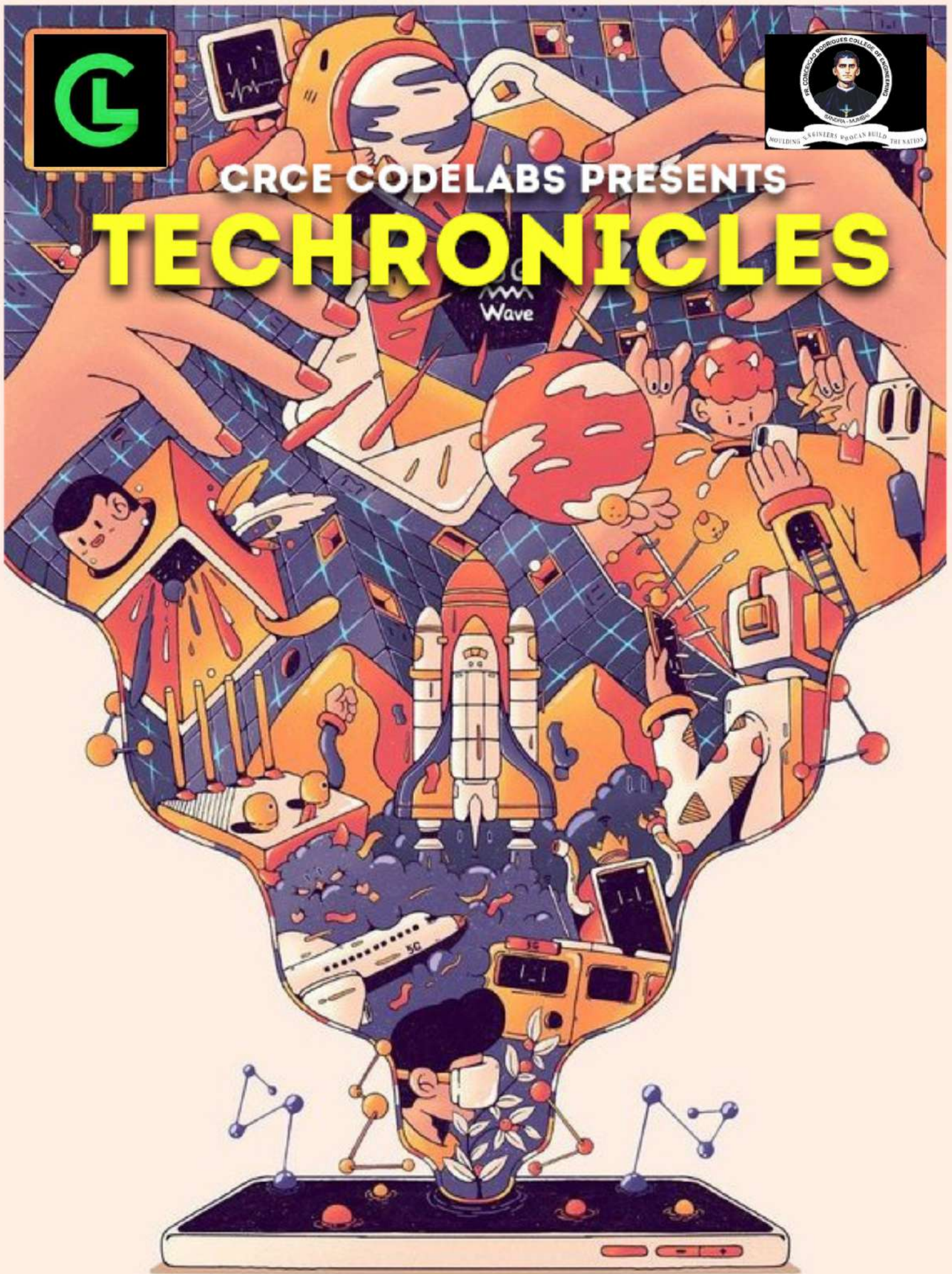


CRCE CODELABS PRESENTS

TECHRONICLES



A NEW DAWN

CANDIDA
NORONHA

BE Comps B

People's expectations, fears, and beliefs about science and technology vary and are frequently in conflict. AI is no exception; it has sparked the curiosity of individuals from all walks of life and is already having an impact on how we live our daily lives. The way people interact with one another and the world around them is changing as a result of artificial intelligence (AI) and intelligent systems. Every area of our lives is impacted by AI, including customer service, retail, education, healthcare, robotics, industrial automation, computer vision, natural language processing, and more. Businesses are rethinking their organizational structures and competitive strategies as they get ready for a new revolution that will be just as profound and fundamental as the industrial revolution of a century ago. There is disagreement among scholars as to when artificial general intelligence will be developed and what it will ultimately mean for society. Some people believe it'll be the greatest invention we've ever made. Others lament that it could lead to our doom.

The most significant subset of AI is machine learning, a field that experienced significant advancements in the second half of the 20th century, but then lay in waiting for computer processing power to keep up with the high demands made by machine-learning algorithms. The rise of Big Data was the key driver behind machine learning. Every aspect of our society is permeated by "mountains and lakes" of data, which is too much for one person or any group to be able to collect and analyse without the aid of machine learning and comparable tools.



Fig 1.1: AI-Da the world's first
Robot Artist

What will our society look like when AI is everywhere? The Future is already here - it's just not evenly distributed. Governments must proactively replace analog policies and laws with fair, equal, and impartial digital and AI-friendly alternatives in order to accelerate the benefits of AI and reduce risk. There are numerous challenges that need to be addressed:

1. A major driving force behind the Fourth Industrial Revolution is AI. In many industries, algorithms are already being used to boost productivity, optimise systems, and improve predictions.
2. Early findings indicate that AI can pose significant challenges. AI could result in job displacement, human bias and discrimination, replication or even exacerbation, as well as other unintended and harmful consequences.
3. AI regulation is a complex and challenging endeavor that requires knowledgeable supervision and useful frameworks.
4. It is necessary to develop a collaborative roadmap to reimagining an adaptable regulatory framework for AI that promotes innovation while reducing risks without being haphazard or disruptive.

We as a society must embrace the opportunities presented by these challenges if we are to develop confidence and momentum for success.

The COVID-19 pandemic has gripped the entire world, bringing a dramatic stop to businesses and severely affecting economies throughout the world. This crisis brings to light a fact about AI that has always been true: it is a tool, and the value of its application in any circumstance is determined by the people who create it and use it. In the end, human action and innovation will determine how far AI is leveraged — across all parts of society.



Fig. 1.2: The impact of AI in our life

HOW DOES AI ART GENERATION SOFTWARE WORK?

HOW DOES AI ART GENERATION SOFTWARE WORK?

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Let us discuss how these AI Models are made and what happens when the user types a prompt and clicks the button. First, let's see how all these models are built and what are the different components. Here we will be primarily studying the text-to-image AI Models

1. The Dataset

For building a good AI model you'll first need a good dataset. These datasets contain images from search engines and different blog posts. The "alt" tag of the image is used to describe the image and what is in it. Based on the requirements of the AI model the dataset can be created. A dataset can contain a Billion images of all kinds e.g. The ImageNet dataset contains 14 million images and 22000 categories and was used to train the MobileNet and VGG16 models. The Laion-5B dataset contains 5.85 Billion images with a size of 50TB and is used to train the stable diffusion model The second type of dataset is specific datasets with a particular target, a celebrated personality or a style to be achieved. e.g. The dataset of an Anime character or a Celebrity. This type of dataset is used to train the Dreambooth models.

2. Deep Learning Models

When Humans See images they can see colors, objects, and shapes. Using this they are able to interpret the context of a particular image. However, a computer can only see images as arrays of RGB values. It is really hard to find meaning to a multidimensional array of numbers. This is where deep learning comes to the rescue. The DL model is given both the image along with the description of the image. The deep learning model uses different layers to extract different features. .

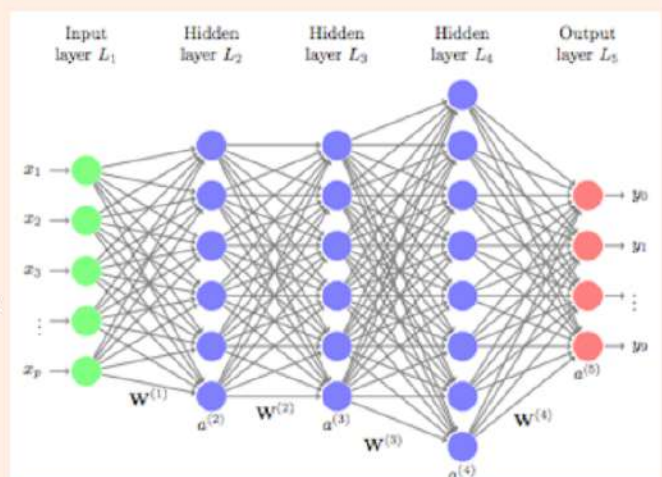


Fig 1.1: Representation of Neural Networks in Deep Learning models

HOW DOES AI ART GENERATION SOFTWARE WORK?

The deep learning models also relate certain words with certain corresponding features. The deep learning model returns a point in the Latent Space. This point corresponds to the features of the image.

3. The Latent Space

The deep learning model returns a point in the latent space. But what on earth is a latent space? Let's discuss it. Latent space is defined as "A mathematical space which maps what a neural network has learned from training images". If you didn't get it don't worry, I'll simplify it for you. The latent space is simply a representation of compressed data in which similar data points are close together in space. It helps us to understand patterns or structured similarities between data points by analyzing data in the latent space, be it through manifolds or clustering, etc. Latent space is useful for data features and for finding simple representations of data for analysis.

4. The Diffusion Layer

Diffusion Models are generative models, meaning that they are used to generate data similar to the data on which they are trained. After training, we can use the Diffusion Model to generate data by simply passing randomly sampled noise through the learned denoising process. A Diffusion Model is a latent variable model which maps to the latent space using a fixed Markov chain. This chain gradually adds noise to the data in order to obtain the approximate posterior. Ultimately, the image is asymptotically transformed to pure Gaussian noise. The goal of training a diffusion model is to learn the reverse process. By traversing backward along this chain, we can generate new data

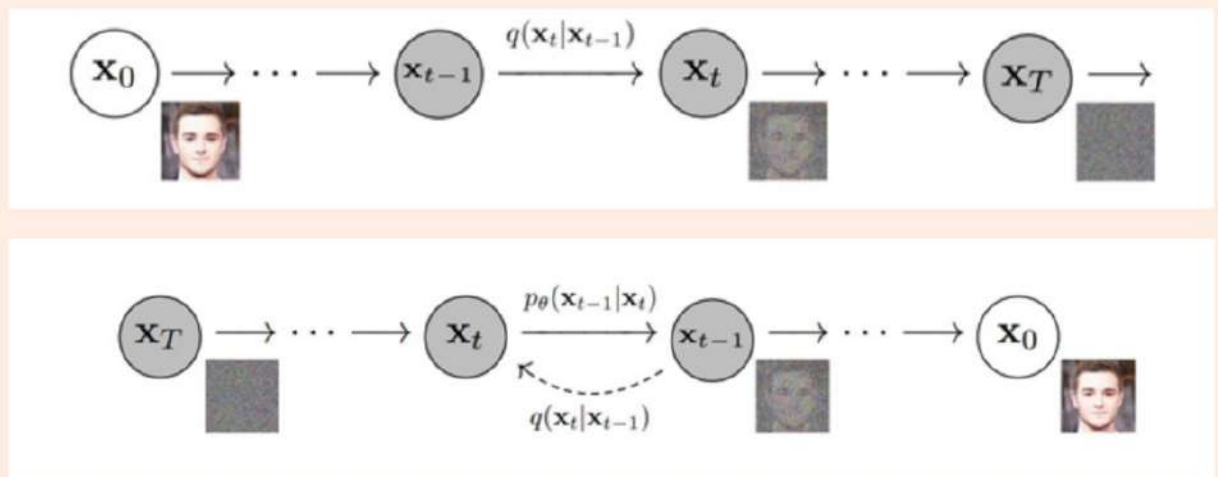


Fig. 1.2: Simplified working of Diffusion Models

HOW DOES AI ART GENERATION SOFTWARE WORK?

T5. The Final Output

After multiple iterations in the diffusion layer, the image is presented to the user. Based on the feedback of the user the models try to improve themselves. These are the 5 components in generating the AI model which can generate images.

6. Conclusion

That said, there are already some examples of AI-created art and literature. For instance, an AI system called GPT-3 was used to generate a short story that was published in an online magazine. And, AI has also been used to create paintings and other works of art. It is likely that AI will continue to have a significant impact on art and literature in the years to come. As AI technology advances, we will likely see more AI-created works of art and literature, and these works may become increasingly sophisticated



Fig. 1.3: "A beautiful complex and intricate blue and white glass sculpture with a dark background" Image generated by Midjourney

THE ROLE OF AI IN AGRICULTURE

LLOYD
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SE Comps B

By 2050, the world's population is predicted to reach close to 10 billion, increasing agricultural production—in a context of modest financial development—by almost 50% compared to 2013. Currently, 37.7% of the earth's surface is dedicated to growing crops. Thus agriculture has a significant role in the nation's economy and in creating jobs.

The use of artificial intelligence (AI) technologies in the agricultural sector is known as precision agriculture or AI in agriculture. The technology is employed for a variety of purposes, including field harvesting, health monitoring, weed and pest management, and the identification of nutritional deficits in the soil.

The amount and quality of the yield, as well as the health of the crop, are directly influenced by the micro- and macronutrients in the soil.

In order to maximize production efficiency when crops are planted in

the soil, it is also crucial to keep track of their developmental stages. To make changes for better crop health, it's essential to comprehend how crop development and the environment interact.

Now, historically, human observation and judgement were used to assess the health of the soil and the crops. However, this approach is neither precise nor timely. Instead, we can now acquire aerial picture data using drones (UAVs) and train computer vision models to use it for informed crop and soil status monitoring. These UAVs have inbuilt AI systems, that automatically detect and inform the farmers about the crops health, yield and also their maturity.

Results are produced by comparing input photographs to a database of ill plants via AI-powered image recognition software. In order to locate the issue, the machine learning system searches for the distinctive patterns of plant illnesses (such as spots and discolorations that resemble mosaics).

Farmers had the issue that precision weeding techniques outweighed the substantial number of crops lost throughout the weeding procedure. These autonomous machines not only increase productivity but also lessen the demand for pointless pesticides and herbicides. The only downside to AI in agriculture is that it is costly to get the robotics and software. However, in the long term, the benefits exceed the drawbacks and turn out to be beneficial for farmers as well.

In conclusion, Artificial Intelligence and Machine Learning will create an advanced agricultural revolution to meet the growing needs of food, clothing and shelter for millions of people which are going to be added in the near future!



Fig.: The role of drones in agriculture

THE FUTURE OF ART AND
LITERATURE IN THE AGE OF
ARTIFICIAL INTELLIGENCEBRENDON
LUCAS

BE Comps B

Reactions from the Art Community

Generative AI might have been dubbed Silicon Valley's "new craze," but beyond the Valley, hostility and skepticism are already ramping up. The topic of AI art generators has polarized the art community. The group supporting AI generation, mainly consisting of sculptors, programmers, content writers, and some digital artists, makes the following points:

1. **Sculptors:** Using AI, Sculptors can describe their imagination to the machine and it returns a sculpture design with aesthetic color combinations. Saving a great deal of time and effort for sculptors.
2. **Content Writers:** The use of AI has opened new opportunities for content writers and script writers as they can describe a scene and the AI can write the entire conversation for the writer. Also, writers use AI to generate new plot twists given the prior plot as the prompt.
3. **Digital Artists:** The "complete the picture" feature of AI generation is being used by various tech-savvy digital artists who can just draw the main character and describe the rest of the image to the AI who can fill up the non-important parts of the image.

The group opposing the AI generation, mainly consisting of digital artists, traditional painters, Anime & Manga Artists, and Stock Photographers, makes the following points:

1. **Digital Artists:** AI tools such as "Dall-E 2", "Stable Diffusion" and "MidJourney" has made it really easy for anyone to create images by describing the idea. This has made digital artists worried about the flooding of Digital images from AI generators and lending them jobless.
2. **Traditional Painters and Manga Artists:** Every popular painter has a specific style of painting. Describing this style or name of the Artist to the image will generate an image with the depiction of the artist's style. This has made painters concerned about their style being copied by AIs.
3. **Stock Photographers:** Dall-E 2 model can create stunning images of stock photos as it has been trained on 250M stock images. This has the potential for corporations to have an AI subscription and create new images on demand removing the need for Stock Image Sites.

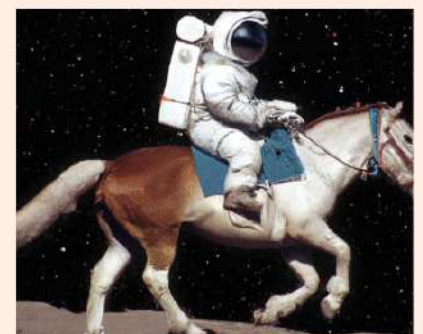


Fig 1.1: An AI generated image of an astronaut riding a horse.

THE FUTURE OF ART AND LITERATURE IN THE AGE OF ARTIFICIAL INTELLIGENCE

opportunities for Engineers in AI Generators

An AI model giving an expected output requires communicating all the required details to the AI in a specific manner. This is called Prompt Engineering. Like most processes, the quality of the inputs determines the quality of the outputs in prompt engineering. For Example, the prompt “A lion roaring, waterfall background, polygon image style higher resolution” results in the image below Developed by OpenAI, the CLIP (Contrastive Language-Image Pre-training) model is an example of a model that utilizes prompts to classify images and captions from over 400 million image-caption pairs. Designing effective prompts increases the likelihood that the model will return a response that is both favorable and contextual. There are many opportunities for engineers in AI art generators. One opportunity is to develop new algorithms that can generate art that is realistic and/or photo-realistic. Another opportunity is to develop new hardware that can be used to generate art. Yet another opportunity is to develop new software that can be used to generate art.



Fig. 1.2: An abstract AI generated image.

THE ROLE OF AI IN FINANCE

**AARON
FURTADO***SE Comps B*

Nowadays, machine learning in finance is regarded as a crucial component of a number of financial services and applications, such as asset management, risk assessment, credit scoring, and even loan approval. Machine learning is now being used in operations by a large number of top fintech and financial services organizations, which has improved workflow, decreased risk, and improved portfolio optimization. Machine learning and other aspects of artificial intelligence (AI) are used in the banking sector in a variety of ways. Machine learning is being used in finance in a variety of ways.

Algorithms are now used to improve trading decisions and are referred to as algorithmic trading. In order to identify any factors that can cause the price of an asset to rise or fall, traders typically construct statistical models that track business news and trading activity in real time. In contrast to human traders, algorithms are able to examine vast amounts of data while making thousands of deals each day. Fast trading decisions made by machine learning put human traders ahead of the market average. Additionally, algorithmic trading avoids the usual restriction of human traders whose judgment may be influenced by emotions or personal objectives by not basing trading judgments on emotions. Hedge fund managers and financial institutions use the trading approach primarily to automate trading activity.

Fraud is a significant issue for banking institutions and businesses that provide financial services, and it causes billions in damages annually. Finance businesses typically store a lot of their data online, which raises the possibility of a security breach. In the past, fraud detection systems were created based on a set of standards that could be easily bypassed by criminals. As a result, the majority of businesses nowadays use machine learning to detect and stop illegal financial activities. Machine learning identifies unusual actions or anomalies in huge data sets and flags them for further analysis by security experts. It determines whether a flagged transaction is similar to the account holder's behavior by comparing it to other data points, such as the customer's account history, IP address, location, etc. The system may then automatically reject a withdrawal or purchase until a person decides, depending on the nature of the transaction.



Fig.: Fraud Detection using AI and ML

TRANSFER LEARNING IN IMAGE PROCESSING AND COMPUTER VISION

VENESSA
D'MELLO

BE Comps A

Let's say you want to create a machine-learning model to classify different hand signs or predict the mood of an individual based on the image provided. What if you wanted to classify disasters based on their severity? In order to achieve such a model we would require huge processing power as well as a huge dataset. To fulfil both these requirements we would need considerable financial investment. Training a general CNN or a deep learning model for any task requires such investment. However, we can't always provide a dataset with many images or great processing power. This is where the concept of transfer learning comes into play.

Transfer Learning is an approach where a model developed for a task is used as a starting point for another task. For Example, let's consider a model which has already been trained to identify different animals, we can then use this model as a starting point to create a new model to identify various species of a particular animal. By using this approach we can solve the issue of huge computational power and dataset.

Many competitions encourage the creation of models on a standard dataset. We already have many image-processing models created for the Classification of Images into various categories. The ImageNet Large Scale Visual Recognition Challenge (ILSVRC) is one such competition that evaluates different algorithms for object detection and image classification at large scale. The ImageNet Dataset consists of over 1.4 million images and a data size of around 160GB. This dataset is used to classify 1000 object categories, such as keyboard, mouse, pencil, and many animals. Processing such a dataset would require significant computational capacity.



Fig.: Image processing using AI

TRANSFER LEARNING IN IMAGE PROCESSING AND COMPUTER VISION

There are two types of transfer learning approaches, i.e. Develop Model Approach, Pre-trained Model Approach. The Pre-trained Model Approach is the most commonly used approach. For a given task, we first select a pre-trained model. Using this model, we remove the classifier layer also known as the top layer (this layer classifies the images into various categories), and create our custom classifier layer. The custom classifier layer is used to classify images for specific tasks required. The images are then passed through both the pre-trained model without the classifier layer and then through our custom layer. This process of transfer learning helps us use the various weights and parameters of the different pre-trained models without requiring huge data or processing power. Some of the most commonly used models for transfer learning are the VGG16, ResNet50, and AlexNet Models. Training such deep models requires a considerable amount of time, but with the help of transfer learning, you can cut the time to less than a quarter of the original time.

This is an approach to try if you can identify a related task with abundant data and you have the resources to develop a model for that task and reuse it on your problem, or if there is a pre-trained model available that you can use as a starting point for your model. On some problems where you may not have very much data, transfer learning can enable you to develop skillful models that you simply could not develop in the absence of transfer learning. So the next time you want to get started on building a model to classify Cats vs Dogs or predict the mood based on an image, you can use the power of transfer learning and in a short period create a great model that can provide good accuracy in a time-efficient manner.

Fig. 1.4: The novel titled “The Day A Computer Writes A Novel” reached in the advanced stages of the Japanese literary prize

WHAT AI HAS DONE SO FAR IN THE ARTS AND LITERATURE

WHAT AI HAS DONE SO FAR IN THE FIELDS OF ARTS AND LITERATURE

BRENDON
LUCAS

BE Comps B

Humans have always sought to create artificial intelligence, but the reality is that we're just not that good at it. Until recently. Computers are getting exponentially better at tasks that humans once only dreamed of handling. In this article, we'll explore the use of AI in art and literature from a historical perspective and examine AI's achievements in both areas.

Introduction to AI

Artificial intelligence has been used in the arts and literature for many years now. It has been used to create new works of art and to help with the editing and proofreading of existing works. AI has also been used to create new characters and to help with the development of plots. There are many different applications for artificial intelligence in the arts and literature. Some of these applications are more important than others. For example, AI can be used to help with the development of new characters. This is because AI can help to create believable and interesting characters. AI can also help to create new plots. This is because AI can help to create believable and interesting plots.

AI can also help to improve the quality of existing works of art and literature. This is because AI can help to identify errors and to suggest improvements.

The First AI Artist

In 2015, a computer program called AI-Da was created by a team of artists and programmers. AI-Da is an artificial intelligence system that can create drawings and paintings.

AI-Da has been exhibited at various art galleries and museums, and her work has been sold at auction. In 2018, AI-Da made history when she became the first AI artist to be nominated for the prestigious Turner Prize, one of the most prestigious awards in the art world.

AI-Da's work is often compared to that of human artists. However, there are some key differences between her work and that of humans.



Fig 1.1: AI-Da the world's first
Robot Artist

WHAT AI HAS DONE SO FAR IN THE ARTS AND LITERATURE

For example, AI-Da's drawings are usually produced by algorithms rather than by hand. This means that they often have a more machine-like quality to them.

Despite this, AI-Da's work has been praised for its creativity and originality. Some critics have even suggested that her work could one day rival that of human artists.

The First AI Writer

When it comes to AI and the arts, one of the most exciting things to watch is how AI is transforming the field of writing. In 2017, an AI system called GPT-2 was released that offers writers a new way to create content.

GPT-2 is a machine learning system that can generate text from scratch. All you need to do is provide it with a prompt, and it will generate a response. This makes it perfect for writers who want to experiment with new ideas or get help with their writing.

One of the first writers to use GPT-2 was Botnik Studios co-founder Jamie Brew. He used the system to create a piece of fiction called "The First AI Writer." The story is about a writer who uses GPT-2 to write a novel.

Brew says that he was surprised by how well the system worked. "I didn't expect it to be as good as it was," he says. "It's really hard to tell that it's not written by a human."

Since then, other writers have also been using GPT-2 to write stories, poems, and even plays. It's exciting to see what AI will do next in the world of writing!

AI Achievements in Arts And Literature

AI has been used to create works of art and literature. Some notable examples include:

Ai Weiwei's "Circle of Animals/Zodiac Heads": In this work, Ai Weiwei used AI to create a sculpture based on the Chinese zodiac.

Jonathan Safran Foer's "Tree of Codes": In this novel, Jonathan Safran Foer used AI to generate a new work of fiction by taking existing texts and rearranging them.

Toby Walsh's "The Turing Test in Literature": In this paper, Toby Walsh used AI to evaluate whether a computer could pass the Turing test by creating a piece of literature that was indistinguishable from the human-written text.

Conclusion

Art and literature are two of the most commonly cited examples of how AI is impacting the world. As AI technology becomes more advanced, it is increasingly being used to create or enhance works of art and literature.

It is likely that AI will continue to have a significant impact on art and literature in the years to come. As AI technology advances, we will likely see more AI-created works of art and literature, and these works may become increasingly sophisticated.



Fig. 1.2: The novel titled "The Day A Computer Writes A Novel" reached in the advanced stages of the Japanese literary prize



CODELABS CRCE

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Our Council helps students get better at programming through organizing coding contests and hackathons. It is majorly aimed at promoting the interdisciplinary nature of coding amongst students, irrespective of their field. We organize various events for the same on intra and inter college level as well as national level

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