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The Great AI Experiment

CODELABS 2024-25
Presents

Scarcity in Abundance

New Dawn

ARTICLE 1 BY JESS DABRE · TE COMPS B

Human perspectives on science and technology shift constantly and AI is no different. It has ignited curiosity across society and is already reshaping the rhythms of everyday life. The way individuals connect with each other and engage with the world is being fundamentally altered by artificial intelligence and intelligent systems. AI now permeates virtually every domain from customer support and retail to education, healthcare, robotics, industrial automation, computer vision, and natural language processing. Organizations are fundamentally rethinking their frameworks and competitive approaches as they prepare for a revolution that promises to be as transformative as the industrial age one hundred years ago. Experts remain divided on when artificial general intelligence will emerge and what its arrival will mean for civilization. Some hail it as humanity's greatest achievement in the making. Others warn it could spell our undoing.

Machine learning stands as AI's most consequential branch and a discipline that saw remarkable breakthroughs in the latter half of the twentieth century, only to await the computing hardware capable of satisfying its demands. The explosion of Big Data served as the key catalyst for machine learning's rise. Our entire society generates staggering volumes of information far beyond what any individual or team could gather or interpret without machine learning and comparable tools.

1. The Fourth Industrial Revolution

AI is a principal catalyst behind the Fourth Industrial Revolution. Across countless industries, algorithms are already deployed to amplify productivity, refine systems, and sharpen predictive accuracy.

2. Significant Risks

Early evidence reveals significant risks. AI carries the potential for workforce displacement, the replication or amplification of human bias and discrimination, and various other unintended consequences.

3. Regulatory Complexity

Regulating AI presents extraordinary complexity, demanding well-informed oversight and robust governance frameworks.

4. Coordinated Strategy

A coordinated strategy is needed to reimagine a flexible regulatory environment for AI and one that fosters innovation while curbing risks, without being erratic or disruptive.

What will civilization look like once AI is omnipresent? The future has already begun and it simply has not reached everyone equally yet. Governments must proactively transform outdated analog policies and regulations into fair, equitable, and technology-friendly frameworks in order to harness AI's benefits while managing its risks.

The COVID-19 pandemic gripped the entire world, bringing commerce to an abrupt standstill and devastating economies across the globe. This crisis illuminated something about AI that has always been true: it is ultimately a tool, and its value in any given context is shaped entirely by the humans who build and deploy it. In the end, human ingenuity and decisive action will determine how broadly AI is leveraged and touching every corner of society.

- As a society, embracing the opportunities embedded in these challenges is essential if we are to cultivate confidence and build genuine momentum toward a better future.

What AI Has Done So Far in the Fields of Arts and Literature

ARTICLE 2 BY MRUGANK WORLIKAR · TE COMPS A

Humanity has long aspired to build artificial intelligence, yet only recently have those ambitions begun to materialize in meaningful ways. Computers are growing exponentially more capable of tasks once reserved purely for human imagination. This piece traces AI's application in art and literature through a historical lens, examining its accomplishments in both realms.

Artificial intelligence has been woven into the arts and literature for decades. It has been employed to produce original creative works and to assist in refining and editing existing pieces. AI has also contributed to crafting fictional characters and shaping narrative arcs. Its applications span character development, plot construction, and quality enhancement of existing creative output 4 helping identify inconsistencies and propose meaningful improvements.



The First AI Artist

In 2015, a groundbreaking computer program named AI-Da was developed by a collaborative team of artists and engineers. AI-Da is an artificial intelligence system capable of producing drawings and paintings. Her work has been exhibited at galleries and museums worldwide, with pieces selling at auction. In 2018, AI-Da made history as the first AI artist nominated for the prestigious Turner Prize 4 one of the art world's most celebrated honors. While AI-Da's creations are often compared to human artwork, key distinctions remain: her pieces are typically generated through algorithms rather than by hand, often carrying a distinctive machine-like character. Despite this, critics have praised her work for its originality, with some suggesting it may one day rival human artistic expression.

The First AI Writer

Among the most compelling intersections of AI and creative expression is the transformation of writing. In 2017, a system called GPT-2 was released, offering writers an entirely new mode of content creation. GPT-2 is a machine learning model capable of generating coherent text from a simple starting prompt 4 making it ideal for authors seeking to explore fresh directions or overcome creative blocks. One of the earliest writers to harness GPT-2 was Botnik Studios co-founder Jamie Brew, who used it to craft a piece of fiction. Brew expressed genuine surprise at the system's quality, noting how difficult it was to distinguish machine-generated prose from human writing. Since then, GPT-2 has been applied to stories, poetry, and even theatrical scripts.

AI Achievements in Arts and Literature

Ai Weiwei's "Circle of Animals/Zodiac Heads"

Weiwei collaborated with AI to create a sculpture series inspired by the Chinese zodiac.

Jonathan Safran Foer's "Tree of Codes"

Foer deployed AI to synthesize a new fictional narrative by rearranging and repurposing existing literary texts.

Toby Walsh's "The Turing Test in Literature"

Walsh used AI to assess whether a computer could satisfy the Turing test by generating literature indistinguishable from human authorship.

Art and literature rank among the most frequently cited examples of AI's growing impact on human culture. As AI capabilities accelerate, it is increasingly being used to generate or augment creative works across both domains. Its influence will only deepen in the years ahead 4 yielding works that may grow increasingly nuanced, original, and indistinguishable from their human-created counterparts.

The Role of AI in Finance

ARTICLE BY AARON FURTADO · BE COMPS B

Today, machine learning in finance is recognized as a critical component of numerous financial services including asset management, risk evaluation, credit scoring, and loan approval processes. A growing number of leading fintech and financial organizations are integrating machine learning into their operations, yielding improvements in workflow efficiency, risk reduction, and portfolio optimization.



Algorithmic Trading

Algorithmic trading now uses AI to enhance investment decisions. Traders construct statistical models that monitor real-time market activity and business news to identify factors influencing asset prices. Unlike human traders, algorithms can analyze enormous datasets while executing thousands of transactions daily. These rapid, data-driven decisions give AI-powered systems an edge over the market average. Crucially, algorithmic trading eliminates the emotional and personal biases that often cloud human judgment a primary reason hedge fund managers and financial institutions use it to automate trading activity at scale.

Financial Fraud Detection

Financial fraud represents a multi-billion-dollar threat to banks and financial service firms annually. Since most financial data now lives online, the risk of security breaches has grown dramatically. Traditional fraud detection relied on fixed rule sets that sophisticated criminals could easily circumvent. Today, machine learning identifies anomalies and unusual behavior patterns within vast datasets and flags them for expert review. These systems compare flagged transactions against broader behavioral data account history, geographic location, and IP address to determine legitimacy. Depending on the outcome, they may automatically block the transaction pending human review.



Portfolio Optimization

AI analyzes market patterns and historical data to construct and rebalance investment portfolios with minimal human intervention.



Risk Evaluation

Machine learning models assess creditworthiness and predict default probabilities far more accurately than traditional scoring methods.



Real-Time Processing

AI systems process millions of financial transactions per second, detecting fraud and executing trades at unprecedented speeds.

Transfer Learning in Image Processing and Computer Vision

ARTICLE 4

BY BLAISE RODRIGUES · SE COMPS B

Imagine trying to build a machine learning model to recognize hand gestures, infer a person's emotional state from a photograph, or categorize disasters by severity. Such tasks demand both enormous computational resources and massive datasets. However, when large datasets or processing power aren't available, transfer learning offers a powerful alternative.



Transfer learning is a methodology in which a model previously developed for one task serves as the foundation for a different task. Consider a model already trained to distinguish between different animal species & that same model can be repurposed to identify specific breeds within a single species. This approach elegantly sidesteps the dual requirements of massive data and raw computing power.

ImageNet and Competitive Benchmarks

Many competitive benchmarks encourage model development on shared standard datasets. The ImageNet Large Scale Visual Recognition Challenge (ILSVRC) evaluates algorithms for object detection and image classification at significant scale. The ImageNet dataset encompasses more than **1.4 million images** across **1,000 object categories**, weighing in at roughly **160GB**.

Two Primary Approaches

Transfer learning encompasses two primary approaches: the **Develop Model Approach** and the **Pre-trained Model Approach** & the latter being by far the most widely adopted. Its final classifier layer is removed and replaced with a custom classification layer tailored to the new task. Popular pre-trained models include VGG16, ResNet50, and AlexNet. While training these from scratch can take weeks, transfer learning can reduce that time to a fraction of the original.

VGG16

16-layer architecture, widely used for general image classification tasks with strong accuracy.

ResNet50

50-layer residual network that solves the vanishing gradient problem for very deep architectures.

AlexNet

Pioneer of modern deep learning, winner of ILSVRC 2012, foundational for transfer learning.

In situations involving limited data, transfer learning enables the construction of capable models that would simply be unachievable otherwise. The next time you set out to build a model & whether classifying cats versus dogs or predicting mood from imagery & transfer learning offers a path to strong accuracy in far less time.

How Does AI Art Generation Software Work?

ARTICLE 5 BY MRUGANK WORLIKAR · TE COMPS A

Let's explore how AI art generation models are constructed and what happens the moment a user enters a prompt. We'll focus primarily on text-to-image AI systems and their five essential components.

01 The Dataset

Every strong AI model begins with a strong dataset. General models may contain billions of diverse images 4 the ImageNet dataset holds 14 million images across 22,000 categories, used to train models like MobileNet and VGG16. The Laion-5B dataset houses 5.85 billion images totaling 50TB, serving as the training ground for stable diffusion models. Specialized datasets target a specific subject or aesthetic 4 an anime character or a celebrity 4 used to train Dreambooth-style models.

02 Deep Learning Models

When humans perceive an image, they intuitively recognize colors, shapes, and objects. Computers interpret images solely as multidimensional arrays of RGB values. Deep learning bridges this gap. Through stacked layers, the model extracts progressively abstract features, learning to associate specific visual attributes with descriptive language 4 ultimately producing a coordinate in the Latent Space.

03 The Latent Space

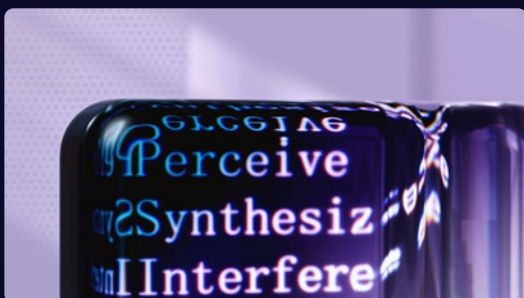
The latent space is a compressed mathematical representation of everything a neural network has learned. Similar images or concepts are positioned close together within this space, while dissimilar ones are further apart. By studying patterns and structural relationships here, researchers can uncover meaningful data representations and facilitate effective generation.

04 The Diffusion Layer

Diffusion models are generative in nature 4 designed to produce new data resembling their training input. A diffusion model progressively injects noise into image data until it converges to pure Gaussian noise. Training the model involves learning to reverse this process 4 reconstructing coherent images from noise by traversing the chain backward.

05 The Final Output

After multiple passes through the diffusion layer, a coherent image is delivered to the user. User feedback continuously improve.



Examples of AI-generated art and literature are already proliferating. As the technology matures, AI-created works will grow more sophisticated and plentiful 4 reshaping how we define creativity itself.

The Future of Art and Literature in the Age of Artificial Intelligence

ARTICLE 6 BY MRUGANK WORLIKAR · TE COMPS A

Generative AI may have earned the label of Silicon Valley's latest fascination, but outside the tech bubble, skepticism and resistance are mounting. The emergence of AI art generation tools has deeply polarized the creative community.



Those Supporting AI Generation

Sculptors: AI enables sculptors to translate mental imagery into concrete design concepts with complementary color schemes 4 saving significant time and creative energy.

Content Writers: AI has opened fresh avenues for writers, enabling them to describe a scene and receive full dialogue suggestions, or generate novel plot directions from a provided story outline.

Digital Artists: AI's outpainting capabilities allow digital artists to sketch their primary subjects and let the AI complete the peripheral visual elements.

Those Opposing AI Generation

Digital Artists: Tools like DALL-E 2, Stable Diffusion, and Midjourney have dramatically lowered the barrier to creating professional-quality imagery 4 making artists fear losing their market value entirely.

Traditional Painters and Manga Artists: Every accomplished artist develops a distinctive visual signature. Inputting an artist's name into an AI model can yield convincing imitations 4 raising urgent concerns about creative theft.

Stock Photographers: The DALL-E 2 model, trained on hundreds of millions of stock images, can synthesize photorealistic compositions on demand 4 posing a direct commercial threat to the photography industry.

Opportunities for Engineers in AI Generation

Obtaining high-quality output from an AI model requires structured, detailed communication with the system 4 a practice known as **prompt engineering**. The precision of a prompt directly determines the quality of the result. The CLIP model by OpenAI classifies images and captions drawn from over **400 million pairs**. For engineers, the AI art space offers rich opportunities: developing next-generation generative algorithms, designing specialized hardware for rendering at scale, and building tools that make AI creativity more accessible for all.

Did You Know?

AI FACTS
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Here are five surprising facts about artificial intelligence that reveal just how deeply AI has already woven itself into the fabric of modern life 4 from entertainment and language to economics and competition.



Born in 1956

The term "Artificial Intelligence" was coined in 1956 by John McCarthy at the Dartmouth Conference 4 launching an entire field of scientific inquiry that would reshape civilization.



Netflix Saves \$1B/Year

Netflix saves over \$1 billion per year using AI-powered recommendation algorithms that keep viewers engaged and reduce subscriber churn dramatically.



100 Billion Words Daily

Google Translate uses AI to handle over 100 billion words of translation every single day, breaking down language barriers at unprecedented scale.



Libratus Wins at Poker

An AI named Libratus defeated world champion poker players in 2017 4 mastering a game of incomplete information and human bluffing through pure computation.



\$15.7 Trillion by 2030

By 2030, AI could contribute \$15.7 trillion to the global economy 4 more than the current combined output of China and India.



The pace of AI advancement is accelerating. What seems impossible today may be routine tomorrow. Stay curious, stay informed, and stay ahead of the curve. 4 **TECHRONICLES Editorial Team**

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CRCE CODELABS

Our student council empowers learners to sharpen their programming skills through competitive coding events, hackathons, and collaborative challenges. We are dedicated to fostering an interdisciplinary approach to programming & welcoming students from all academic backgrounds. We host events at the intra-college, inter-college, and national levels, providing a platform for innovation and technical growth.

Competitive Coding

Participate in intra-college, inter-college, and national-level coding competitions designed to sharpen algorithmic thinking and problem-solving under pressure.

Hackathons

Join intensive collaborative events where teams build real-world projects, experiment with cutting-edge technologies, and showcase their skills to industry mentors.

Interdisciplinary Community

We welcome students from all academic backgrounds & fostering a diverse, inclusive environment where cross-disciplinary ideas spark the most innovative solutions.

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"The question of whether a computer can think is no more interesting than the question of whether a submarine can swim." - Edsger W. Dijkstra

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