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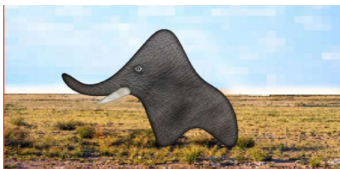
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DATA SCIENCE



Let's talk about the elephant in the data

"You would not be surprised to see an elephant in the savanna or a plate in your kitchen. Based on your prior experiences and knowledge, you know that is where elephants and plates are often to be found. If you saw a mysterious object in your kitchen, how would you figure out what it was? You would rely on your expectations or prior knowledge. Should a computer approach the problem in the same way? The answer may surprise you. Cold Spring Harbor Laboratory Professor Partha Mitra described how he views problems like these in a "Perspective" in Nature Machine Intelligence. He hopes his insights will help researchers teach computers how to analyze complex systems more effectively."

Source: Cold Spring Harbor Laboratory

New system cleans messy data tables automatically

"MIT researchers have created a new system that automatically cleans "dirty data" — the typos, duplicates, missing values, misspellings, and inconsistencies dreaded by data analysts, data engineers, and data scientists. The system, called PClean, is the latest in a series of domain-specific

DATA SCIENCE



Data science: a game changer for science and innovation

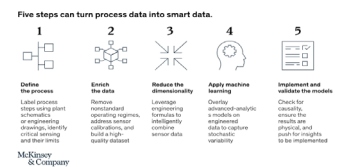
"This paper shows data science's potential for disruptive innovation in science, industry, policy, and people's lives. We present how data science impacts science and society at large in the coming years, including ethical problems in managing human behavior data and considering the quantitative expectations of data science economic impact. We introduce concepts such as open science and e-infrastructure as useful tools for supporting ethical data science and training new generations of data scientists."

Source: Springer Link

Data Science for Business Analytics and Business Intelligence

"Data science as the interdisciplinary collection of methods and techniques to support businesses is becoming more and more popular. This article begins with definitions and shows how systematically competitive advantages can be built up on the basis of digital data. Essential sources and types of data-driven knowledge are introduced. Then a classification of approaches of data science concepts is explained. A distinction is made between Business Analytics

DATA SCIENCE



Adopting a smart data mindset in a world of big data

"Creating smart data

A common failure mode for companies looking to leverage AI is poor integration of operational expertise into the data-science process. Indeed, we advocate applying machine learning only after process data have been analyzed, enriched, and transformed with expert-driven data engineering."

Source: McKinsey & Company

Digitalization and Data Analytics are Driving Asia-Pacific Cross-border and Remittance Service Market Growth

"2020 was marked by pervasive disruption, caused by the COVID-19 pandemic, which created growth opportunities for cross-border and remittance service providers. The market witnessed a rise in digital adoption rates (15% YoY growth rate in 2020). Rapidly advancing technologies, evolving customer expectations, and a changing regulatory landscape are driving the automation of cross-border and remittance services. Financial technology innovation—from mobile remittance and mobile payment to cryptocurrency—have captured the attention of customers, regulatory

probabilistic programming languages written by researchers at the Probabilistic Computing Project that aim to simplify and automate the development of AI applications (others include one for 3D perception via inverse graphics and another for modeling time series and databases)."

Source: Massachusetts Institute of Technology

Big Data & Higher Education: How Are They Connected?

"Over the past few years, big data has become a significant part of our lives. Its influence is continually rising. Big data plays a role in nearly everything we do, from our navigation systems, to our Netflix recommendations, to our healthcare systems. At this point, you could probably pick any aspect of your life and find a way that big data has influenced it.

For example, think about higher education. Big data is playing a much bigger role in our choices of colleges and our experiences while there than we probably even realize. Universities are using big data in all sorts of interesting ways that benefit both their profit margins and the students attending the school."

Source: Inside Big Data

Data Science is Changing the World for the Better: Here's How

"Data and analytics are used everyday to help businesses drive efficiencies, glean deeper operational insights and ultimately generate more revenue. However, the impact of data science reaches far beyond the business sector and is helping to solve some of mankind's most pressing issues.

From preventing blindness and treating drug and alcohol addiction to fighting poverty, data science is being utilized not only as a business tool – but for the greater good of society."

Source: Inside Big Data

How Can Big Data and AI help to Tackle Fake News and Mis(Dis)information

"Fake news and disinformation have become a global threat for information integrity and are driving distrust towards individuals, communities and governments worldwide. We are overwhelmed with disinformation on a daily basis through news reports, images, videos, and memes.

Twisting facts to further an agenda is not a new problem. However, the explosive growth of social media, combined with the emerging power of artificial intelligence to generate

and Business Intelligence as different levels of analytical skills. The paper goes into depth with these concepts and presents concrete techniques, algorithms, and application scenarios. Thus, the contribution introduces State of the Art approaches to analysis, control, monitoring but also to advanced approaches such as prediction, simulation, and optimization."

Source: IGI Global

Data science meets standardized game learning analytics

"Data science applications in education are quickly proliferating, partially due to the use of LMSs and MOOCs. However, the application of data science techniques in the validation and deployment of serious games is still scarce. Among other reasons, obtaining and communicating useful information from the varied interaction data captured from serious games requires specific data analysis and visualization techniques that are out of reach of most non-experts. To mitigate this lack of application of data science techniques in the field of serious games, we present T-Mon, a monitor of traces for the xAPI-SG standard. T-Mon offers a default set of analysis and visualizations for serious game interaction data that follows this standard, with no other configuration required. The information reported by T-Mon provides an overview of the game interaction data collected, bringing analysis and visualizations closer to non-experts and simplifying the application of serious games."

Source: Research Gate

Enhancing the friendliness of data analytics tasks: an automated methodology

"This paper presents ADESCA (Automated Data Exploration with Storytelling CAPability), a new methodology to automatically extract models and structures from the data, with the aim of democratizing data science. Particular importance was placed on the creation of an innovative storyboard for automated data analytics, allowing creation and visualization of data stories. In addition, ADESCA also offers a guided and more traditional step-by-step exploration, where the algorithm parameters are configured automatically and the results are graphically shown through different plots in order to be as understandable and user-friendly as possible. Preliminary experimental results are promising and demonstrated the

bodies, and market participants. From a service provider perspective, these rapid changes can threaten the traditional structure of the financial space; however, they can also open up opportunities for business growth."

Source: Frost & Sullivan

ARTIFICIAL INTELLIGENCE



Winning with AI is a state of mind

"More and more organizations are adopting these basic practices, and those that do tend to report the highest bottom-line impact from AI. But successful organizations don't just behave differently; our experience in thousands of client engagements around analytics and AI over the past five years shows that they also think differently about AI. At these companies, AI is etched in the collective mindset ("We are AI enabled"), rather than simply applied opportunistically ("Here's a use case where AI can add value").

Having this mindset means deeply internalizing the long-term competitive benefits of augmenting human decision making, processing data from many sources at a massive scale and enormous speed, and continuously adapting business models and operational strategies based on signals from the data."

Source: McKinsey & Company

15 Graphs You Need to See to Understand AI in 2021

"If you haven't had time to read the AI Index Report for 2021, which clocks in at 222 pages, don't worry—we've got you covered. The massive document, produced by the Stanford Institute for Human-Centered Artificial Intelligence, is packed full of data and graphs, and we've plucked out 15 that provide a snapshot of the current state of AI.

Deeply interested readers can dive into the report to learn more; it contains chapters on R&D, technical performance, the economy, AI education, ethical challenges of AI applications, diversity in AI, and AI policy and national strategies."

Source: IEEE Spectrum

How to be responsible in AI publication

"AI research has leapfrogged into a similar situation of ethical complexity. AI algorithms and data are frequently shown to harbour biases and amplify society's injustices, and tools have become available that can have

content, has added new dimensions to the problem and greatly magnified it, resulting in the current "fake news" epidemic and information crisis."

Source: Inside Big Data

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Researchers Fine-Tune Control Over AI Image Generation

"Researchers from North Carolina State University have developed a new state-of-the-art method for controlling how artificial intelligence (AI) systems create images. The work has applications for fields from autonomous robotics to AI training. At issue is a type of AI task called conditional image generation, in which AI systems create images that meet a specific set of conditions."

Source: NC State University

Closer hardware systems bring the future of artificial intelligence into view

"Machine learning is the process by which computers adapt their responses without human intervention. This form of artificial intelligence (AI) is now common in everyday tools such as virtual assistants and is being developed for use in areas from medicine to agriculture. A challenge posed by the rapid expansion of machine learning is the high energy demand of the complex computing processes. Researchers from The University of Tokyo have reported the first integration of a mobility-enhanced field-effect transistor (FET) and a ferroelectric capacitor (FE-CAP) to bring the memory system into the proximity of a microprocessor and improve the efficiency of the data-intensive computing system. Their findings were presented at the 2021 Symposium on VLSI Technology."

Source: University of Tokyo

How AI Could Alert Firefighters of Imminent Danger

"Firefighting is a race against time. Exactly how much time? For firefighters, that part is often unclear. Building fires can turn from bad to deadly in an instant, and the warning signs are frequently difficult to discern amid the mayhem of an inferno. Seeking to remove this major blind spot, researchers at the National Institute of Standards and Technology (NIST) have developed P-Flash, or the Prediction Model for Flashover. The artificial-intelligence-powered tool was designed to predict and warn of a deadly phenomenon in burning

effectiveness and efficiency of the proposed automated methodology."

Source: Politecnico di Torino

Descriptive Data Analytics on Dinesafe Data for Food Assessment and Evaluation Using R Programming Language: A Case Study on Toronto's Dinesafe Inspection and Disclosure System

"In the digital era of the 21st century, data analytics (DA) can be highlighted as 'finding conclusions based on observations' or unique knowledge discovery from data (KDD) in form of patterns and visualizations for ease of understanding. The city of Toronto consists of thousands of food chains, restaurants, bars based all over the streets of the city. Dinesafe is an agency-based inspection system monitored by the provincial and municipal regulations and ran by the Ministry of Health, Ontario. This chapter proposes an efficient descriptive data analytics on the Dinesafe data provided by the Health Ministry of Toronto, Ontario using an open-source data programming framework like R. The data is publicly available for all the researchers and motivates the practitioners for conveying the results to the ministry for betterment of the people of Toronto. The chapter will also shed light on the methodology, visualization, types and share the results from the work executed on R."

Source: IGI Global

ARTIFICIAL INTELLIGENCE



The evolving role of artificial intelligence in marketing: A review and research agenda

"An increasing amount of research on Intelligent Systems/Artificial Intelligence (AI) in marketing has shown that AI is capable of mimicking humans and performing activities in an 'intelligent' manner. Considering the growing interest in AI among marketing researchers and practitioners, this review seeks to provide an overview of the trajectory of marketing and AI research fields...Our study of selected articles by means of Multiple Correspondence Analysis (MCA) procedure outlines several research avenues related to the adoption, use, and acceptance of AI technology in marketing, the role of data protection and ethics, the role of institutional support for marketing AI, as well as the

harmful impact on individuals and groups. Examples are facial and other biometric recognition in surveillance applications, AI algorithms deployed in high-stakes decisions directly affecting individuals' lives and deepfake videos and text that can spread misinformation at a large scale. Overall ethical guiding principles like the Montreal Declaration are useful, but the growing risk of harmful impact caused by AI applications indicates a need for the AI community to reflect in a systematic way on downstream consequences of the research they are undertaking."

Source: Nature Machine Intelligence

Platform operating model for the AI bank of the future

"The need to change a bank's operating model arises from a combination of external and internal circumstances. Externally, as consumers and businesses increasingly rely on AI technologies in daily life, banks are shifting the foundation of their business models from products to experiences. In other words, as many traditional banking products become embedded—or even "invisible"—within beyond-the-bank journeys, experiences become the more salient element of a customer's relationship with the bank. This shift involves a rapid increase in the number of customer interactions, and at the same time, the revenue associated with each interaction is declining. This is a fundamental change: just a few years ago, customers conducted business with the bank by visiting a branch once or twice a month; more recently, they would conduct transactions several times each week through the bank website; now many customers interact with their bank daily through their mobile banking app, and often several times a day through wearable devices. In short, banks and their customers now have an interconnected, always-on relationship."

Source: McKinsey & Company

Getting to know—and manage—your biggest AI risks

"Just as AI deployment will be core to organizations' future success, leading organizations will be those that actively identify and manage the associated risks. In our latest AI survey, respondents at organizations getting the most value from AI were more likely than others to recognize and mitigate the risks posed by the technology.

The prospect of protecting against a wide and growing range of AI risks might seem overwhelming, but neither avoiding AI nor turning a blind

buildings known as flashover, when flammable materials in a room ignite almost simultaneously, producing a blaze only limited in size by available oxygen."

Source: National Institute of Standards and Technology

Voice-Assisted AI is Becoming Smarter, But Consumers Have Higher Expectations

"Most people have a general understanding of artificial intelligence used in devices like Amazon's Alexa and Google Home, Chen said. In comparing AI to humans, "they think of AI as smart and intelligent but not as sophisticated or complicated enough. Even though they communicate and interact with AI, they still don't think AI can do complicated or sophisticated tasks. They think human beings still need to do that kind of task."

Some people wish AI devices could master more functions to help them with their daily lives, Chen said. For now, how they are using voice-assisted AI focuses on five aspects"

Source: University of Florida

Envisioning safer cities with AI

"A team of researchers from the NSF NHERI SimCenter, a computational modeling and simulation center for the natural hazards engineering community headquartered at the University of California, Berkeley, have developed a suite of tools called BRAILS — Building Recognition using AI at Large-Scale — that can automatically identify characteristics of buildings in a city and even detect the risks that a city's structures would face in an earthquake, hurricane, or tsunami. The team is comprised of researchers from UC Berkeley, International Computer Science Institute, Stanford, and UCLA."

Source: University of Texas at Austin

'We're playing Moneyball with building assets'

"Researchers have developed a tool to help governments and other organizations with limited budgets spend money on building repairs more wisely.

The new tool uses artificial intelligence (AI) and text mining techniques to analyze written inspection reports and determine which work is most urgently needed."

Source: University of Waterloo

AI learns to type on a phone like humans

"Touchscreens are notoriously difficult to type on. Since we can't feel the keys, we rely on the sense of sight to move our fingers to the right places and check for errors, a combination of efforts we can't pull off at the same

revolution of the labor market and marketers' competencies."

Source: Elsevier

Developing an Artificial Intelligence (A.I.)-based descriptor of facial appearance that fits with the assessments of makeup experts

"Objective

To develop an A.I.-based automatic descriptor that detects and grades, from selfie pictures, 23 facial signs, hairs included, as a help to making-up procedures.

Material and Methods

The selfie images taken in very different conditions by 3326 women and men were used to create (90% of dataset) and validate (10% of dataset) a new algorithm architecture to appraise and grade 23 different facial signs such as lips, nose, eye color, eyebrows, eyelashes, and hair color as defined by makeup artists. Each selfie image was annotated by 12 experts and defined references to train Artificial Intelligence (A.I.)-based algorithm."

Source: Wiley Online Library

MACHINE LEARNING



Machine learning-accelerated computational fluid dynamics

"Numerical simulation of fluids plays an essential role in modeling many physical phenomena, such as weather, climate, aerodynamics, and plasma physics. Fluids are well described by the Navier-Stokes equations, but solving these equations at scale remains daunting, limited by the computational cost of resolving the smallest spatiotemporal features. This leads to unfavorable trade-offs between accuracy and tractability. Here we use end-to-end deep learning to improve approximations inside computational fluid dynamics for modeling two-dimensional turbulent flows."

Source: PNAS

Fitting elephants in modern machine learning by statistically consistent interpolation

"Textbook wisdom advocates for smooth function fits and implies that interpolation of noisy data should lead to poor generalization. A related heuristic is that fitting parameters should be fewer than measurements (Occam's razor). Surprisingly,

eye to the risks is a viable option in today's competitive and increasingly digitized business environment. So where should companies start?"

Source: McKinsey & Company

10 surprising things that rely on artificial intelligence

"Artificial intelligence (AI) has transformed many aspects of our lives for the better. It even played a role in developing vaccines against COVID-19. But you may be surprised just how many things we take for granted that rely on AI. As IBM explain, "at its simplest form, artificial intelligence is a field, which combines computer science and robust datasets to enable problem-solving." It includes the sub-fields of machine learning and deep learning. These two fields use algorithms that are designed to make predictions or classifications based on input data. Of course, as technology becomes more sophisticated, literally millions of decisions need to be made every day and AI speeds things up and takes the burden off humans. The Forum's platform, Shaping the Future of Technology Governance: Artificial Intelligence and Machine Learning, is bringing together key stakeholders to design and test policy frameworks that accelerate the benefits and mitigate the risks of AI and machine learning.

Here are 10 examples of AI we encounter every day."

Source: World Economic Forum

Imec's SNN chip combines low latency & energy consumption with high inference accuracy

"In April 2020, imec introduced the world's first chip to process radar signals using a spiking recurrent neural network (SNN). Its flagship use-case? The creation of a smart, low-power multi-sensor perception system for drones that identifies obstacles in a matter of millisecond.

Contrary to the artificial neural networks that are a key ingredient of today's robotics perception systems, SNNs mimic the way groups of biological neurons operate – firing electrical pulses sparsely over time, and, in the case of biological sensory neurons, only when the sensory input changes. It is an approach that comes with important benefits: at the time of the announcement, imec's SNN chip showed to consume up to a hundred times less power than traditional implementations while featuring a tenfold reduction in latency – enabling almost instantaneous decision-making."

Source: IMEC

Innovations And Growth Opportunities In Ai-Based

time. To really understand how people type on touchscreens, researchers at Aalto University and the Finnish Center for Artificial Intelligence (FCAI) have created the first artificial intelligence model that predicts how people move their eyes and fingers while typing.

The AI model can simulate how a human user would type any sentence on any keyboard design. It makes errors, detects them -- though not always immediately -- and corrects them, very much like humans would."

Source: Aalto University

Making AI algorithms show their work

"Artificial intelligence (AI) learning machines can be trained to solve problems and puzzles on their own instead of using rules that we made for them. But often, researchers do not know what rules the machines make for themselves. Cold Spring Harbor Laboratory (CSHL) Assistant Professor Peter Koo developed a new method that quizzes a machine-learning program to figure out what rules it learned on its own and if they are the right ones.

Computer scientists "train" an AI machine to make predictions by presenting it with a set of data. The machine extracts a series of rules and operations—a model—based on information it encountered during its training."

Source: Cold Spring Harbor Laboratory

Researchers develop artificial intelligence that can detect sarcasm in social media

"The team's findings were recently published in the journal *Entropy*.

Effectively the team taught the computer model to find patterns that often indicate sarcasm and combined that with teaching the program to correctly pick out cue words in sequences that were more likely to indicate sarcasm. They taught the model to do this by feeding it large data sets and then checked its accuracy."

Source: University of Central Florida

'AI' is being used to profile people from their head vibrations – but is there enough evidence to support it?

"Digital video surveillance systems can't just identify who someone is. They can also work out how someone is feeling and what kind of personality they have. They can even tell how they might behave in the future. And the key to unlocking this information about a person is the movement of their head.

contemporary machine learning approaches, such as deep nets, generalize well, despite interpolating noisy data. This may be understood via statistically consistent interpolation (SCI), that is, data interpolation techniques that generalize optimally for big data. Here, we elucidate SCI using the weighted interpolating nearest neighbours algorithm, which adds singular weight functions to k nearest neighbours. This shows that data interpolation can be a valid machine learning strategy for big data. SCI clarifies the relation between two ways of modelling natural phenomena: the rationalist approach (strong priors) of theoretical physics with few parameters, and the empiricist (weak priors) approach of modern machine learning with more parameters than data."

Source: Nature Machine Intelligence

Machine-learning-based dynamic-importance sampling for adaptive multiscale simulations

"Multiscale simulations are a well-accepted way to bridge the length and time scales required for scientific studies with the solution accuracy achievable through available computational resources. Traditional approaches either solve a coarse model with selective refinement or coerce a detailed model into faster sampling, both of which have limitations. Here, we present a paradigm of adaptive, multiscale simulations that couple different scales using a dynamic-importance sampling approach. Our method uses machine learning to dynamically and exhaustively sample the phase space explored by a macro model using microscale simulations and enables an automatic feedback from the micro to the macro scale, leading to a self-healing multiscale simulation."

Source: Nature Machine Intelligence

On the Applicability of Machine Learning Fairness Notions

"This paper is a survey of fairness notions that, unlike other surveys in the literature, addresses the question of "which notion of fairness is most suited to a given real-world scenario and why?". Our attempt to answer this question consists in (1) identifying the set of fairness-related characteristics of the real-world scenario at hand, (2) analyzing the behavior of each fairness notion, and then (3) fitting these two elements to recommend the most suitable fairness notion in every specific setup. The results are summarized in a decision diagram that can be used by practitioners and policy makers to navigate the

Diagnostics, Point-Of-Care And Chronic Disease Management Solutions

"The latest issue of Advanced MedTech Technology Opportunity Engine (TOE) profiles a wide range of innovations from the advanced medical device and imaging industry. The innovations in this issue cover various AI enabled diagnostic and screening solutions. The issue also profiles various advanced point-of-care diagnostics and emerging chronic disease management solutions such as insulin patch and artificial pancreas. These innovations portray the diversity in their technology readiness levels, indicating an immediate or potential market impact. The growth opportunities for all these advanced medical device technologies are also covered in this issue."

Source: Frost & Sullivan

Learned Smartphone ISP on Mobile NPUs with Deep Learning, Mobile AI 2021 Challenge: Report

"As the quality of mobile cameras starts to play a crucial role in modern smartphones, more and more attention is now being paid to ISP algorithms used to improve various perceptual aspects of mobile photos. In this Mobile AI challenge, the target was to develop an end-to-end deep learning-based image signal processing (ISP) pipeline that can replace classical hand-crafted ISPs and achieve nearly real-time performance on smartphone NPUs. For this, the participants were provided with a novel learned ISP dataset consisting of RAW-RGB image pairs captured with the Sony IMX586 Quad Bayer mobile sensor and a professional 102-megapixel medium format camera. The runtime of all models was evaluated on the MediaTek Dimensity 1000+ platform with a dedicated AI processing unit capable of accelerating both floating-point and quantized neural networks. The proposed solutions are fully compatible with the above NPU and are capable of processing Full HD photos under 60-100 milliseconds while achieving high fidelity results. A detailed description of all models developed in this challenge is provided in this paper."

Source: Cornell University

Real-Time Video Super-Resolution on Smartphones with Deep Learning, Mobile AI 2021 Challenge: Report

"Video super-resolution has recently become one of the most important mobile-related problems due to the rise of video communication and

That is the claim made by the company behind the Vibrant artificial intelligence (AI) system."

Source: The Conversation

Amazon will continue to ban police from using its facial recognition AI

"Amazon has now extended its ban indefinitely. Facial recognition services have already led to wrongful arrests that disproportionately impacted marginalised communities. Last year, the American Civil Liberties Union (ACLU) filed a complaint against the Detroit police after black male Robert Williams was arrested on his front lawn "as his wife Melissa looked on and as his daughters wept from the trauma" following a misidentification by a facial recognition system."

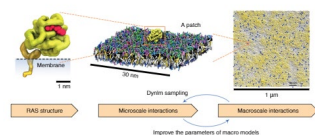
Source: Artificial Intelligence News

Google aims to use AI to help recognize common skin conditions

"Google's I/O team has just released a preview of a new AI tool that keeps users informed on the state of their own skin, hair and nails. As the human body's largest organ, the skin poses an area of great interest as far as determining one's overall health condition. For this technology, Google uses many similar techniques used to identify diabetic eye disease and lung cancer via CT scans. By using a camera to capture an image of a user's skin, the tool can suggest diagnosis for certain ailments, such as a rash."

Source: TechXplore

MACHINE LEARNING



Linking the length scales

"A challenge for multiscale simulations is how to link the macroscopic and microscopic length scales effectively. A new machine-learning-based sampling approach enables full exploration of macro configurations while retaining the precision of a microscale model."

Source: Nature Machine Intelligence

Using machine learning to predict high-impact research

"An artificial intelligence framework built by MIT researchers can give an "early-alert" signal for future high-impact technologies, by learning from patterns gleaned from previous scientific publications.

In a retrospective test of its capabilities, DELPHI, short for Dynamic

relatively large catalogue of ML fairness notions."

Source: ACM Digital Library

Power of data in quantum machine learning

"The use of quantum computing for machine learning is among the most exciting prospective applications of quantum technologies. However, machine learning tasks where data is provided can be considerably different than commonly studied computational tasks. In this work, we show that some problems that are classically hard to compute can be easily predicted by classical machines learning from data. Using rigorous prediction error bounds as a foundation, we develop a methodology for assessing potential quantum advantage in learning tasks. The bounds are tight asymptotically and empirically predictive for a wide range of learning models."

Source: Nature Communications

Pervasive Label Errors in Test Sets Destabilize Machine Learning Benchmarks

"We algorithmically identify label errors in the test sets of 10 of the most commonly-used computer vision, natural language, and audio datasets, and subsequently study the potential for these label errors to affect benchmark results. Errors in test sets are numerous and widespread: we estimate an average of 3.4% errors across the 10 datasets, where for example 2916 label errors comprise 6% of the ImageNet validation set. Putative label errors are found using confident learning and then human-validated via crowdsourcing (54% of the algorithmically-flagged candidates are indeed erroneously labeled). Surprisingly, we find that lower capacity models may be practically more useful than higher capacity models in real-world datasets with high proportions of erroneously labeled data."

Source: Cornell University

Machine learning for glass science and engineering: A review

"The design of new glasses is often plagued by poorly efficient Edisonian "trial-and-error" discovery approaches. As an alternative route, the Materials Genome Initiative has largely popularized new approaches relying on artificial intelligence and machine learning for accelerating the discovery and optimization of novel, advanced materials. Here, we review some recent progress in adopting machine learning to accelerate the design of new glasses with tailored properties."

Source: Elsevier

streaming services. While many solutions have been proposed for this task, the majority of them are too computationally expensive to run on portable devices with limited hardware resources. To address this problem, we introduce the first Mobile AI challenge, where the target is to develop an end-to-end deep learning-based video super-resolution solutions that can achieve a real-time performance on mobile GPUs. The participants were provided with the REDS dataset and trained their models to do an efficient 4X video upscaling. The runtime of all models was evaluated on the OPPO Find X2 smartphone with the Snapdragon 865 SoC capable of accelerating floating-point networks on its Adreno GPU. The proposed solutions are fully compatible with any mobile GPU and can upscale videos to HD resolution at up to 80 FPS while demonstrating high fidelity results. A detailed description of all models developed in the challenge is provided in this paper."

Source: Cornell University

Early-warning by Learning to Predict High Impact, was able to identify all pioneering papers on an experts' list of key foundational biotechnologies, sometimes as early as the first year after their publication."

Source: Massachusetts Institute of Technology

Using machine learning and radar to detect drones in complicated urban settings

"Look, up in the sky! It's a bird! It's a plane! It's...actually pretty easy for radar to tell the difference. Flying aliens from Krypton notwithstanding, there are simply not many things moving through the mostly empty, wide-open skies that are as big and fast as an airplane.

But if radar signals move down from the clouds and into a city's streets, there are suddenly many objects that can be mistaken for one another. With only distance, speed and direction to go on, drones can easily be "hidden in plain sight" on radar displays among slowly moving cars, bicyclists, a person jogging or even the spinning blades of an air conditioning unit."

Source: Duke University School of Nursing

AI Gets the Glory but ML is Quietly Making Fortunes

"When we think about the future of data science, it's easy to get carried away. For a couple of decades now, if you believe the hype, we've been on the verge of a revolution. A revolution in which "Artificial Intelligence" – as a vaguely defined but enormously powerful force – is always on the verge of solving the world's problems. Or at least make data analysis easier...

In this article, we'll look at the differences between AI and ML, look at why AI gets all the attention, and why we shouldn't overlook the everyday revolution that ML is already creating."

Source: Inside Big Data

Trust the machine -- it knows what it is doing

"Machine learning, when used in climate science builds an actual understanding of the climate system, according to a study published in the journal Chaos by Manuel Santos Gutiérrez and Valerio Lucarini, University of Reading, UK, Mickäel Chekroun, the Weizmann Institute, Israel and Michael Ghil, Ecole Normale Supérieure, Paris, France. This means we can trust machine learning and further its applications in climate science, say the authors. The study is part of the European Horizon 2020 TiPES project on tipping points in the Earth system. TiPES is administered from the University of Copenhagen, Denmark."

DEEP LEARNING



Democratising deep learning for microscopy with ZeroCostDL4Mic

"Deep Learning (DL) methods are powerful analytical tools for microscopy and can outperform conventional image processing pipelines. Despite the enthusiasm and innovations fuelled by DL technology, the need to access powerful and compatible resources to train DL networks leads to an accessibility barrier that novice users often find difficult to overcome. Here, we present ZeroCostDL4Mic, an entry-level platform simplifying DL access by leveraging the free, cloud-based computational resources of Google Colab. ZeroCostDL4Mic allows researchers with no coding expertise to train and apply key DL networks to perform tasks including segmentation."

Source: Nature Communications

Deep Learning--based Text Classification: A Comprehensive Review

"Deep learning--based models have surpassed classical machine learning--based approaches in various text classification tasks, including sentiment analysis, news categorization, question answering, and natural language inference. In this article, we provide a comprehensive review of more than 150 deep learning--based models for text classification developed in recent years, and we discuss their technical contributions, similarities, and strengths. We also provide a summary of more than 40 popular datasets widely used for text classification. Finally, we provide a quantitative analysis of the performance of different deep learning models on popular benchmarks, and we discuss future research directions."

Source: ACM Digital Library

A survey on deep learning and its applications

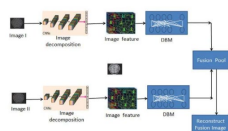
"Deep learning, a branch of machine learning, is a frontier for artificial intelligence, aiming to be closer to its primary goal—artificial intelligence. This paper mainly adopts the summary and the induction methods of deep learning. Firstly, it introduces the global development and the current situation of deep learning. Secondly, it describes the structural principle, the characteristics, and

Machine learning is changing our culture. Try this text-altering tool to see how

"Most of us benefit every day from the fact computers can now "understand" us when we speak or write. Yet few of us have paused to consider the potentially damaging ways this same technology may be shaping our culture...Computer scientists and linguists have spent decades trying to program computers to understand the nuances of human language. And in certain ways, computers are fast approaching humans' ability to understand and generate text."

Source: The Conversation

DEEP LEARNING

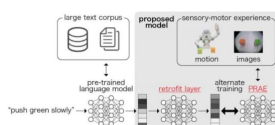


New medical image fusion method draws on deep learning to improve patient outcomes

"Researchers at the College of Data Science Software Engineering at China's Qingdao University have developed a new "multi-modal" image fusion method based on supervised deep learning that enhances image clarity, reduces redundant image features and supports batch processing. Their findings have just been published in KeAi's International Journal of Cognitive Computing in Engineering."

Source: KeAi Communications

NEURAL NETWORKS



An artificial neural network to acquire grounded representations of robot actions and language

"To best assist human users while they complete everyday tasks, robots should be able to understand their queries, answer them and perform actions accordingly. In other words, they should be able to flexibly generate and perform actions that are aligned with a user's verbal instructions...Researchers at Waseda University in Tokyo recently developed a deep neural network that can acquire grounded representations of robot actions and linguistic descriptions of these actions. The technique they created,

some kinds of classic models of deep learning, such as stacked auto encoder, deep belief network, deep Boltzmann machine, and convolutional neural network. Thirdly, it presents the latest developments and applications of deep learning in many fields such as speech processing, computer vision, natural language processing, and medical applications. Finally, it puts forward the problems and the future research directions of deep learning."

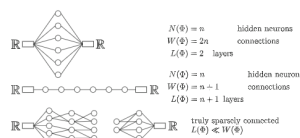
Source: Elsevier

Deep learning: a statistical viewpoint

"The remarkable practical success of deep learning has revealed some major surprises from a theoretical perspective. In particular, simple gradient methods easily find near-optimal solutions to non-convex optimization problems, and despite giving a near-perfect fit to training data without any explicit effort to control model complexity, these methods exhibit excellent predictive accuracy. We conjecture that specific principles underlie these phenomena: that overparametrization allows gradient methods to find interpolating solutions, that these methods implicitly impose regularization, and that overparametrization leads to benign overfitting. We survey recent theoretical progress that provides examples illustrating these principles in simpler settings. We first review classical uniform convergence results and why they fall short of explaining aspects of the behavior of deep learning methods. We give examples of implicit regularization in simple settings, where gradient methods lead to minimal norm functions that perfectly fit the training data. Then we review prediction methods that exhibit benign overfitting, focusing on regression problems with quadratic loss."

Source: Cornell University

NEURAL NETWORKS



Approximation Spaces of Deep Neural Networks

"We study the expressivity of deep neural networks. Measuring a network's complexity by its number of connections or by its number of neurons, we consider the class of functions for which the error of best approximation with networks of a given complexity decays at a certain rate when increasing the complexity budget. Using results from classical

presented in a paper published in IEEE Robotics and Automation Letters, could be used to enhance the ability of robots to perform actions aligned with a user's verbal instructions."

Source: TechXplore

A recurrent neural network that infers the global temporal structure based on local examples

"Most computer systems are designed to store and manipulate information, such as documents, images, audio files and other data. While conventional computers are programmed to perform specific operations on structured data, emerging neuro-inspired systems can learn to solve tasks more adaptively, without having to be engineered to carry out a set type of operations."

Source: TechXplore

Microscopists push neural networks to the limit to sharpen fuzzy images

"In new work published in the June issue of Nature Methods a team of microscopists and computer scientists used a type of artificial intelligence called a neural network to obtain clearer pictures of cells at work even with extremely low, cell-friendly light levels."

Source: TechXplore

Beautiful or handsome? Neural language models try their hand at word substitution

"Researchers from Skoltech and their colleagues have run a first of its kind large-scale computational study of the most advanced neural language models to see how they handle lexical substitution, a crucial task in natural language processing. The paper was presented at the 28th International Conference on Computational Linguistics (COLING-2020).

Lexical substitution is the task of replacing a particular word in a sentence with another word that is somehow related to the original word and still appropriate for the context. For instance, in a sentence 'Who killed Laura Palmer?' the word killed can be replaced with a synonym murdered. In 'I'm the king of the world!' we can replace king with a hypernym (a word with a broader meaning) ruler. And in 'You're gonna need a bigger boat', sea enthusiasts can arguably replace boat with a meronym hull, using the word that means a part of something to refer to the whole object."

Source: Skolkovo Institute of Science and Technology

PEDAGOGY

approximation theory, we show that this class can be endowed with a (quasi)-norm that makes it a linear function space, called approximation space. We establish that allowing the networks to have certain types of "skip connections" does not change the resulting approximation spaces."

Source: Springer Link

Reusability report: Predicting spatiotemporal nonlinear dynamics in multimode fibre optics with a recurrent neural network

"With their internal memory, recurrent neural networks can be used to learn and predict time-dependent behaviours. In their recent work, Salmela et al.¹ present a recurrent neural network architecture to learn and predict complex nonlinear propagation in an optical fibre based on the input pulse intensity profile in the time domain. Here, we use their model by extending it to the case of spatiotemporal nonlinear propagation for an arbitrary number of modes in graded-index multimode fibres. In addition to the original work's focus on predicting the temporal evolution of pulses, we show that the method is applicable for modelling and predicting spatial beam propagation incorporating nonlinear mode coupling."

Source: Nature Machine Intelligence

1D convolutional neural networks and applications: A survey

"During the last decade, Convolutional Neural Networks (CNNs) have become the de facto standard for various Computer Vision and Machine Learning operations. CNNs are feed-forward Artificial Neural Networks (ANNs) with alternating convolutional and subsampling layers. Deep 2D CNNs with many hidden layers and millions of parameters have the ability to learn complex objects and patterns providing that they can be trained on a massive size visual database with ground-truth labels.... To address this issue, 1D CNNs have recently been proposed and immediately achieved the state-of-the-art performance levels in several applications such as personalized biomedical data classification and early diagnosis, structural health monitoring, anomaly detection and identification in power electronics and electrical motor fault detection."

Source: Elsevier

Accelerating Sparse Deep Neural Networks

"As neural network model sizes have dramatically increased, so has the



Helping Students of All Ages Flourish in the Era of Artificial Intelligence

"A new cross-disciplinary research initiative at MIT aims to promote the understanding and use of AI across all segments of society. The effort, called Responsible AI for Social Empowerment and Education (RAISE), will develop new teaching approaches and tools to engage learners in settings from preK-12 to the workforce.

"People are using AI every day in our workplaces and our private lives. It's in our apps, devices, social media, and more. It's shaping the global economy, our institutions, and ourselves."

Source: Massachusetts Institute of Technology

SECURITY



How AIs ask for personal information is important for gaining user trust

"In a study, Penn State researchers report that users responded differently when AIs either offered to help the user, or asked for help from the user. This response influenced whether the user trusted the AI with their personal information. They added that these introductions from the AI could be designed in a way to both increase users' trust, as well as raise their awareness about the importance of personal information."

Source: Pennsylvania State University

CLIMATE SCIENCE



CLIMATE SCIENCE AI BUILDS GENUINE UNDERSTANDING OF CLIMATE SYSTEM

"Artificial intelligence programmes used widely in climate science build an actual understanding of the climate system, meaning we can trust machine learning and further its applications in climate science, according to a new study.

Large, complex climate models are often impractical to work with as they need to run for months on supercomputers. As an alternative,

interest in various techniques to reduce their parameter counts and accelerate their execution. An active area of research in this field is sparsity - encouraging zero values in parameters that can then be discarded from storage or computations.... We present the design and behavior of Sparse Tensor Cores, which exploit a 2:4 (50%) sparsity pattern that leads to twice the math throughput of dense matrix units. We also describe a simple workflow for training networks that both satisfy 2:4 sparsity pattern requirements and maintain accuracy, verifying it on a wide range of common tasks and model architectures. This workflow makes it easy to prepare accurate models for efficient deployment on Sparse Tensor Cores."

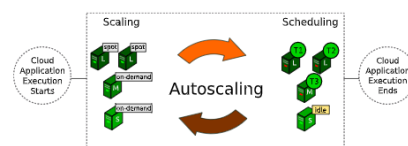
Source: Cornell University

Linearized two-layers neural networks in high dimension

"We consider the problem of learning an unknown function f^* on the d -dimensional sphere with respect to the square loss, given i.i.d. samples $\{(y_i, x_i)\}_{i=1}^n$ where x_i is a feature vector uniformly distributed on the sphere and $y_i = f^*(x_i) + \epsilon_i$, $y_i = f^*(x_i) + \epsilon_i$. We study two popular classes of models that can be regarded as linearizations of two-layers neural networks around a random initialization: the random features model of Rahimi-Recht (RF); the neural tangent model of Jacot-Gabriel-Hongler (NT). Both these models can also be regarded as randomized approximations of kernel ridge regression (with respect to different kernels), and enjoy universal approximation properties when the number of neurons N diverges, for a fixed dimension d ."

Source: Project Euclid

REINFORCEMENT LEARNING



Reinforcement learning-based application Autoscaling in the Cloud: A survey

"Reinforcement Learning (RL) has demonstrated a great potential for automatically solving decision-making problems in complex, uncertain environments. RL proposes a computational approach that allows learning through interaction in an environment with stochastic behavior, where agents take actions to maximize some cumulative short-term and long-term rewards. Some of the most impressive results have been shown in Game Theory where agents

climate scientists often study simplified models."

Source: University of Reading

GREEN TECH

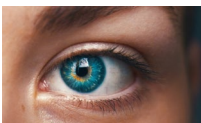


Artificial intelligence enables smart control and fair sharing of resources in energy communities

"Energy communities will play a key role in building the more decentralised, less carbon intensive, and fairer energy systems of the future. Such communities enable local prosumers (consumers with own generation and storage) to generate, store and trade energy with each other -- using locally owned assets, such as wind turbines, rooftop solar panels and batteries. In turn, this enables the community to use more locally generated renewable generation, and shifts the market power from large utility companies to individual prosumers."

Source: EurekAlert!

BIOMEDICAL



How AI technologies are being used to better understand retinal diseases

"AIRA, an artificial intelligence retina analyser, is the result. Being a pattern recognition use case, AI was the obvious solution. PixelPlex was originally given a 'large array' of data containing images from fundus cameras, which contained various symptoms and anatomical structures of the human eye, from hemorrhages to arteries and veins. The company added its own data sets from later research, to be used in neural network training."

Source: Artificial Intelligence News

New AI technology protects privacy in healthcare settings

"Artificially intelligent (AI) algorithms can support clinicians in diagnosing illnesses like cancers and sepsis. The effectiveness of these algorithms depends on the quantity and quality of the medical data used to train them, and patient data is often shared between clinics to maximise the data pool.

To protect these data, the material usually undergoes anonymisation and pseudonymisation, but the researchers say these safeguards

exhibited superhuman performance in games like Go or Starcraft 2, which led to its gradual adoption in many other domains, including Cloud Computing. Therefore, RL appears as a promising approach for Autoscaling in Cloud since it is possible to learn transparent (with no human intervention), dynamic (no static plans), and adaptable (constantly updated) resource management policies to execute applications."

Source: Elsevier

Deep reinforcement learning-based energy management of hybrid battery systems in electric vehicles

"In this paper, we propose an energy management strategy based on deep reinforcement learning for a hybrid battery system in electric vehicles consisting of a high-energy and a high-power battery pack. The energy management strategy of the hybrid battery system was developed based on the electrical and thermal characterization of the battery cells, aiming at minimizing the energy loss and increasing both the electrical and thermal safety level of the whole system. Primarily, we designed a novel reward term to explore the optimal operating range of the high-power pack without imposing a rigid constraint of state of charge. Furthermore, various load profiles were randomly combined to train the deep Q-learning model, which avoided the overfitting problem."

Source: Elsevier

A Hybrid MPC for Constrained Deep Reinforcement Learning applied for Planar Robotic Arm

"The main contribution of this paper is to construct a hybrid structured algorithm from model predictive control (MPC) and deep reinforcement learning (DRL) (MPC-DRL), that makes use of the benefits of both methods, to satisfy constraint conditions throughout the learning process. The validity of the proposed approach is demonstrated by learning a reachability task. The results show complete satisfaction for the constraint condition, represented by a static obstacle, with a smaller number of samples and higher performance compared to state-of-the-art model-free algorithms."

Source: Elsevier

DNN2: A hyper-parameter reinforcement learning game for self-design of neural network based elasto-plastic constitutive descriptions

"This contribution presents a meta-modeling framework that employs artificial intelligence to design a

have often proven inadequate in terms of protecting patients' health data."

Source: Imperial College London

neural network that replicates the path-dependent constitutive responses of composite materials sampled by a numerical testing procedure of Representative Volume Elements (RVE). A Deep Reinforcement Learning (DRL) combinatorics game is invented to automatically search for the optimal set of hyper-parameters from a decision tree. Besides the typical hyper-parameters for ANN training, such as the network topology, the size and composition of the considered training data are incorporated as additional hyper-parameters to help investigate the amount of data necessary for training and validation."

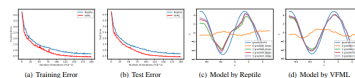
Source: Elsevier

Using process data to generate an optimal control policy via apprenticeship and reinforcement learning

"Reinforcement learning (RL) is a data-driven approach to synthesizing an optimal control policy. A barrier to wide implementation of RL-based controllers is its data-hungry nature during online training and its inability to extract useful information from human operator and historical process operation data. Here, we present a two-step framework to resolve this challenge. First, we employ apprenticeship learning via inverse RL to analyze historical process data for synchronous identification of a reward function and parameterization of the control policy."

Source: AIChE Online Library

NATURAL LANGUAGE PROCESSING



Variance-reduced First-order Meta-learning for Natural Language Processing Tasks

"First-order meta-learning algorithms have been widely used in practice to learn initial model parameters that can be quickly adapted to new tasks due to their efficiency and effectiveness. However, existing studies find that meta-learner can overfit to some specific adaptation when we have heterogeneous tasks, leading to significantly degraded performance. In Natural Language Processing (NLP) applications, datasets are often diverse and each task has its unique characteristics. Therefore, to address the overfitting issue when applying first-order meta-learning to NLP applications, we propose to reduce the variance of the gradient estimator used in task adaptation. To this end, we develop

a variance-reduced first-order meta-learning algorithm."

Source: ACL Anthology

XNLP: A Living Survey for XAI Research in Natural Language Processing

"We present XNLP: an interactive browser-based system embodying a living survey of recent state-of-the-art research in the field of Explainable AI (XAI) within the domain of Natural Language Processing (NLP). The system visually organizes and illustrates XAI-NLP publications and distills their content to allow users to gain insights, generate ideas, and explore the field. We hope that XNLP can become a leading demonstrative example of a living survey, balancing the depth and quality of a traditional well-constructed survey paper with the collaborative dynamism of a widely available interactive tool."

Source: ACM Digital Library

Natural language processing to identify the creation and impact of new technologies in patent text: Code, data, and new measures

"We develop natural language processing techniques to identify the creation and impact of new technologies in the population of U.S. patents. We validate the new techniques and their improvement over traditional metrics based on patent classification and citations in two case-control studies. First, we collect patents linked to awards such as the Nobel prize and the National Inventor Hall of Fame. These patents likely cover radically new technologies with a major impact on technological progress and patenting."

Source: Elsevier

User Stories and Natural Language Processing: A Systematic Literature Review

"User stories have been widely accepted as artifacts to capture the user requirements in agile software development. They are short pieces of texts in a semi-structured format that express requirements. Natural language processing (NLP) techniques offer a potential advantage in user story applications. Objective: Conduct a systematic literature review to capture the current state-of-the-art of NLP research on user stories. Method: The search strategy is used to obtain relevant papers from SCOPUS, ScienceDirect, IEEE Xplore, ACM Digital Library, SpringerLink, and Google Scholar. Inclusion and exclusion criteria are applied to filter

the search results. We also use the forward and backward snowballing techniques to obtain more comprehensive results. Results: The search results identified 718 papers published between January 2009 to December 2020. After applying the inclusion/exclusion criteria and the snowballing technique, we identified 38 primary studies that discuss NLP techniques in user stories. Most studies used NLP techniques to extract aspects of who, what, and why from user stories."

Source: IEEE Xplore

BIOMEDICAL



Artificial Intelligence–Enabled Analysis of Public Attitudes on Facebook and Twitter Toward COVID-19 Vaccines in the United Kingdom and the United States: Observational Study

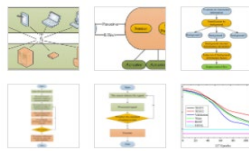
"The aim of this study was to develop and apply an artificial intelligence–based approach to analyze public sentiments on social media in the United Kingdom and the United States toward COVID-19 vaccines to better understand the public attitude and concerns regarding COVID-19 vaccines."

Source: Journal of Medical Internet Research

Clinical and Research Medical Applications of Artificial Intelligence

"Artificial intelligence (AI), including machine learning (ML), has transformed numerous industries through newfound efficiencies and supportive decision-making. With the exponential growth of computing power and large datasets, AI has transitioned from theory to reality in teaching machines to automate tasks without human supervision. AI-based computational algorithms analyze "training sets" using pattern recognition and learning from inputted data to classify and predict outputs that otherwise could not be effectively analyzed with human processing or standard statistical methods. Though widespread understanding of the fundamental principles and adoption of applications have yet to be achieved, recent applications and research efforts implementing AI have demonstrated great promise in predicting future injury risk, interpreting advanced imaging, evaluating patient-reported outcomes, reporting value-based metrics, and augmenting telehealth."

CONSTRUCTION INDUSTRY



Artificial intelligence for securing industrial-based cyber-physical systems

"The combination of artificial intelligence and cyber-physical systems (CPSs) in buildings has many advantages. Therefore, CPSs and artificial intelligence are studied based on previous research to promote their use in the construction industry...This research on the combination of a CPS and artificial intelligence in the construction industry can provide a theoretical basis and practical reference materials for the development of the intelligent construction industry."

Source: Elsevier

MOBILE BANKING INDUSTRY



Enhancing the value co-creation process: artificial intelligence and mobile banking service platforms

"The purpose of this study is to investigate the relationships that influence the value co-creation process and lead to consumer comfort with artificial intelligence (AI) and mobile banking (AIMB) service platforms... This study highlights the role and importance of the sequential relationships that impact the assessment of AIMB. The findings suggest that service delivery and the customer's role in value co-creation change as AI is introduced into a digital self-service technology channel. Furthermore, AIMB offers transaction-oriented (utilitarian) value propositions more so than relationship-oriented (hedonic) value propositions."

Source: Emerald