The outcomes of global problems can be predicted by ML algorithms, which establishes a foundation for potential future stock market developments. Better outcomes will be obtained by combining algorithms and forecasts since many aspects interact with one another.

Chatbots in Trading

Creating chatbots for communication is another approach to employ machine learning in trading. The tasks and responsibilities of chatbots are the same across all industries. Chatbots converse with traders and give them the details they request (past deals, financial statements, investment records, etc.). Additionally, the chatbots can construct a list of trading opportunities,suitable stocks to buy, current prices, and much more.

Chatbots driven by AI are quicker and more efficient than human support staff. A single chatbotcan manage numerous discussions at once and give each trader the necessary information without growing weary, lost, or making mistakes. In order to better support the traders, the algorithms are built to take feedback and learn from past errors.

Rohini Desai

Assistant Professor

Technologies that can change Financial Markets in Future

Financial markets refer broadly to any marketplace where the trading of securities occurs. There are many categories of financial markets, including (but not limited to) forex, money, stock, and bond markets. These markets may include assets or securities that are either listed on regulated exchanges. The stock market is just one category of financial market. Financial markets are made by buying and selling numerous typesof financial instruments including equities, bonds, currencies, and derivatives.

There are many technologies that can revolutionise the financial markets in the coming days.

Many financial firms are turning to algorithms to do the job that humans have been doing fordecades. Algo-trading is the use of predefined programs to execute trades. A set of instructions or an algorithm is fed into a computer program and it automatically executes the trade when the command is met. The algorithm can be based on a number of input points likeprice, timing, quantity or other metrics.

Going forward, we may only have robots of Dalal Street. Algorithms have advanced to understand financial goals, risk profile and other intricate details of an investment to come upwith personalized investment portfolio. It can reallocate funds, book profits, or square off positions based on self-learning algorithms. The platform can either be web-based and/or smartphone-based, making it extremely easy to access or customize. All this is self-operated without the user having to talk to a live person. As opposed to a human adviser who charges aportfolio management fees, here you get this service at no recurring expense.

Financial markets generate massive amount of data every second. Storing and analyzing this information on real time basis is critical. A combination of private and public cloud solves the problem of storage and real-time access to this ocean of data at an affordable price. Big data analytics makes it possible to highlight correlations that were impossible for humans tofind out.

Snehal Tandale
Assistant Professor

AUTO ML

Automated machine learning (AutoML) is one of the latest trends driving the democratization of data science. A large part of a data scientist's work is in data cleansing and preparation, and each of these tasks is repetitive and time- consuming. AutoML automates these tasks and includes model building, algorithm building, and neural networks.

AutoML is basically the process of leveraging automation to apply ML Models to real-world problems. AutoML frameworks help data scientists visualize data, understand models, and deploy models. Its main innovations are component preprocessing, model type selection and hyperparameter search used for hyperparameter optimization.

Automated machine learning (AutoML) is the process of applying machine learning (ML) models to real-world problems using automation. Specifically, it automates the selection, configuration, and parameterization of machine learning models. Automating the machine learning process makes it easier to use and often produces faster and more accurate results than hand-coded algorithms.

How does the AutoML process work?

AutoML is typically a platform or open source library that simplifies every step of the machine learning process, from manipulating raw datasets to delivering working machine learning models. In traditional machine learning, models were developed manually and had to handle each step of the process separately.

The automated machine learning process
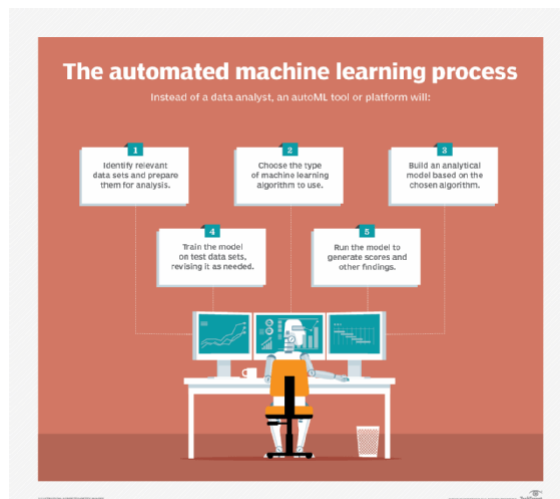
Why is AutoML important?

AutoML is important because it represents a breakthrough in the field of machine learning and artificial intelligence (AI). AI and machine learning have been criticized for being "black boxes". This means that machine learning algorithms are difficult to reverse engineer. It increases efficiency and processing power to produce the result, but it can be difficult to understand how the algorithm produced this output. Therefore, when a model is a black box, it can be difficult to predict the outcome, and therefore it is also difficult to choose the right model for a particular problem.

The main benefits of AutoML are:

- Efficiency – Speeds up and simplifies the machine learning process, reducing training time for machine learning models.
- Reduced costs – Faster and more efficient machine learning processes mean that companies can cut costs by reducing the budget they spend on maintaining those processes.

- Accessibility -- Simpler processes save companies money in training staff and hiring professionals. It also makes machine learning a viable option for a wider range of businesses.

- Performance – AutoML algorithms tend to be more efficient than hand-coded models.

AutoML tool features
Some popular AutoML platforms include:

- Google AutoML, Google's proprietary, cloud-based automated machine learning platform.
- Azure Automated Machine Learning, a proprietary, cloud-based platform.
- Auto Keras, an open-source software library developed by the DATA lab at Texas A&M university.
- Auto-sklearn, which evolved from and replaced Scikit learn, which was an open source, commercially usable collection of simple machine learning tools in Python. Users can find it on GitHub.

Learning with Google AutoML

Tabular data is everywhere today, providing powerful insight into business and technical problems. A common way to extract these insights is to apply machine learning (ML) techniques to this data. The process of applying ML to a dataset consists of various steps. B. Data preprocessing, feature engineering, and hyper parameter optimization. Each of these steps is itself often a time-consuming trial-and-error process.

How AutoML works
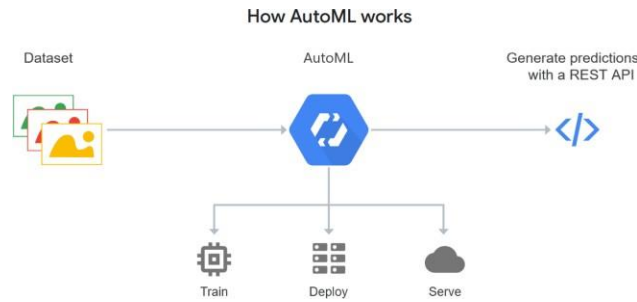
1. Data Preparation

Before you start training, you need to make sure your training data is in a format supported by your platform. AutoML Tabular supports two methods of importing training data. If you're already using Google's BigQuery platform, you can import your data directly from your BigQuery tables or upload a comma-separated values (CSV) file to Cloud Storage.

2. Creating a Dataset

Commented [e1]:

Importing datasets can be done from the Google Cloud Platform (GCP) console. The Vertex AI section has a Datasets page where you can manage your datasets. From there, you can create a tabular data set and select a data source for the data set. After the data source is deployed, you'll see a page showing general statistics for your data.

3. Training a Model

Start this process by clicking Train New Model on the Statistics page. Next, you'll be presented with a dialog where you can select a training target, and choose whether to use AutoML to train your model or use a custom training solution. For this example, select Regression as the training goal and AutoML as the training method.

4. Next, you will be asked to select a target variable/column to train the model to predict. Advanced options give you more control over how the data is split between the training, validation, and test sets.

This split can be done by random assignment, manual assignment, and time series assignment based on selected columns. For this example, select median_house_value as the target and leave the advanced options at their default values.

Spruha More
Assistant Professor

Role of Statistics in Data Analytics field

Recently the analytics field is grown exponentially. Analytics is a process which helps to discover the informational patterns with data. The field of analytics is an amalgamation of statistics, computer programming and operations research. Analytics has shown growth in the arena of data analytics, predictive analytics and social analytics.

Data analytics is device used to support decision-making process. It converts raw data into meaningful information. Data analytics is applied in numerous organizations to allow companies and organization to take wise business decisions and in the sciences to prove or disprove existing models or theories. Data analytics focuses on inference, the process of deriving a conclusion based solely on the knowledge of researcher.

For Example: Predictive analytics:

Predictive analytics is the subdivision of data mining that is concerned with forecasting probabilities. Predictive analytics is the subdivision of data mining that is concerned with forecasting probabilities. The technique utilizes variables that can be measured to predict the future behaviour of a person or other entity. Multiple predictors are united into a predictive model. In predictive modelling, data is collected to create a statisticalmodel, basically, it is a tool that is used to forecast future events based on current and historical information.

A typical example of predictive analytics is Predictive modeling for financial services help optimize the overall business strategy, revenue generation, resource optimization, and generating sales. Automated financial services analytics can allow firms torun thousands of models simultaneously and deliver faster results than with traditional modeling.

It does this by analyzing strategic business investments, improve daily operations, increase productivity, and predicting changes to the current and future marketplace. The more common form of predictive analytics in financial services is the creditscoring system used to approve or deny loans, often within minutes.

In predictive modelling, data is collected to create a statistical model. Basically, itis a tool that is used to forecast future events based on current and historical information. Predictive models require data that describes what's known at the time a prediction needs to bemade, and the eventual outcome. Statistical techniques, such as linear regression and neural networks, are applied to recognise predictors and calculate the actual models.

Vaishali Deshmukh
Assistant Professor

ML and AI nGIS for Image Classification

Machine Learning is the ability of a computer learn from circumstances without explicitprogramming. It helps optimizing performance criterions using example data or past experience. Simply, ML extracts information out of raw noisy data, finding patterns that never existed.

The two categories of ML are supervised and unsupervised. Supervised Learning is tailoring data into a function that generates predictions. For example, plotting billions of sample points in a graph, could trace a line for approximation a function. Unsupervised Learning recognizes 'what the data is' using patterns from unlabelled data. For example, it takes billions of images and runs them through a training algorithm. After millions of linear algebra operations, it can take a new picture and segment it into clusters.

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Using these abilities, a transition into the field of Geographic Information System is being observed where classification, prediction, and segmentation is done with help of Artificial intelligence and Machine Learning.

Image Classification (Support Vector Machine)

Looking at a satellite image, it is very difficult to figure out if it is a tree or grass or roads or buildings. So, it is going to be very difficult for computer to figure it out.

Support Vector Machine (SVM) is a machine learning technique that takes classified data and looks at the extremes. Next, it draws a decision boundary line based on the data called a "hyperplane". And the data points that the "hyperplane" margin pushes up against are the "support vectors".

And "support vectors" are what's important because they are the data points that are closest tothe opposing classes. Because these points are the only ones considered, all other training points can be ignored in the model. Essentially, you feed SVM training samples of trees and grass. Based on this training data, it builds the model generating a decision boundary of its own.

Now, the results of this supervised classification aren't perfect, and algorithms still have a lot more learning to do. We still need to work on features like roads, wetlands, and buildings. As algorithms get more training data, they will eventually improve to classify anywhere.

Kanchan Taksale
Assistant Professor

Glucometers with No More Pain

In today's stressful life maintaining a healthy lifestyle is a big challenge as well as necessity. A disease like Diabetes has become one of the health concerns around the globe. Keeping the healthy blood glucose levels is important to keep a check and control of diabetes and requires regular monitoring of blood glucose. The conventional method used for glucose monitoring is painful as it involves finger pricking and testing the collected blood samples. This may also lead to infections if the needle used for pricking is not sterilized or if it is a used one. These factors may cause fear in the patients and hence resulting into reluctance in monitoring the blood glucose. However now technology is moving towards "Non-invasive" methods for monitoring the blood glucose levels.
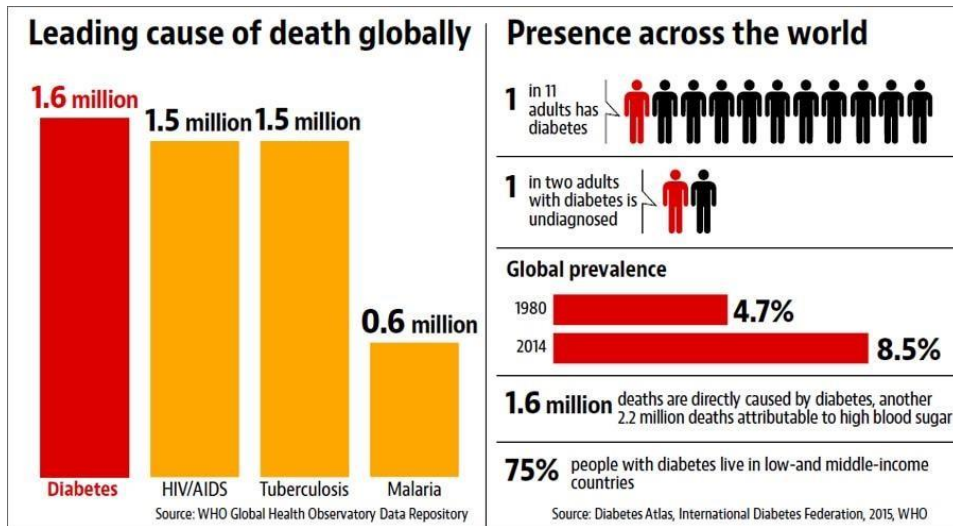

Fig.1 Diabetes Survey

As per the International Diabetes Federation, there are 463 million adults worldwide with diabetes. The total number of people with diabetes is predicted to rise by approximately 50% in next 20 years. As per the survey carried out by World Health Organization, diabetes is one of the leading causes of death across the world.
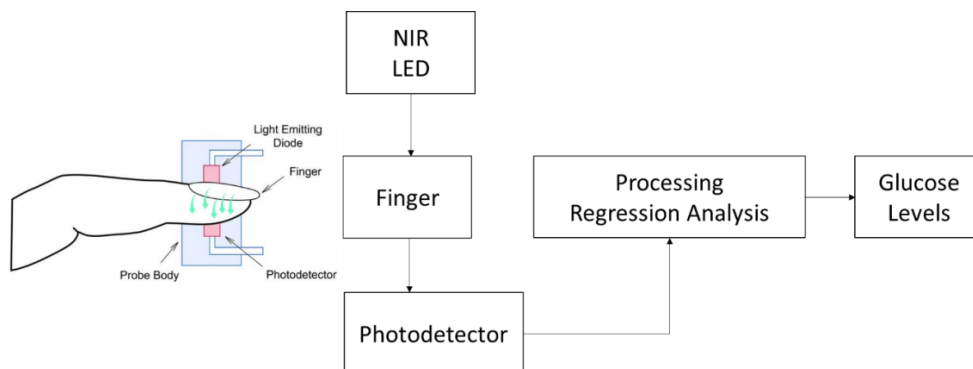

Fig.2 Near Infrared Absorption Spectroscopy for glucose monitoring

According to NIR Spectroscopy photodiode output voltage and the glucose concentration is

directly proportional to each other. So, by using Polynomial Regression prediction of the glucose concentration value by passing the voltage value to the equation is possible. Softwarelike Scilab can be used for the regression process. The initial voltage reading is derived by multi-meter.

To form a non-invasive glucose monitoring system, it is important to calibrate that system with the help of the conventional method of glucose monitoring. For that different known samples are taken into consideration. Voltage values from different known samples are compared with glucose level measured by conventional method of testing blood glucose. The method of regression is used in algorithm for calculating blood glucose level of unknown samples. In non-invasive methods to achieve the voltage value from samples different sensors are used and threshold values are calculated by regression and calibration methods.

A lot of research has been done over the years to develop non-invasive techniques for monitoring of glucose. This technique will be proved to be a boon for diabetic prone people with problems like hemophobia (fear of blood) or trypanophobia (fear of needles) to maintaina healthy lifestyle.

<div align="right">

Amraja K. Shivkar

Assistant Professor

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Flashforge Adventurer-3: A 3D printer

A 3D printer is a machine that creates physical objects from digital models by laying down successive layers of material. It works by reading a computer-aided design (CAD) file and using that information to control the movement of a print head or extruder, which deposits the material in the desired shape. 3D printing is used to create a wide range of products, from prototypes to finished goods, and is used in industries such as manufacturing, architecture, and healthcare.
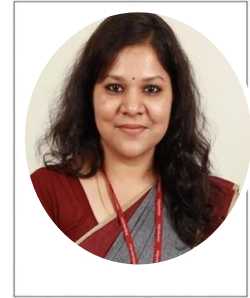
Adventurer3 is the best choice for family, school, workshop, and 3D printing beginners. The friendly interface design and easy-to-use powerful functions make 3D printing easy. Flashforge Adventurer 3 is a new generation of FDM 3D Printer, it is super smart and light. With a fully upgraded nozzle and removable heated print bed, one can enjoy free levelling and 45dB ultra quiet during operation.


Adventurer3 is a kind of productive tools for designers and engineers to realize creative designs. Following are the key features of it:

- Minimalist design
- Detachable nozzle
- Removable flexible platform
- 150*150*150 print volume
- Filament detector
- Touch-screen operation
- Cloud print
- 45 DB ultra-mute printing

3D printing is an additive manufacturing process that creates a physical object from a digital design. The process works by laying down thin layers of material in the form of liquid or powdered plastic, metal or cement, and then fusing the layers together. A 3D model is the virtual input that a 3D printer needs to print an object. You can get your very own 3D file by downloading it, 3D scanning an object, hiring a 3D designer,

or designing it with 3D modelling software. We can use free CAD (computer-aided design) software such as 3DTADA, AutoCAD, SolidWorks, Pro-E, and our own software Happy 3D, which is suitable for the beginners, to design your own 3D model.
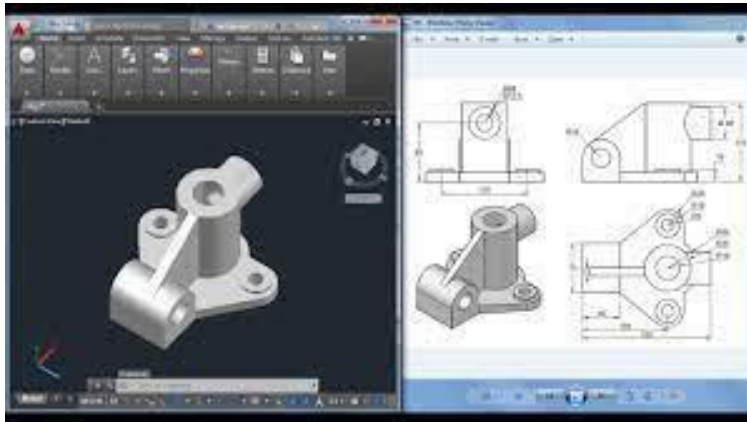
FlashPrint software 5.3.1 software FlashPrint provides a simple and easy to use user interfacefor preparing your 3D designs for printing on the Flashforge 3D printers.

Students can benefit from using a 3D printer in a variety of ways.
Some benefits include:

1. Hands-on learning: 3D printing allows students to physically hold and manipulate a model of an object they are studying, which can help them understand the subject matterbetter.
2. Creativity and problem-solving: 3D printing encourages students to think creatively and develop problem-solving skills as they design and create their own objects.
3. STEM education: 3D printing can be used to teach subjects such as engineering, mathematics, and computer-aided design (CAD).
4. Entrepreneurship: 3D printing can be used to create prototypes for inventions, allowing students to develop their entrepreneurial skills.
5. Cost-effective: 3D printing can be cost-effective and accessible for student projects, it eliminates the need for traditional manufacturing methods which can be expensive.
6. Real world application: 3D printing can be used in a variety of fields, such as medicine, aerospace, and architecture, giving students a chance to see the real-world applicationsof what they are learning.

Madhavi Amondkar

Assistant Professor

Metaverse: Trends in the Virtual Universe

The term "Metaverse" has significantly grabbed the attention in the tech world. Metaverse, also known as 'Virtual Universe' is a computer-generated technology, which facilitates usersto interact with each other around the globe. It is the combination of "Virtual Reality"(VR), "Augmented Reality"(AR), "Non-Fungible Tokens"(NFTs) and other evolving technologies which helps create a fully attractive, immersive and interactive experience.

As the technology advances and the metaverse becomes mainstream,there are several trends that we can expect to see in 2023. Here are some of the most exciting trends in the metaverse to look out for:

Rise in Integration with the Physical World:

While the metaverse is a virtual world, it is becoming extensively connected to the physical world. In 2023, we can expect to see morescenarios of this integration, such as virtual events being held in physical locations or VR experiences being linked to real-world locations.

Increased use of Avatars:

In the metaverse, "Avatars" are virtual representations of users. In 2023, we expect to see a significant increase in the use of avatars as they become more realistic and customisable. By the means of avatars, users can express themselves and interact with other user avatars inthe virtual universe. Avatars can also allow users to remain anonymous in the virtual universe.

The Rise of Virtual Influencers:

As there are social media influencers, we will also see the virtual influencers in Metaverse.Virtual influencers are the digital avatars with remarkable following on social media. In 2023, we can expect to see a rise in the recognition of virtual influencers as they become more realistic and sophisticated. Brands are already using virtual influencers to promote products or services, which is expected to continue in 2023.

The Growth of Virtual and Augmented Reality Gaming:

Gaming is already a significant component of the metaverse, and in 2023, we can expect tosee even more growth in the virtual reality gaming industry. VR gaming allows players to fully immerse themselves in the game, creating a more realistic and interactive experience.Metaverse platforms are also celebrating Indian culture and aims to provide a space for creators, investors, and gamers to explore the endless possibilities.

The Expansion of Virtual Reality Therapy:

Virtual reality therapy is a trend that is expected to continue in 2023 as VR technology becomes more advanced and affordable. VR therapy can treat various mental health conditions, such as anxiety, depression, and post-traumatic stress disorder (PTSD). VR therapy allows patients to confront their fears and triggers in a controlled and safe environment and can effectively treat mental health conditions. In 2023, we can expect to seethe expansion of VR therapy and its use in treating a broad range of mental health conditions.

The Development of Virtual Education and Training:

Virtual education and training are already being used in various industries, and in 2023, we can expect to see even more growth in this area. The metaverse allows for the creation of immersive and interactive learning environments that can be accessed from anywhere in the world. Virtual education and training provide a more flexible and cost-effective alternative totraditional education and training methods. It also allows the creation of customised learning experiences as per the needs of the learner.

Rohana Ranadive
Assistant Professor

Decision Intelligence

A new discipline for leadership in the AI era!!

Decision intelligence is a new academic discipline concerned with all aspects of selecting between options. It brings together the best of applied data science, social science, and managerial science into a unified field that helps people use data to improve their lives, their businesses, and the world around them. It's a vital science for the AI era, covering the skills needed to lead AI projects responsibly and design objectives, metrics, and safety-nets for automation at scale.

Decision intelligence is the discipline of turning information into better actions at any scale.

What's a decision?

Data are beautiful, but it's decisions that are important. It's through our decisions — our actions — that we affect the world around us.

We define the word "decision" to mean any selection between options by any entity, so the conversation is broader than MBA-style dilemmas (like whether to open a branch of your business in London).

It's through our decisions — our actions — that we affect the world around us.

In this terminology, appending a label such as cat versus not-cat to a user's photo is a decision executed by a computer system, while figuring out whether to launch that system is a decision taken thoughtfully by the human leader (I hope!) in charge of the project.

What's a decision-maker?

In our parlance, a "decision-maker" is not that stakeholder or investor who swoops in to veto the machinations of the project team, but rather the person who is responsible for decision architecture and context framing. In other words, a creator of meticulously-phrased objectives as opposed to their destroyer.

What's decision-making?

Decision-making is a word that is used differently by different disciplines, so it can refer to:

taking an action when there were alternative options (in this sense it's possible to talk about decision-making by a computer or a lizard).

performing the function of a (human) decision-maker, part of which is taking responsibility for decisions. Even though a computer system can execute a decision, it will not be called a decision-maker because it does not bear responsibility for its outputs — that responsibility rests squarely on the shoulders of the humans who created it.

Making a calculation versus making a decision

Not all outputs/suggestions are decisions. In decision analysis terminology, a decision is only made once an irrevocable allocation of resources takes place. As long as you can change your mind for free, no decision has been made yet.

Decision intelligence taxonomy

One way to approach learning about decision intelligence is to break it along traditional lines into its quantitative aspects (largely overlapping with applied data science) and qualitative aspects (developed primarily by researchers in the social and managerial sciences).

Qualitative side: The decision sciences

The disciplines making up the qualitative side have traditionally been referred to as the decision sciences — which I'd have loved for the whole thing to be called (alas we can't always have what we want).

Aasha Chavan

Assistant Professor

Unleashing the Potential of Chat GPT: Advancing Conversational AI to New Horizons

Introduction
Chat GPT is based on the GPT (Generative Pre-Trained Transformer) architecture developed by OpenAI. Over time, several versions of GPT have been released, each introducing improvements in model size, training data, performance, and capabilities. Examples include GPT-1, GPT-2, GPT-3, and GPT-3.5. These versions represent major milestones in the development of language models, but are not the only iterations. Chat GPT has emerged as a ground-breaking innovation in the realm of conversational AI, revolutionizing the way humans interact with machines. Powered by the state-of-the-art GPT-3.5 architecture, Chat GPT exhibits exceptional language understanding and generation capabilities. This article, delve deeper into the advancements and potential of Chat GPT, exploring its impact on various industries, its limitations, and the future directions of conversational AI.

Understanding the Power of Chat GPT

Chat GPT is built upon an immense corpus of diverse textual data, enabling it to comprehend and generate human-like responses in natural language. Its deep learning algorithms analyze context, semantic relationships, and syntactical structures to generate coherent and contextually relevant replies. This enables Chat GPT to engage in interactive conversations, provide information, and even exhibit a degree of creativity in its responses.

Enhancing Customer Experience

Chat GPT has transformed customer experience across industries. Its ability to understand complex queries and provide accurate information enables businesses to offer personalized and efficient support to customers. Through intelligent chatbots, Chat GPT assists users in finding relevant products, troubleshooting issues, and addressing inquiries, resulting in improved customer satisfaction, reduced response times, and increased operational efficiency.

Advancing Virtual Assistance

Virtual assistants powered by Chat GPT have become indispensable in our daily lives. By understanding and interpreting natural language input, Chat GPT assists users with tasks ranging from setting reminders and managing schedules to answering general knowledge questions. As Chat GPT continues to evolve, it will become increasingly proficient in understanding user intent, enabling more sophisticated and personalized interactions.

Enriching Content Creation

Chat GPT has also made significant strides in content creation. Writers and creators can leverage its capabilities to generate ideas, receive suggestions, and refine their work. From aiding in the creation of engaging articles and captivating storytelling to assisting in the development of marketing campaigns,

Chat GPT acts as a creative collaborator, enhancing productivity and pushing the boundaries of human creativity.

Overcoming Limitations

While Chat GPT exhibits impressive language abilities, it is not without limitations. One significant challenge is the model's susceptibility to producing biased or inaccurate responses due to biases present in the training data. Researchers and developers are actively addressing these concerns by refining the training process, ensuring inclusivity, and promoting ethical use. Continued efforts are necessary to enhance fairness, transparency, and accountability in the deployment of Chat GPT.

The Road Ahead for Conversational AI

The future of conversational AI holds immense promise. As Chat GPT evolves, integrating advancements such as better contextual understanding, multi-modal input/output, and emotional intelligence, it will offer more refined and personalized interactions. We can expect AI systems to understand user intent with higher accuracy, exhibit empathy, and adapt to individual preferences, leading to a more immersive and human-like conversational experience.

Ethical Considerations and Responsible Deployment

As we embrace the power of Chat GPT and conversational AI, it is essential to prioritize ethical considerations. Transparent and responsible deployment involves ensuring privacy, security, and user consent. It also requires mitigating biases, addressing concerns of misinformation, and providing users with the ability to understand and influence AI-generated content. Collaboration between researchers, developers, policymakers, and the public will be instrumental in establishing guidelines and frameworks that govern the responsible use of Chat GPT and conversational AI technologies.

Conclusion

Chat GPT has propelled conversational AI into new horizons, reshaping the way we interact with technology. Its ability to understand and generate human-like text has paved the way for enhanced customer experiences, enriched content creation, and virtual assistance. However, responsible deployment and continuous efforts to address limitations and ethical considerations are vital to ensure the ethical and unbiased use of Chat GPT. As we move forward, the advancement of Chat GPT and conversational AI holds great potential to redefine the boundaries of human-machine interactions and unlock a multitude of possibilities across industries and society as a whole.

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Dr Sarika Chouhan
Chief Academic Officer

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Best AI content writing tools

1) SEO.ai

If rankings are important to you, then SEO.ai is a must-have tool. This brand new tool uses world-leading artificial intelligence technologies to help you analyze semantic keywords, write search intent-focused articles and optimize your content for much faster and better search engine results. The big advantage is how SEO.ai integrate its simple Google Doc style editor with an advanced AI Writing assistant powered by semantic keywords analysis done by NLP. The platform supports more than 100 languages and benchmarks every text your write against the competition.

2) ChatGPT

ChatGPT is a powerful language generation model that can assist with a variety of writing tasks. This state-of-the-art AI technology uses machine learning algorithms to understand natural language input and generate human-like responses. With its advanced capabilities, ChatGPT can be used for tasks such as conversation generation, language translation, summarization, and more. Unlike SEO.ai, ChatGPT does not focus on SEO but rather on providing a general-purpose AI language model that can be fine-tuned for various NLP tasks. Additionally, ChatGPT supports a wide range of languages and has a large amount of text data to make its responses more natural and relevant.

3) QuillBot

QuillBot is an AI-powered writing tool that helps you write better and faster. It includes features such as grammar checking, style suggestions, and a thesaurus. The core feature of QuillBot is the paraphrasing tool that helps people rewrite and improve sentences, paragraphs, or articles.

4) Grammarly

Grammarly is one of the most popular AI writing tools on the market. It uses artificial intelligence to check your grammar, spelling, and punctuation for errors. It also makes suggestions for improving your writing style. At the moment it only works in English.

5) Jasper.ai

Jasper (formerly known as conversion.ai and Jarvis) is an AI writing tool that helps you write more efficiently by suggesting a variety of sentences. Jasper has templates for many copywriting tasks including Facebook Ads, Book writing, and blog posts. Jasper also includes a plagiarism checker ad-on from Copyscape to help you avoid accidentally copying someone else's work.

6) Rytr.me

Rytr.me is an AI writing helper that enables you to produce content in a matter of a few seconds at a fraction of the price. They have a free plan and more than a million users. If you're struggling with writer's block, this automated copywriting tool is a great little helper. Just select a use case (template), enter some context, and let the tool do the rest.

7) Copy.ai

Say goodbye to the blank page and experience the power of an NLP-based text machine that delivers the text in seconds. Copy.ai is great for Social Media and E-mail marketing and it's very easy to use.

8) Writer

Writer is an AI writing platform designed for enterprises. It enables teams to create original content that is consistent with their brand guidelines by being trained on the best-performing content. Writer can be used to automate content creation and editing, reducing the time and effort required to produce content. Writer is a B2B-trained model that supports multiple teams and is SOC 2 and HIPAA compliant. The platform is available on subscription.

9) GetGenie

GetGenie AI offers a simple WordPress plugin that replaces 10+ apps with its AI capabilities. It includes features such as SEO analysis, competitor analysis, and AI-assisted content writing. A free trial is available.

10) LongShot

LongShot AI is a tool that leverages artificial intelligence to create blogs and content. It offers a free trial and a subscription. The tool can generate content for various needs and ensures that the generated content is factually accurate. LongShot has integrations with popular tools such as WordPress, Semrush, Hubspot, Ghost, and Medium. You can also use the LongShot Chrome Extension to bring AI into your workflow anywhere on the internet.

Sanjeela Sagar
Assistant Professor

Microsoft Azure: An Overview

Microsoft Azure is a cloud computing platform that provides a wide range of services for building, deploying, and managing applications and services. With Azure, businesses and developers can leverage the power of the cloud to build and scale applications, store and analyze data, and run virtual machines and servers, all with the flexibility and agility of the cloud.

Azure provides a comprehensive set of cloud services, including computing, storage, networking, analytics, and artificial intelligence (AI). Some of the key features of Azure include:

1. Infrastructure as a Service (IaaS): With Azure, businesses can create and manage virtual machines (VMs) and infrastructure to support their applications and workloads.
2. Platform as a Service (PaaS): Azure offers a range of PaaS services, such as Azure App Service, Azure Functions, and Azure Container Instances, that enable developers to build, deploy, and manage their applications quickly and easily.
3. Software as a Service (SaaS): Azure also offers SaaS solutions, such as Office 365 and Dynamics 365, that provide businesses with a range of productivity tools and business applications.
4. Storage: Azure provides a variety of storage solutions, including Blob storage, Queue storage, and File storage, that enable businesses to store and manage their data in the cloud.
5. Networking: Azure offers a range of networking services, such as Virtual Network, Load Balancer, and VPN Gateway, that enable businesses to connect their on-premises infrastructure to the cloud.
6. Analytics: Azure provides a suite of analytics services, such as Azure Stream Analytics, Azure Data Lake Analytics, and Azure HDInsight, that enable businesses to process and analyze data in real time.
7. Artificial Intelligence: Azure provides a range of AI services, such as Azure Cognitive Services, Azure Machine Learning, and Azure Bot Service, that enable businesses to build intelligent applications and services.

One of the key advantages of Azure is its hybrid cloud capabilities, which enable businesses to run their applications and workloads on-premises, in the cloud, or in a hybrid environment. This enables businesses to leverage the benefits of the cloud while also maintaining control and security over their data and infrastructure.

In summary, Microsoft Azure is a powerful cloud computing platform that provides a wide range of services for building, deploying, and managing applications and services. With its comprehensive set of cloud services, hybrid cloud capabilities, and support for a wide range of programming languages and platforms, Azure is a popular choice for businesses and developers looking to leverage the power of the cloud.

Seema Vishwakarma

Assistant Professor

Editorial Team:
Mr. Makarand Deshpande
Ms. Aasha Chavan

VSIT | Vidyalankar School of Information Technology

Vidyalankar Educational Campus, Vidyalankar Marg, Wadala (East), Mumbai - 400 037 Maharashtra, India.
Telefax: +91 22 2416 1126 | Email: principal@vsit.edu.in