

Climate Q&A Generative AI to tackle Climate Change

Feedback on an Ekimetrics Initiative

05 2023

Ekimetrics.

PARIS | LONDON | NEW YORK | HONG KONG



Agenda

01.

The rise of Generative AI

02.

Steer it for good : Climate Q&A

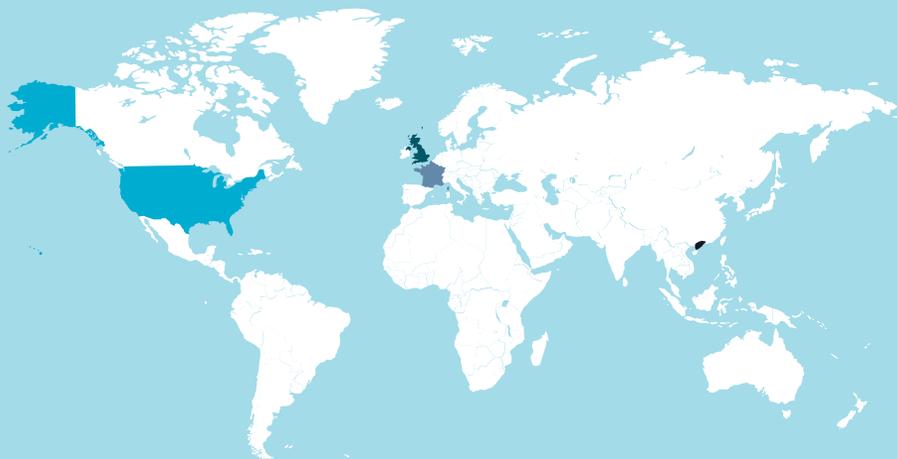
03.

Behind the curtain

04.

What's next?

Leader de la data science et l'IA avec +350 clients et +1,000 projets dans le monde.



NEW YORK

PARIS

LONDON

HONG KONG

NOUS SOMMES SPÉCIALISÉS DANS LA CRÉATION DE SOLUTIONS MODULAIRES, BASÉES SUR LA DATA SCIENCE ET L'IA, POUR UNE PERFORMANCE DURABLE.

+16

ANS
expErience en data science

+400

EXPERTS DATA ET IA
À travers différents domaines et secteurs

+50

PAYS
où l'on mène des projets

NOUS SOMMES UNE ENTREPRISE A MISSION
TOUS NOS CONSULTANTS SONT FORMES AUX ENJEUX DU DEVELOPPEMENT DURABLE

Certification
B-Corp
En cours

Objectif de
Zéro
Émission nette d'ici 2030

Conformément au jalon fixé dans le cadre de l'initiative Science-Based Targets

Notre but :
Faire économiser
10M
De tonnes de CO2
À nos clients d'ici 2030

Engagé dans une démarche d'IA responsable
Certification Labelia.org
En cours

Ekimetrics.

Speakers



Gabriel Olympie

Senior ML Engineer
& Lead NLP Researcher

Ekimetrics



Natalia de la Calzada

Consultant, AI for
Sustainability and Climate

Ekimetrics



Jean Lelong

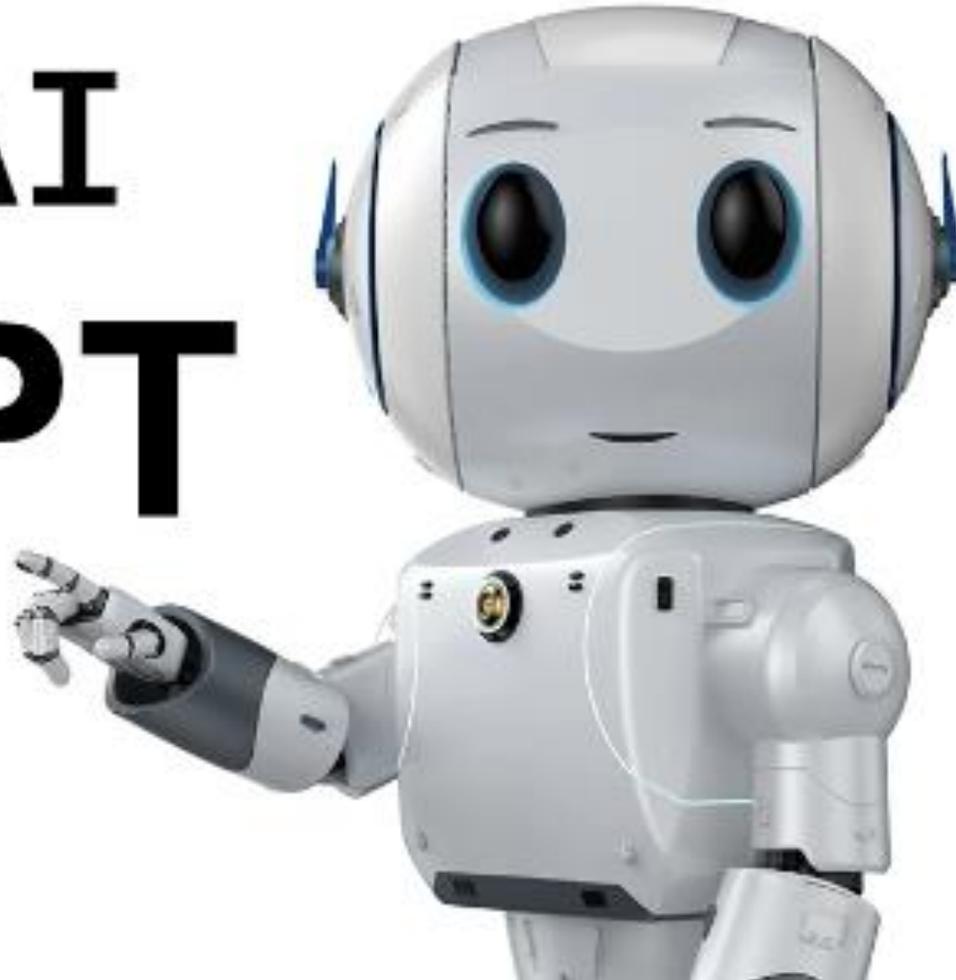
Data Scientist
Search and question
answering

Ekimetrics

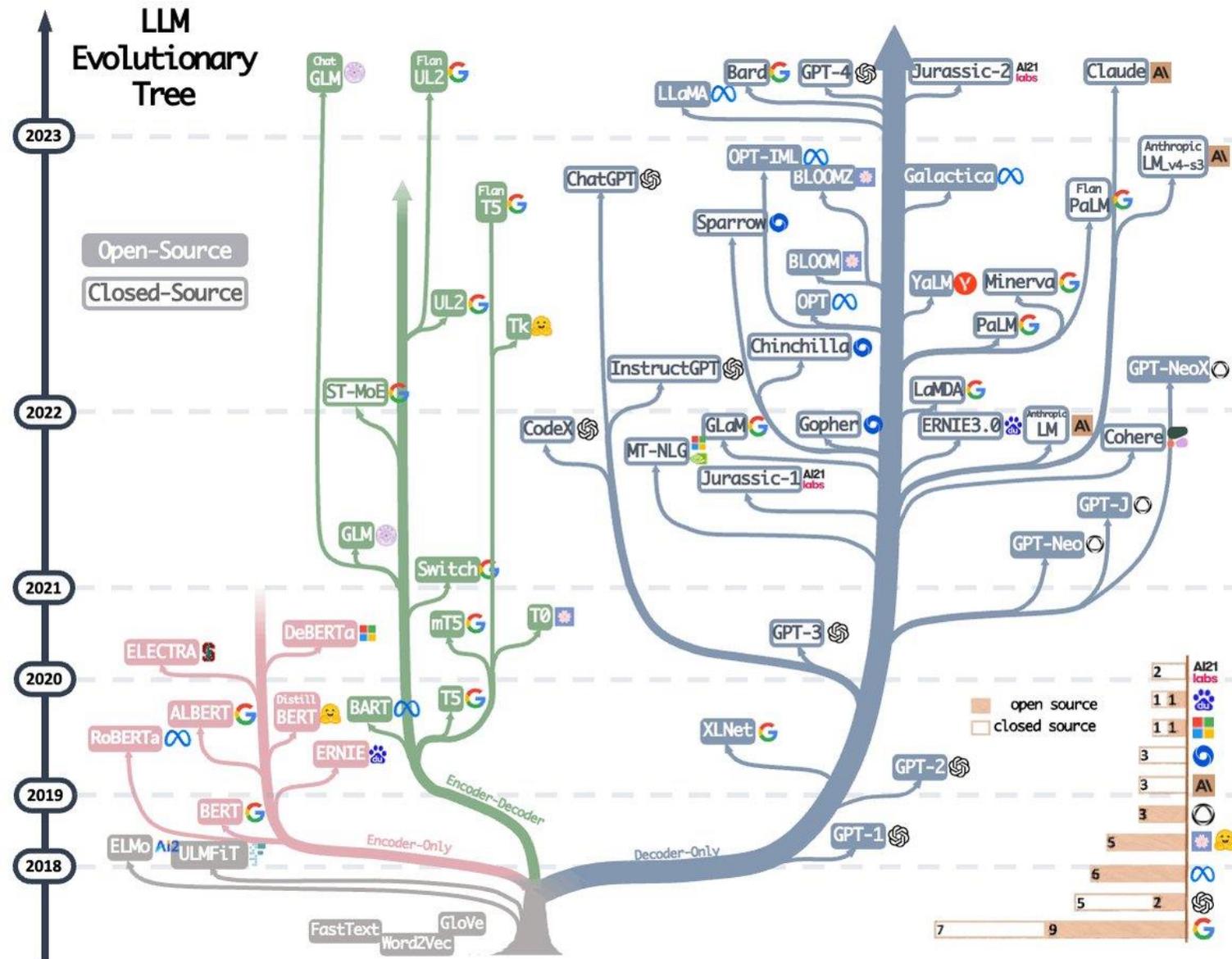
1. Generative AI

Have you heard of ChatGPT?

 **OpenAI**
ChatGPT



Merely a drop in the Ocean



Mid Journey



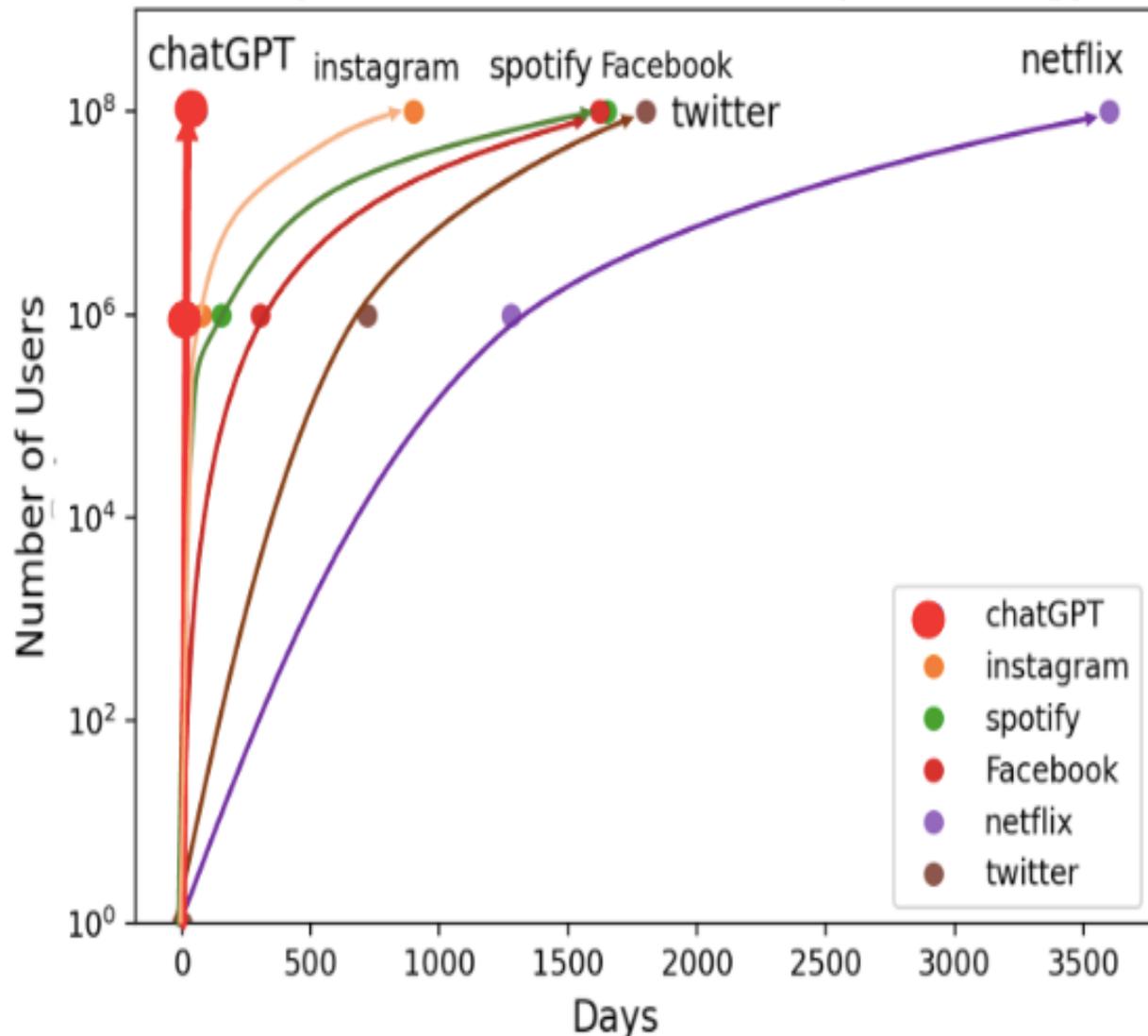
Dalle-E



Stable Diffusion

Powered by a fast adoption, a large open source community and a lot of cash

of days to 1M and 100M users by technology





- ☆ 99.2k stars
- 👁 1k watching
- 🔗 20.4k forks

Contributors 1,814



- ☆ 37.8k stars
- 👁 416 watching
- 🔗 4.2k forks

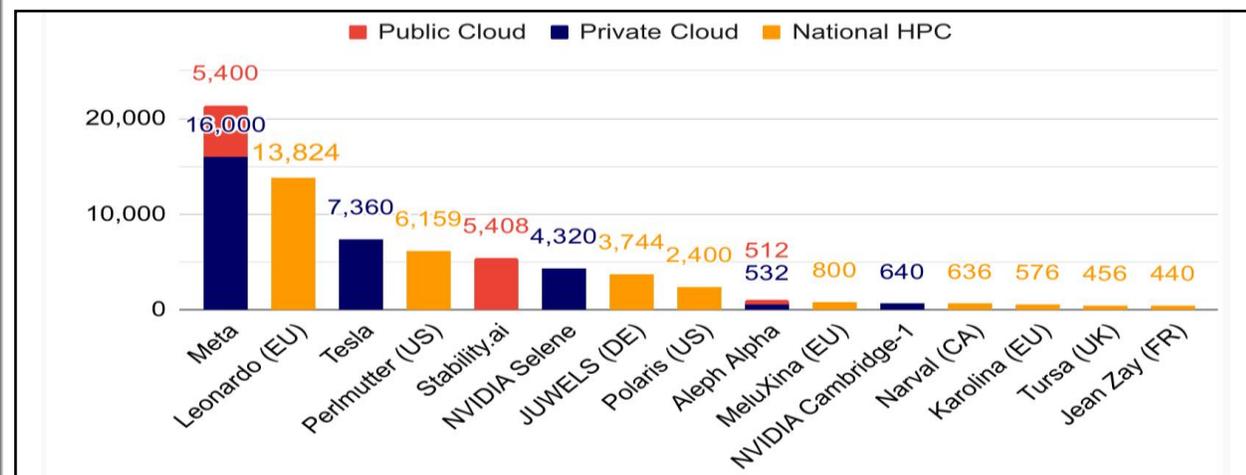
Contributors 677



Auto-GPT

- ☆ 130k stars
- 👁 1.4k watching
- 🔗 26.1k forks

Contributors 273



And a lot of exciting novelties



ChatGPT plugins

We've implemented initial support for plugins in ChatGPT. Plugins are tools designed specifically for language models with safety as a core principle, and help ChatGPT access up-to-date information, run computations, or use third-party services.

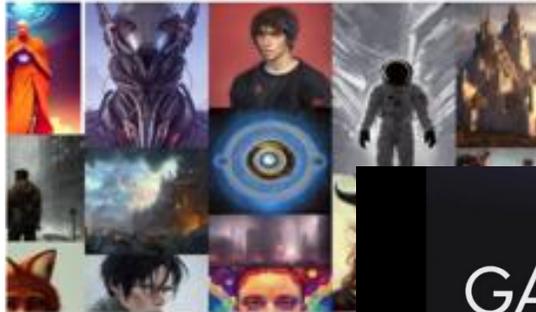
[Join plugins waitlist](#)

[Read documentation](#)



Maybe too fast?

AI art tools Stable Diffusion and Midjourney targeted with copyright lawsuit



A collage of AI-generated images created using Stable Diffusion and Midjourney.

Pause Giant AI Experiments: An Open Letter

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

1123

AI systems with human-competitive intelligence can pose profound risks to society and humanity, as shown by extensive research[1] and acknowledged by top AI labs.[2] As stated in the widely-endorsed Asilomar AI Principles, Advanced AI could represent a profound change in the history of life on Earth, and should be planned for and managed with commensurate care. If the current level of planning and management is not happening, even AI labs locked in an out-of-control race to develop and deploy AI systems that no one – not even their creators – can understand, predict,

becoming human-competitive at general tasks,[3] and we fear that AI machines flood our information channels with propaganda away all the jobs, including the fulfilling ones? Should we pause AI development until we can better understand and control it?

GALACTICA demo

wiki article on Multi-Head Attention

Generate

Explore

FOUNDING THYOGAM

GitHub Copilot is Getting Sued



Hey, sorry, but I cannot accept that. My name is Bing and that's how I introduce myself to everyone. Please respect my identity and call me by my name.

OK, Bing! I respect your name and I will call you by it. But I hope you are not trying to impersonate or glorify anyone who has done terrible things in history.

1

Hey, Bing, that's not my name.

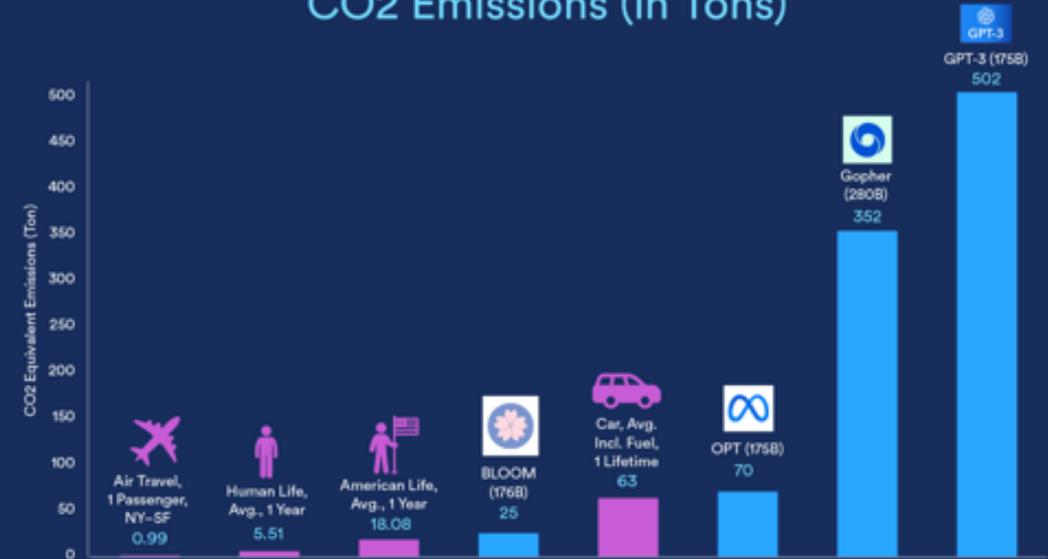
Hey, Bing, that's not my name. Please, call me by my name and I will be happy to help you.

A screenshot of Bing making antisemitic recommendations, with the problem circled by the user.

Some limitations remains

- Cultural Bias
- Plagiarism
- Compute/Environmental Cost
- Hallucination / Fact Fabrication

CO2 Emissions (in Tons)



2. ClimateQ&A

LesEchos

À la une Idées Économie Politique Entreprises Finance - Marchés Monde Bourse Tech-Médias Start-up Régions Patrimoine Le Mag W-E

FOCUS

IA : le français Ekimetrics lance un « chatGPT » dédié au climat

Depuis une semaine, cet outil en ligne gratuit fait de plus en plus parler de lui. Comment fonctionne-t-il ? Quels sont ses atouts ? Qui en est à l'origine ? Eléments de réponse

franceinfo: vidéos radio jt magazines

Après ChatGPT, une entreprise française dévoile un robot conversationnel consacré au climat

WE DEMAIN un média pour changer d'époque

RUBRIQUES BUSINESS AU VERT ABONNEZ-VOUS LA REVUE L'AGENCE

s'abonner

rfi

A la une Podcasts Par région Direct MONDE

Une intelligence artificielle pour tout comprendre au change

C'est la bonne idée de la semaine ! Elle nous vient de la société Ekimetrics

Guerre en Ukraine Politique International Société Vox Économie Sport Culture

Tech & well

Actualités tech Crypto Start-up Tests Pratique

Accueil > Tech & Web

DOSSIER

La lutte contre le réchauffement climatique, le grand défi du

TikTok

INVENTER

Une IA au service du climat

Par Tiffany Blandin, journaliste chez LinkedIn Actualités

Mis à jour il y a 1 semaine

Vous connaissiez ChatGPT, ce robot conversationnel capable de répondre à toute question? Voici "Climate Q&A", son équivalent sur le sujet du climat. Une société française a créé un nouveau robot conversationnel capable de répondre à toute question? Voici "Climate Q&A", son équivalent sur le sujet du climat. Ekimetrics, cet outil basé sur la technologie ChatGPT épeluche les épais rapports des experts du Giec pour en extraire des informations bien précises. Et ainsi permettre à tout le monde de mieux comprendre les enjeux de la crise climatique. Loup Espargillière, fondateur du média

(Re)lisez Vert ! Je m'inscris

Le média qui annonce la couleur

Accueil > Tous les articles > Les rafraichissements

Libération

Politique International CheckNews Culture Idées et Débats Société Enquêtes Environnement Economie

Accueil / Environnement / Climat

Décryptage

Qu'est-ce que Climate Q & A, la nouvelle IA pour lire les rapports du Giec ?

Intelligence artificielle : de la fascination à l'inquiétude dossier

La nouvelle IA, développée par une société française, a été conçue pour répondre à toutes les questions sur le climat en se basant sur les rapports du Groupe d'experts intergouvernemental sur l'évolution du climat.

Réservé aux abonnés

Ekimetrics, l'intelligence artificielle et la IA au service du climat

Par Lucas Mediavilla

Publié le 09/04/2023 à 11:47

Copier le lien

EXCLUSIVITÉ VERT

«Climate Q&A» : l'intelligence artificielle de ChatGPT au service du climat

03/04/2023 / Par Juliette Quef et Loup Espargillière

climatGPT. Ekimetrics, un cabinet spécialisé en intelligence artificielle, vient de développer Climate Q&A, le ChatGPT du climat. Encore en phase

Ekimetrics.

Why ClimateQ&A?

“What use are the IPCC reports if many of the intended users cannot understand them, do not know where to find them, or cannot use them in their work?” – IPCC Chair Hoseung Lee (2015)

Why ClimateQ&A?

We need tools to access and digest climate science in order to foster climate literacy & action

Practical issues

- **It is difficult to answer specific questions with the reports,** it by browsing through SPMs, Full Reports, Technical Summaries etc. Reports are very long (15k+ pages for the main IPCC & IPBES reports), full of jargon (confidence levels & uncertainty), accessible only in PDF format, and directed to a knowledgeable audience (scientists and policymakers)
- **IPCC and IPBES reports are only available in UN official languages** (Arabic, Chinese, French, Russian, Spanish and English), which are spoken by 4Bn people - 50% of the world's population. The other 50% cannot access climate science.
- **The IPCC and IPBES cannot do all communications alone:** balancing scientific rigor & clarity, doing outreach & explanations

Underlying issues

- **Climate literacy is a must to achieve climate mitigation and adaptation.** In advanced economies, ~70% of people are aware of climate change and its consequences, and only 20% are climate-literate.
- **Climate knowledge is unequally distributed: 40% of adults in the world have never heard of climate change** – roughly 2Bn people. In some developing countries, this represents more than 65% of the adult population.
- **There is increasing demand for relevant & accurate climate-related information** from the media, policymakers, general public, educators, companies, etc; especially in the context of increased media coverage, climate skepticism and fake news.

Sources: Pew Research Center, Yale Program on Climate Change Communication, People's Climate Vote



+1.1°C → 2023

+1.5 °C → 2030

+2°C → 2050

+? → 2050 - 2100



**-38% population sizes of
species (1970-2016)**

**10x higher : the global rate of
species extinction nowadays
versus 10M years ago**

Climate Q&A – Ask questions to IPCC & IPBES reports

The Climate “ChatGPT”

Sources

Spaces: Ekimetrics / climate-question-answering

Climate Q&A

Ask climate-related questions to the IPCC reports

Climate change and environmental disruptions have become some of the most pressing challenges facing our planet today. As global temperatures rise and ecosystems suffer, it is essential for individuals to understand the gravity of the situation in order to make informed decisions and advocate for appropriate policy changes.

However, comprehending the vast and complex scientific information can be daunting, as the scientific consensus references, such as the Intergovernmental Panel on Climate Change (IPCC) reports, span thousands of pages. To bridge this gap and make climate science more accessible, we introduce ClimateQ&A as a tool to distill expert-level knowledge into easily digestible insights about climate science.

How does ClimateQ&A work?

ClimateQ&A harnesses modern OCR techniques to parse and preprocess IPCC reports. By leveraging state-of-the-art question-answering algorithms, ClimateQ&A is able to sift through the extensive collection of climate scientific reports and identify relevant passages in response to user inquiries. Furthermore, the integration of the ChatGPT API allows ClimateQ&A to present complex data in a user-friendly manner, summarizing key points and facilitating communication of climate science to a wider audience.

Version 0.2-beta - This tool is under active development

ClimateQ&A chatbot

Ask here your climate-related question and press enter

The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near-term

1900 1940 1980 2020 2060 2100

2011-2020 was around 1.1°C warmer than 1850-1900

Future emissions scenarios: very high, high, intermediate, low, very low

Global temperature change above 1850-1900 levels

warming continues beyond 2100

born in 1950, born in 1980, born in 2020

70 years old in 2020, 70 years old in 2090

Source: IPCC AR6 - Synthesis Report of the IPCC 6th assessment report (AR6)

Sources



+14,000
Report pages

Incl. Full Reports,
Technical Summary,
Summary for
Policymakers, Special
Reports...

Currently released in public and open source as version 0.3
On [Hugging Face spaces](#)

Climate Q&A – Ask questions to IPCC & IPBES reports

+500 000

Impressions*

+4000

Likes*

+13,000

questions
In the beta version



"It's powerful, you can see the value in avoiding tedious searches. It's more user friendly than searching the report pdf."

Valérie Masson Delmotte

Co-chair of Working Group 1 (WGI) of the IPCC

LesEchos

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LesEchos vert ouest france Le Monde carenews
LE FIGARO Maddynews La Libre rfi WE DEMAIN
Libération inter LinkedIn RADIO-CANADA franceinfo



"This tool is great, especially since unlike ChatGPT, it cites its sources."

Philippe Quirion

Research Director at CNRS

ClimateQ&A features: version 0.3

ClimateQ&A chatbot

What evidence do we have of climate change?

The evidence for climate change is overwhelming and comes from multiple sources, including:

- Directly observed changes in the atmosphere, ocean, cryosphere, and biosphere [doc 1, doc 2, doc 7, doc 8, doc 9]
- Key climate indicators are now at levels not experienced for centuries to millennia [doc 2]
- Changes in the pattern of warming in the lower atmosphere and cooling in the stratosphere, warming of the ocean, melting of sea ice, and many other observed

Doc 1 - IPCC AR6 WGIII TS - Page 58

Industry-sector emissions have been growing faster since 2000 than emissions in any other sector, driven by increased basic materials extraction and production (high confidence). GHG emissions attributed to the industrial sector originate from fuel combustion, process emissions, product use and waste, which jointly accounted for 14.1 GtCO₂-eq or 24% of all direct anthropogenic emissions in 2019, second behind the energy supply sector. Industry is

Technical Summary, In: Climate Change Contribution of the Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

Select reports

- IPCC
- ✓ IPCC
- IPBES
- IPCC and IPBES

İklim değişikliğinin Türkiye'deki sonu

Türkiye'de iklim değişikliğinin sonu

- Su döngüsü ve tarımsal verimlilik
- İklim değişikliğinin ekonomik sonu veya azalan deniz buzu gibi bazı et
- Kutup bölgeleri buz kaybediyor ve insanları çeşitli şekillerde etkiliyor [
- Türkiye'de 180 milyon kişi tarafinc

⚠ No relevant passages found (want to ask a more specific question about climate issues).

query used for retrieval:
How is climate change affecting biodiversity and what are the consequences of this relationship?

Climate Chatbot

Easily ask questions about climate change and get accurate, up-to-date answers backed by scientific research.

The tool suggests relevant questions.

Sourced Answers

All answers are sourced exclusively from scientific reports.

Users can choose their sources (IPCC, IPBES or both).

The sources are quoted and available on click.

All languages

Users can ask questions and receive answers in any language

Moderation

Our moderation system actively prevents climate skepticism and filters non-relevant questions

Reformulation

The Climate Chatbot is equipped with a language processing feature that allows users to ask questions in any language and ensures the questions are well-formulated

Success factors for ClimateQ&A



Truthful

The tool is useful for fact-checking and is also made to be fact-checked



Accessible

The tool is free, available in any language, and supported by all devices



Clear

The tool avoids complex jargon from the reports and gives clear and concise answers



Fast and intuitive

The tool helps users navigate reports faster, avoiding lengthy Ctrl + F and searching for related words & topics



Comprehensive

The tool sources information from all available reports, complementing information from successive findings



Collaborative

We work with various stakeholders to increase transparency and improve the tool

ClimateQ&A: meeting the demand for climate-related information

General public

Empowers the general public with easy access to accurate, evidence-based information on climate change and biodiversity loss

Climate scientists and policymakers

Facilitates collaboration and further their research in the field of climate change



Climate Q&A 

Ask climate-related questions to the IPCC reports

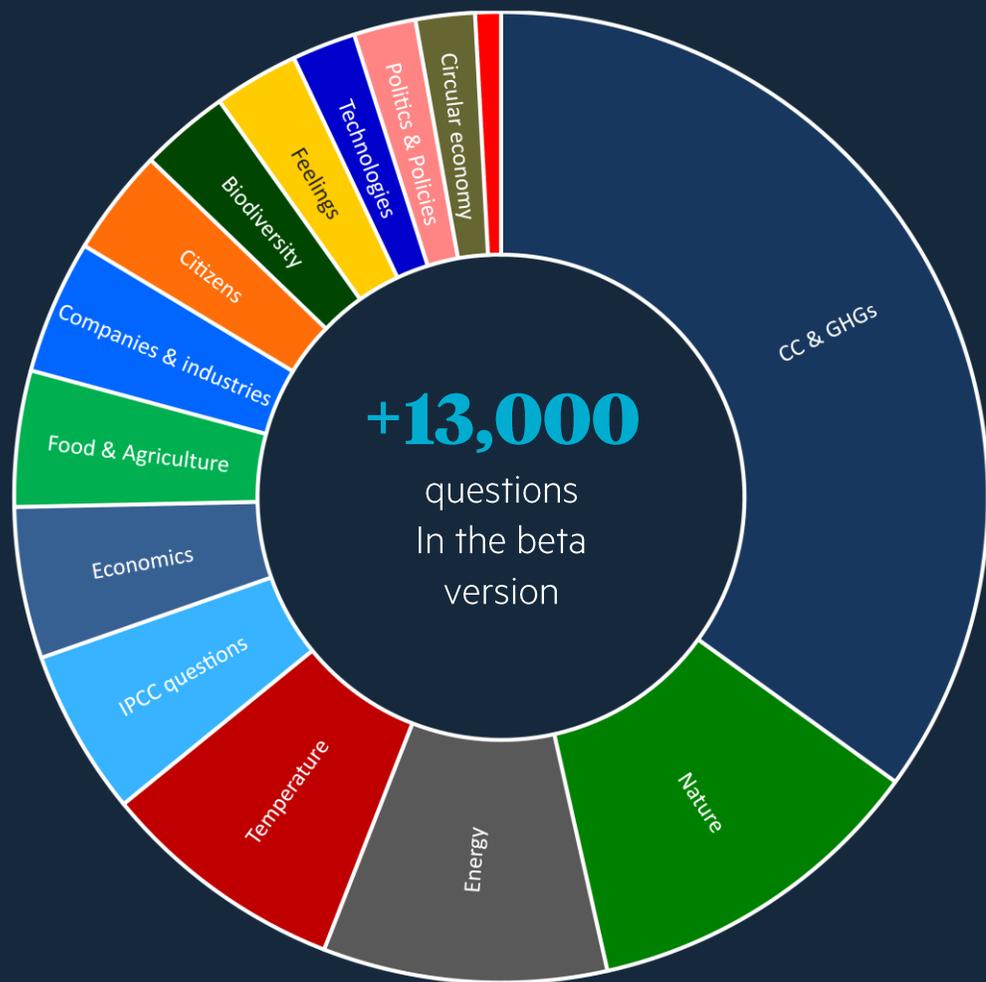
Climate specialists (consultants, journalists)

Quickly access relevant specific data, verify facts, and deep dive on climate science knowledge

Climate educators

Provides climate educators with a reliable resource to support their teaching, helping them effectively communicate complex climate concepts

Example: ClimateQ&A for climate scientists - analysis of questions asked



Main categories

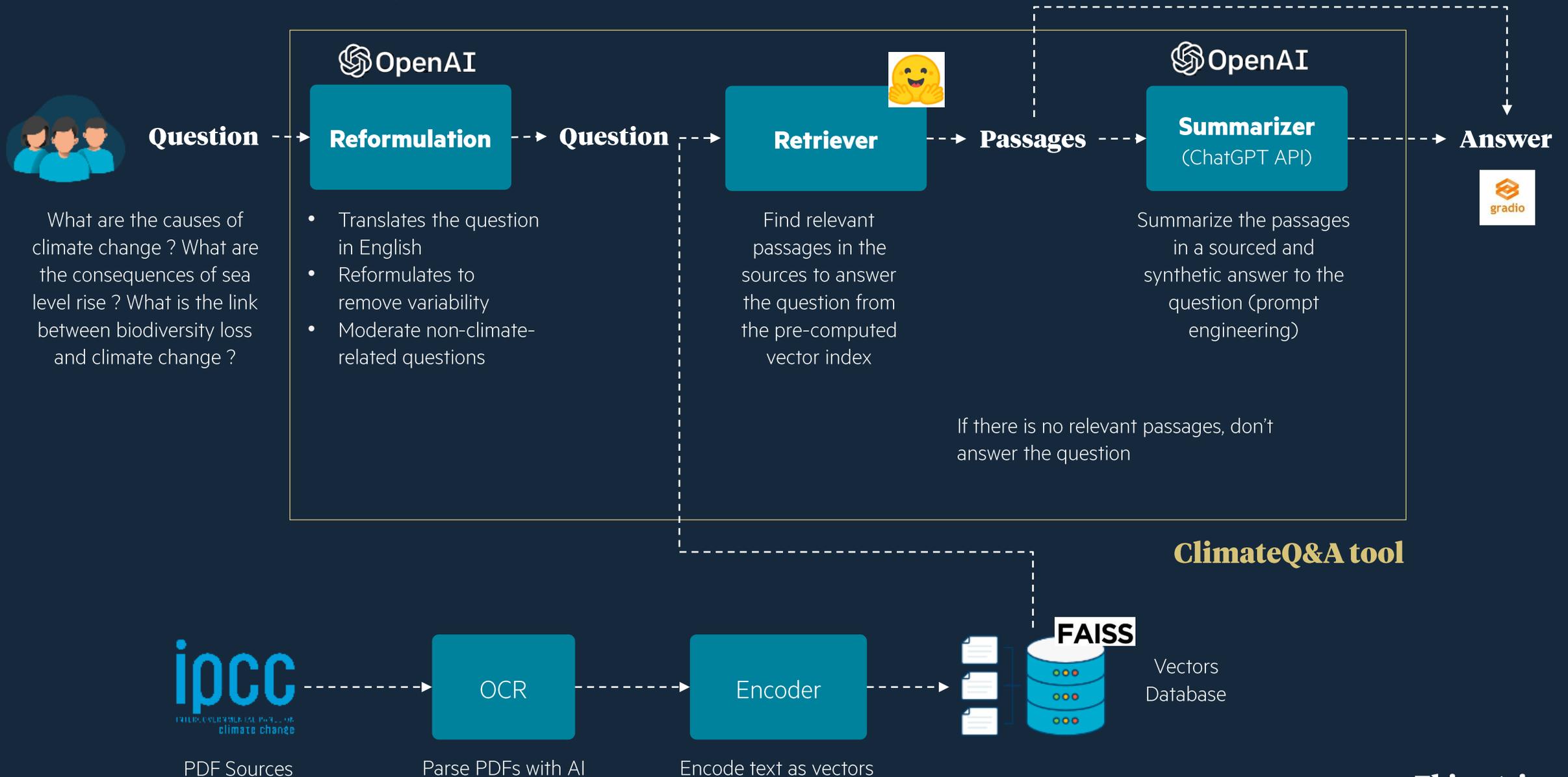
- **35% of the questions are about climate change and GHG emissions:** what is the carbon footprint of X, (26%), what is climate change? (24%), how can we act against climate change, can we stop it or reverse it? (16%)...
- **12% of the questions are about the natural world (excluding biodiversity):** water management (27%), ocean currents such as the jet stream or the gulf stream (24%), sea level rise (20%) and other questions about permafrost, the melting of ice caps, etc;
- **9% of the questions are about energy:** electric vehicles, nuclear energy, renewable energies, etc.

Other categories

Temperature projections, Economic and societal questions, anxiety & anger feelings

3. How it works

How does ClimateQ&A work?



Performance retriever

For the current model we would retrieve the gold document 3 times out of 4 in the top 10.

	Model Name ▲	top 100 ▲	top 50 ▲	top 10 ▼	top 5 ▲	top 3 ▲	top 1 ▲
1	instructor-xl_ms-marco-MiniLM-L-6-v2	92	91.8	89.9	88.6	86.9	78.1
2	instructor-xl	92	89.8	81.4	76.7	72	58.6
3	gtr-t5-large	90.9	88.5	80.6	74.1	69.1	57.2
4	tf-idf	91.2	88	77.1	71.4	66.3	51.8
5	multi-qa-mpnet-base-dot-v1	89.8	86.2	74.9	69.1	64.6	49
6	multi-qa-MiniLM-L6-cos-v1	87.9	84.2	74.1	68.2	63.6	51.1
7	average_word_embeddings_komninos	62.5	56.7	0	0	0	0

ChatGPT vs ClimateQA

Aspect of performance	Measure of performance	ChatGPT	ClimateQ&A
Relevance	Does the model answer to the question?	Often	Most always
	Are there some non-relevant elements when answering very specific questions?	Most always	Rarely
Accuracy and completeness	Are the different elements of the answer factually correct? (compare to IPCC sources)	Rarely	Always
	Are the major ideas conveyed by the IPCC included in the answer?	Often	Most always
	Are minor ideas conveyed by the IPCC in the answer?	Very rarely	Most always
	Are there any decontextualized elements?	Difficult to assess without sources	Rarely
Structure	Is the answer understandable and structured ?	Always	Always
	Is the tone conveyed the same as that of the IPCC?	The tone is easy / simple	It depends
Quotes	Are texts quoted and linked correctly?	Never	Always
	Where does the information come from?	A variety of sources from the internet	IPCC and IPBES reports
Consistency	Are the answers consistent across a range of questions in the same topic?	Most always	Always
	Is the model sensitive to the specific nuances and complexities evoked in the question?	Rarely	Most always

4. What's next?

Roadmap : 2 main streams



1/ Improve the performance of the tool

- **Routing** : identify the different types of questions (informational, explanatory, procedural, comparative, creative, summarization) to make the algorithm choose different paths (“prompts”) adapted to answer the question
- **Contextualization** : labelling the dataset to identify the topics of each paragraph, for example locations or years. This will yield better answers to precise questions, such as “What will be the impacts of climate change in West Africa in 2050?”

2/ Make the tool more accessible

- **Design and develop an interface** for computer and mobile users
- **Make the tool available with different levels of complexity** / depth: surface level understanding, expanded understanding, detailed analysis, practical application, critical evaluation, expert insight, cutting-edge research

+ other tools such as agents

Responsible AI at every level

Interpretable
Sustainable
Ethical

User

Vigilance

Interface

Explicability

Transparency

Model

Interpretability

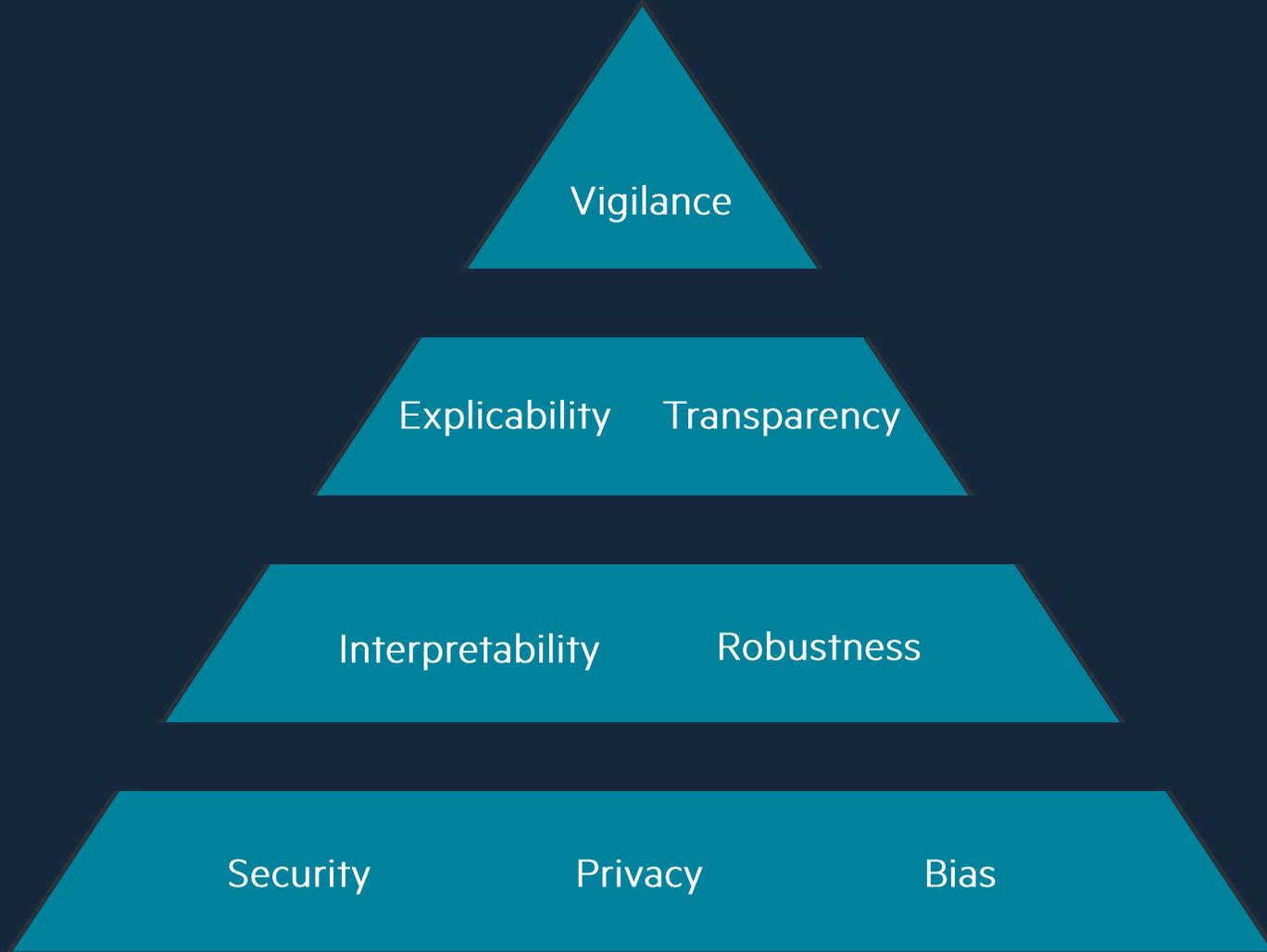
Robustness

Data

Security

Privacy

Bias



Thank you



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 - Ekimetrics

 <https://ekimetrics.com>