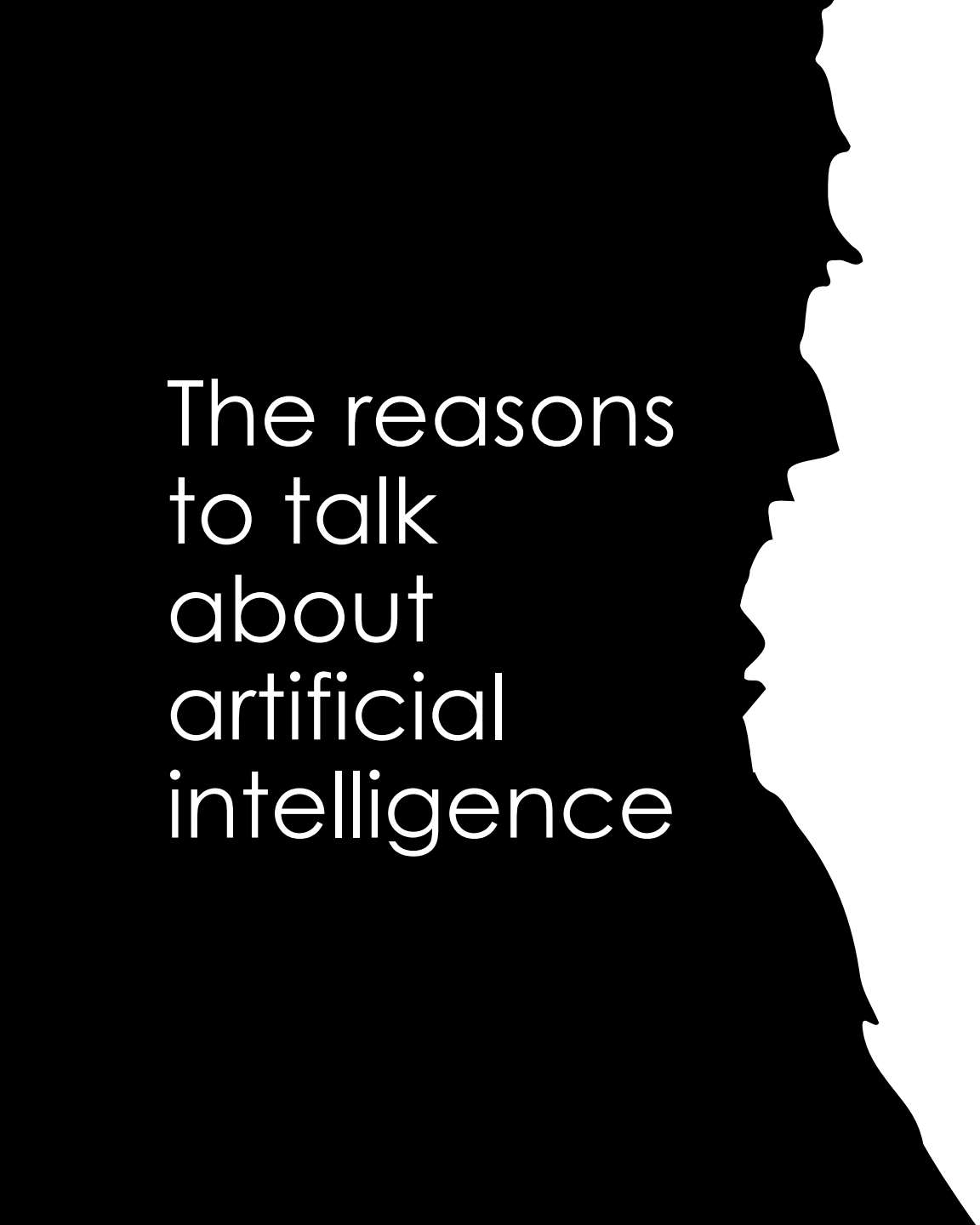
Benefits & dangers from Artificial intellingence in our lives

GUY PAIC INSTITUTO DE CIENCIAS NUCLEARES,UNAM MEXICO



The reasons to talk about artificial intelligence

I believe that this is the most dramatic development in this century and more:

As the internet it will influence our lives, but unlike it, it will drastically change the whole social structure including our manner to do Physics

Kairos – Trogir Croatia

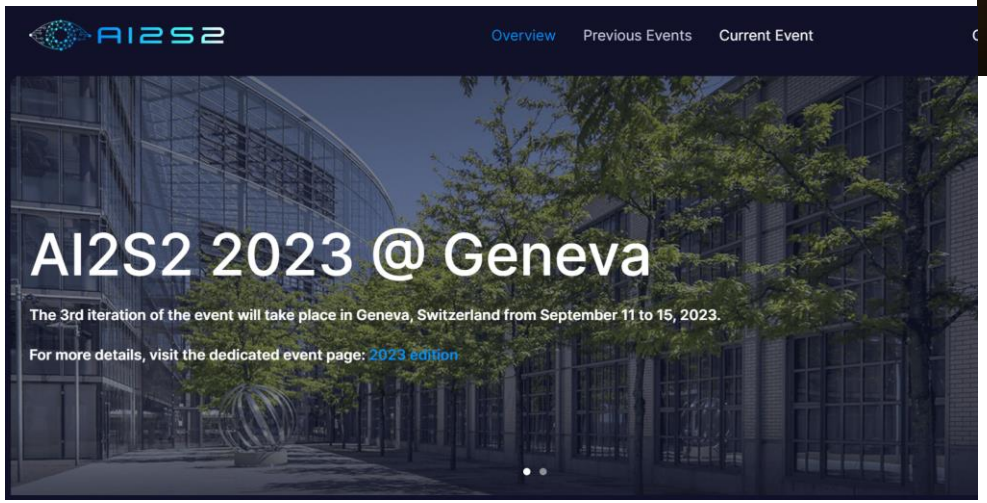
Why here?

- The academia is one of the most important factors in using AI in education and investigation and eventually in the control of the effects

- As the use of AI becomes more widespread, so does the need to ensure that the positives benefit us all, and the risks do not undermine our rights and freedoms. Jérôme Duberry

The history of my engagement in AI

Artificial Intelligence for Science, Industry and Society (AISIS2019)



Recently

> https://www.ties.unam.mx/index.php/ties/article/view/10/16

el equilibrio de la balanza entre los peligros y beneficios de la inteligencia artificial

Carlos A. Coello Coello
Instituto Politécnico Nacional, Centro de Investigación y de Estudios Avanzados, Departamento de Computación, Ciudad de México, México.
ORCID: 0000-0002-8435-680X

Guy Paic
Universidad Nacional Autónoma de México, Instituto de Ciencias Nucleares, Ciudad de México, México.
ORCID: 0000-0003-2513-2459

Leonid Serkin
Universidad Nacional Autónoma de México, Instituto de Ciencias Nucleares, Ciudad de México, México.
ORCID: 0000-0003-4749-5250

Biden's executive order…

- **Artificial intelligence (AI) holds extraordinary potential for both promise and peril**.
  - **making us more prosperous, productive, innovative, and secure.**
  - but in wrong hands a tremendous potential to exacerbate
  - **societal harms such as fraud, discrimination, bias, and disinformation; displace and disempower workers; stifle competition; and pose risks to national security.**
  - **Harnessing AI for good and realizing its myriad benefits requires mitigating its substantial risks. This endeavor demands a society-wide effort that includes government, the private sector, academia, and civil society.**

Artificial Intelligence must be safe and secure

- Testing and evaluations, including post-deployment performance monitoring, will help ensure that AI systems function as intended, are resilient against misuse or dangerous modifications, are ethically developed and operated in a secure manner
- Develop effective labelling and content provenance mechanisms to determine when content is generated using AI and when it is not.

Defense may be more difficult than attack!

From Joshua Bengio

- we may see these systems used against society in attacks, we will also need some AI to defend us. In the case of bioweapons, for example,
- if AI is used to design a dangerous pathogen, we are going to need another AI to detect that order for synthesising this pathogen. Similarly, for cyberattacks, if there are some that are stronger than our best human programmers, we need AI systems to help us figure that out and find defences and countermeasures.
- It must safe? Even if they behave as intended by those who operate them, those who operate them may abuse the power of these AI systems in many areas, whether it's politics, military, or economic agendas.
- We have to worry about increased power concentration. Right now, we think it's in the hands of a few corporations but in the future, it might also be states or individuals within companies that abuse that power.
- We need to realise that this power concentration problem is **in contradiction with the very objective of democracy**, which is about sharing power. It says we're going to build these tools that give a lot of power to those that use them. This means our democratic institutions need to somehow manage that concentration of power and make sure that power is used in a way that aligns with our collective will, goals, and values. That means that governments need to acquire the muscles, the capability to master these frontier AI systems, to drag them in the directions that we collectively want, and to regulate them properly.

A fulgurant development

- In 2019 the chatGPT2 could not reliably count till 10

1. Today AI systems can write software, advise on scientific topics, and combine language and image processing to generate photorealistic scenes, coming closer and closer to human-level intelligence.
2. AI will probably be the most important development of the century – it may completely change our ways of teaching, learning, making science

The next discoveries in HEP will be data driven

- To find evidence for BSM events we may have to shift thru billions of events in a better way tan with triggers. The important events may be very few and similar to SM predicted events Karagiorgi, G. et al. Machine learning in the search for new fundamental physics. *Nat. Rev. Phys.* **4**, 399–412 (2022).
- with a Flow of 100 terabytes of data every second only ML learning can allow treatment and progress

AI helping new physics

Event display of the highest anomaly score event that is not selected by the normal L1T menu, from Ephemeral Zero Bias 2023 Run 367883. This event features the maximal number of jets (12), out of which 11 have ET > 20 GeV. It also features a 3 GeV muon. The offline reconstruction identifies 7 jets (reconstructed with the PUPPI algorithm) with p T > 15 GeV, and 1 muon.

DP2023_079.pdf (cern.ch)

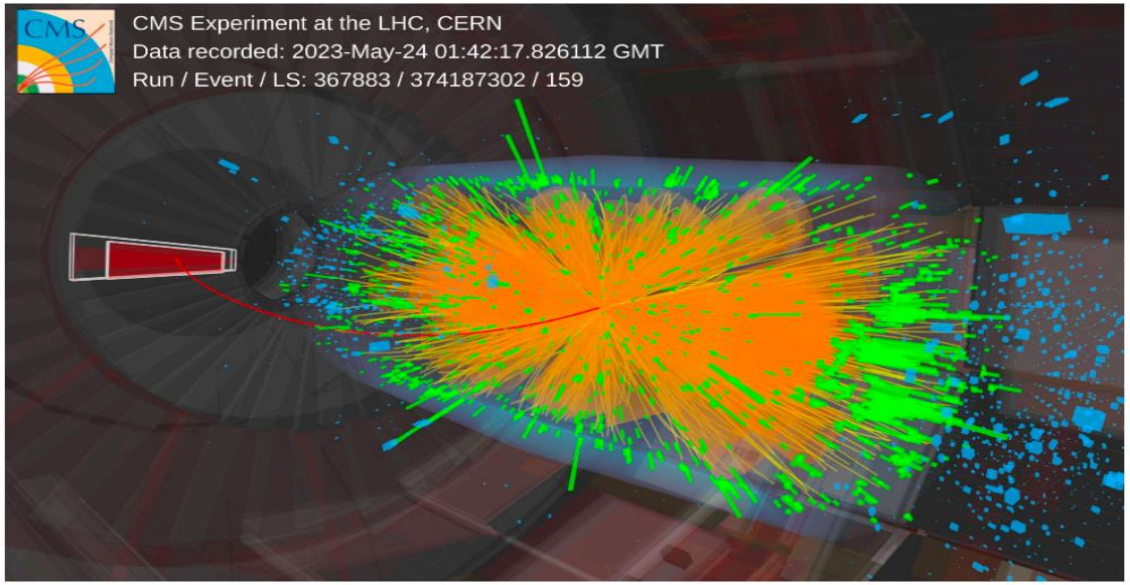


Figure 8. An event selected by an autoencoder-based anomaly detection hardware triggering algorithm in the CMS Experiment (figure from Ref. [94]).

The four pilars of AI

- I the professionals trained in AI
- II the data: necessary to train the algorithm, represent geographical specificities in different applications so that the data have to be local, secure and guarantee privacy
- III publicly accesible software
- IVComputing capacity

Some details on the necesities

- The AI IS NOT the programme on your computer!
- It needs power,data computers and storage!

Is AI going to make us more lazy?

- There are discussions about the effects of AI on cognitive capacity
- The memory has to be exercised – use it or lose it!
- Psycological effects – loss of self esteem
- The mitigation of these effects have also to be adressed
- Academics have asked to postpone GhatGpt 5

Example.: University of Florida

- The University of Florida has a partnership with NVIDIA to develop the HiPerGator3 supercomputer, the most powerful AI machine in US higher education and a cost overall of 70millions to spend!
- The goals UF has set to infuse **the entire curriculum with** AI training and educational opportunities is an example all universities should aspire to follow. It demonstrates that the University of Florida and NVIDIA understand the depth and the breadth of AI's impact as the demand for AI-literate workers will extend well beyond the tech sector."

- The storage requirements for AI systems can vary significantly based on several factors. Here are some considerations:

1. **Data Volume**: The amount of data being processed plays a crucial role. Large language models (LLMs) and other generative AI systems, such as text-to-image and sound generation models, require massive datasets for training[1].
2. **Model Complexity**: The complexity of the AI models matters. Deep learning models, like neural networks, often demand more storage due to their intricate architectures.
3. **Application Requirements**: The specific application determines storage needs. For example, regression, classification, and multilabel models may require different amounts of data

Energy consumption

- "In terms of macro numbers, by 2030 AI could account for 3% to 4% of global power demand. Google said right now AI is representing 10% to 15% of their power use or 2.3 TWh annually.“
- the journal *Joule,* estimated that using generative AI such as ChatGPT in each Google search would require more than 500,000 of Nvidia's A100 HGX servers, totaling 4.1 million graphics processing units, or GPUs. At a power demand of 6.5 kW per server, that would result in daily electricity consumption of 80 GWh and annual consumption of 29.2 TWh

AI depends on large scale storage

Data, computing power and algorithm are the three key elements of AI development

Storage, like computing, also consumes a large quantity of energy, especially when data needs to be quickly accessed.

Based on its access frequency, data can be classified into hot, warm and cold data.

AI workloads are data driven.

Today's analytics-based AI requires tremendous amounts of AI storage. Without this capacity, you would not be able to benefit from information and knowledge unleashed by AI workloads. Whether you are sequencing human genomes, reading medical imaging, or performing clinical trial research, the amount of data to process is huge. The same is true with machine learning monitoring the Internet of Things (IoT); intelligent agents enabling customer support, purchase prediction, and fraud detection; and business intelligence and other analytical applications. In each case, you can see the commonality of storage at an enormous scale.

And now for a first hand experience!

- We are part of a team from Northwestern University, Stanford University, and Cornell University, committed to providing research feedback to scholars with the assistance of advance AI models. We have followed your work closely and, upon a thorough examination, generate the suggestions below. These suggestions cover various aspects of your work, including the writing style, research design, and title. We hope they offer you fresh insights that may enhance the depth and impact of your research.

1. Significance and Novelty

Significance:

The study provides valuable data on atmospheric muon flux variations in Mexico City, which can contribute critical information to the field of space weather and cosmic ray research.

The correlation of muon flux with solar phenomena such as Forbush decreases and geomagnetic storms enhances our understanding of solarterrestrial interactions.

Novelty:

The studys use of data from scintillator detectors at the specific location of UNAM and the comprehensive analysis combining this data with geomagnetic indices is novel.

Deriving the barometric coefficient specific to Mexico City and comparing it with global data adds a new dimension to existing muon flux studies.

2. Suggestions for Improvement

Clarify Experimental Setup Details:

Context: The description of the electronics in the experimental setup is somewhat dense and could benefit from additional clarification.

Issue: Details about the data acquisition system, specifically the sequence from PMT to digital counters, are complex and require careful reading to understand.

Recommendation: Consider adding a simplified flowchart or additional explanatory text in the paper to improve clarity for readers unfamiliar with these techniques.

Expand Data Analysis Explanation:

Context: The methods used for data analysis, including the calculation of the barometric coefficient, are integral to the study.

Issue: The explanation of how geomagnetically quiet days were selected is brief and may lead to questions about data validation and reliability.

Recommendation: Provide a more detailed description of the selection criteria for quiet days, including any thresholds or indices used to identify such periods. This will enhance transparency and reproducibility.

Visual Clarity of Figures:

Context: Figures are crucial for conveying results clearly and effectively in scientific papers.

Issue: Some figures, particularly Figure 4, which combines multiple datasets and overlays potential Forbush decrease periods, may be difficult to interpret due to overlapping data points and indicators.

Recommendation: Improve the visual clarity by using distinct colorcoding or symbols for different datasets and ensuring that the gray zones indicating Forbush decreases are not obscuring data points.

Statistical Analysis Justification:

Context: Precise statistical analysis is foundational for validating scientific results.