An Open Cocktail of Engineering, Al, DRR...

LI Pan, AI & Big Data Working Group, WFEO-CEIT May 4, 2023





World Federation of Engineering Organizations Fédération Mondiale des Organisations d'Ingénieurs

Engineering for Sustainable Development

- The peak international body for professional engineering institutions
- Founded in 1968, under the auspices of UNESCO
- 100+ national professional engineering institutions
- lacksquare
- Representing 30 million engineers







WFEO Academy

www.wfeo.org



WFEO President Prof. José Vieira addresses at the United Nations 2023 Water Conference

POLITICAL FORUM



12 international and continental/regional professional engineering institutions

World Federation of Engineering Organizations Fédération Mondiale des Organisations d'Ingénieurs	World Federation of Engineering Organizations	Lithia finance and the second
s engineering professionals, we use our knowledge and skills for the benefit of the world, in order to reate engineering solutions for a sustainable future. In doing so, we strive to serve our communities	\sim \sim 50th avaiversary —	
head of any personal or sectional interests. o do so successfully requires ethical behavior. Simply put, ethical behavior is about making choices. Inne with our obligations as professionals, we wish to nensure that the choices that we make as ingenese make use to do things with an ar goot. In addition, we wish to nensure that we do these	WFE0 Engineering 2030	
good things' in a manner which is 'right'.	A Plan to advance the achievement of the UN	
In WFED Model Code of Ethics is designed to assist member organisations in guiding ethical which by formalizing their own Codes of Ethics. A Code of Ethics. The Model ethics and Sob ethics. First, it must rovide guidance on the Values we must athem to in professional practice if we are to make the 'good' histos referred to alow. Second. a Code. Ethics must set out the Principles we must follow in pplying those values, in order to do things in a manner which is right.	Sustainable Development Goals through engineering	
he exercise of professional judgment is often difficult and complex. The inherent nature of reflessionalism is that as engineers we always have a duty to others and an obligation to 'do the right ing'. Exadly who how others are and entable horight hing's who are autore continual balance. He are expected to get the balance right. We also know that each situation may be different, requiring peolic choices depending on the circumstances.		Engineering
Code of Ethics will not give us all the answers nor tell us what to do under all circumstances. Ethical haviour reflects an individual specuptions of right and wrong, guided by third consolence and the takes they adhree is a indiating the WFEOM dood Code of Ethics, considerable care have been taken to and get the balance of colligations right, without making statements that could be misleading (and use problems for members) when integrated narrowly.		for Sustainable Development
reposition of duties upon members which they cannot realistically satisfy and the inclusion of provisions hich restrain commercial activity and have a negative effect is not the function of a code of ethics.		
he values and principles in the WFEO Model Code of Ethics are those which are deemed to be pplicable universally to the practice of engineering. The WFEO Model Code of Ethics provides a amework for analysis and decision making about the appropriateness of particular conduct or ehaviour.	Progress Report No. 1 - October 2018	
s engineering practitioners our (preferred) future is dependent on engagement and trust from our ommunity. An engineer who practises in accordance with the Model Code of Ethics and the uidelines will meet these community expectations of responsibility.	A collaborative project with	
he general question of the duties engineering practitioners owe to the community are best captured in efficis averness program. Member organisations of VWED are encouraged to develop a Code of filios for their organisation based on the values and principles are down in the Mode Code and to pract the values and principles that individuals need to assist their decision making process through this support programs.	Division of Science Policy and Capacity Building Natural Sciences Sector	
he Guidelines appended to the Model Code set out the principles which underpin each value and give xamples of each principle in practice.	Sous WFED / FMOI - Maison de l'Unesco - 1 rue Miolis, 75015 Paris, France Tel - 433 (0) 1 45 58 48 46 - serretariat@wfm.org - www.wfm.org	Linking CEE

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中央编译出版社 CCTP Consi Compilion & Tomation Press

Al for Disaster Risk Reduction How AI can help protect us from disasters

- Understanding natural hazards
- Interoperable and cross-border solutions
- The challenge of refining statistical models
- Optimizing relief resources
- Anticipating earthquakes and tsunamis

Focus Group on AI for Natural Disaster Management





WORLD METEOROLOGICAL ORGANIZATION





Applications of AI on DRR between 2018 and 2021, literature survey



SpaceML Worldview Search identifies Hurricane Sam, 2021



Deep-learning seismology, Mousavi & Beroza, 2022, Science





New Era: Generative Al will transform how people live and work



"The limits of my language mean the limits of my world" -Ludwig Wittgenstein, Austrian philosopher

ANTHROP\C

Meta

Google

Attention Network Token Prompt Deep Learning, GPUs, Database (Common Crawl) Transformer

LLMs

Algorithms, Computing Power, Data Instruct

> Alignment Autoregression RLHF

> > **Bigness is better**

Emergent abilities

GPT-4 passed American Uniform Examination in the 90th percentile

Bloomberg

just too much (papers, codes, models, etc.) to follow



GPT





Generative AI and Open Science A balance of openness and sustainability



Components of Open Science

Using GPT to translate all STEM classics into different languages







Open Source Al Model Everyone can train his/her own edge/student model



Excitement, Concerns, Fears

- Improve people's living standard on the Earth
 - Developing new drugs, designing new materials to fight against climate change, realizing fusion power...
 - 10x increase in world GDP
- Rescue us from tedious tasks and routine physical and mental labor
- Empower us as superman capable of writing songs, poem, essays, drawing, coding, etc.

an equal impact as the web browser had in the early 1990s



iPhone Moment for AI

Excitement, Concerns, Fears

- Spread misinformation, scam people, etc.
- Alignment problems: Al single-mindedly purse a goal, but in the process do something harmful
- Bias, Privacy, Intellectual-property Rights
- Black Boxes: outrun the creators' understanding and control



The Sorcerer's Apprentice by Johann Wolfgang von Goethe

Until maybe a couple of years ago had I been asked what is the most pressing and important conversation we should be having about our future, I might have said climate change or one of the other big challenges facing humanity, such as terrorism, antimicrobial resistance, the threat of pandemics or world poverty.

But today I am certain the most important conversation we should be having is about the future of AI. It will dominate what happens with all of these other issues for better or for worse.

--Jim Al-Khalili, in 2018 Iraqi-British theoretical physicist, author and broadcaster



Excitement, Concern, Fears

become a huge risk to jobs, or worse, a risk to humanity.

Pause Giant AI Experiments: An Open Letter

We call on all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4.



Reuters https://www.reuters.com > technology > china-releases-dr...

China proposes measures to manage generative AI services

10 Apr 2023 — The CAC said that China supports AI innovation and application and encourages use of safe and reliable software, tools and data resources, but ...

Elon Musk, feel that generative AI can be a tool for misinformation and could

- Yoshua Bengio, Founder and Scientific Director at Mila, Turing Prize winner and professor at University of Montreal
- Stuart Russell, Berkeley, Professor of Computer Science, director of the Center for Intelligent Systems, and co-author of the standard textbook "Artificial Intelligence: a Modern Approach"
- Bart Selman, Cornell, Professor of Computer Science, past president of AAAI
 - Elon Musk, CEO of SpaceX, Tesla & Twitter
 - Steve Wozniak, Co-founder, Apple
 - Yuval Noah Harari, Author and Professor, Hebrew University of Jerusalem.
 - Emad Mostaque, CEO, Stability AI

 - Reuters

EU proposes new copyright rules for generative AI

Companies deploying generative AI tools, such as ChatGPT, will have to disclose any copyrighted material used to develop their systems,...

5 days ago



The Godfather of Al's Regrets and Worries

'The Godfather of A.I.' Leaves Google and Warns of Danger Ahead

For half a century, Geoffrey Hinton nurtured the technology at the heart of chatbots like ChatGPT. Now he worries it will cause serious harm.

New York Times



The Godfather of Al's Regrets and Wears —Geoffrey Hinton

- "Right now, they're not more intelligent than us, as far as I can tell. But I think they soon may be"
- "It is hard to see how you can prevent the bad actors from using it for bad things"
- "Look at how it was five years ago and how it is now. Take the difference and propagate it forwards. That's scary."
- Hinton fears that as the world gets filled with fake imagery and text that nobody will be able to tell "what is true anymore".
- "I console myself with the normal excuse: If I hadn't done it, somebody else would have"





To be effective in warding off disastrous consequences, our understanding of our manmade machines should in general develop pari passu [step-by-step] with the performance of the machine. By the very slowness of our human actions, our effective control of our machines may be nullified. By the time we are able to react to information conveyed by our senses and stop the car we are driving, it may already have run head on into the wall.

-Norbert Wiener, American mathematician



Discreet, Confident, Positive to face this Al New Era

- ChatGPT \neq Explore, Vision \neq Visionary
- Machines should work. People should think. IBM Pollyanna Principle
- Provably safe and beneficial AI is possible and desirable. Stuart Russell



Big Data and Al Principles in Engineering Promoting responsible conduct of Big Data and AI innovation and application in Engineering

- Good for Humanity and Its Environment
- Inclusiveness, Fairness, Public Awareness and Empowerment 0
- Opening and Sharing while Respecting Privacy and Data Integrity
- Transparency
- Accountability
- Peace, Safety and Security
- Collaboration

http://www.wfeo.org/big-data-and-ai-principles-in-engineering/



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Recommendations

- Promote international and interdisciplinary cooperation between academic institutions, universities and industry, as well as civil society across the world, and advance AI innovation and applications for the implementation of the Sustainable Development Goals.
- Promote international dialogue to reach a global consensus on Al governance, and adopt global principles, guidelines and standards for the responsible conduct of AI.
- Promote AI education and literacy to help people adapt to the AI era, engineers to conduct responsible application and innovation, and all actors, especially business leaders and policy-makers, to make informed decisions, with special efforts to narrow the digital divide between rich and poor countries to ensure that the benefits can be shared by all and 'leaves no one behind'.

https://worldengineeringday.net/2021/11/08/unesco-engineering-report/

To accelerate the development of AI with human values for sustainable development,



Thank you

<u>www.wfeo.org</u> <u>lipankit@163.com</u>

Created by Nozen/Watercolor Model Prompt: a cocktail martini glass with UN SDGs circle, Al, engineering, open science, DRR inside, transparent background, horizontal view