Tortoise

The Global Artificial Intelligence Index

Methodology Report

SEPTEMBER 2024

Overview

Launched in 2019, the Global AI Index (GAII) was the first to rank countries based on capacity for artificial intelligence, by measuring levels of investment, innovation and implementation. For the fifth iteration of the index, Tortoise has worked to further reflect the current international landscape across the areas of talent, infrastructure, operating environment, research, development, commercial ventures and government strategy.

This report details the underlying methodology of the Global AI Index, including the rationale for its structure and the techniques behind the data collection, imputation, weighting and scoring. As a composite index, the GAII draws on 24 different data sources, including government reports, public databases from international organisations, think-tanks and private companies, as well as Tortoise's own research, to measure the national ecosystems that determine capacity for artificial intelligence.

The 122 indicators that comprise the Global AI Index have been selected because they:

- Reflect publicly-available information;
- Use up-to-date data sources;
- Relate to key developments in the artificial intelligence sector.

The indicators are grouped by associative themes around three main pillars and seven sub-pillars:

- **Implementation.** Indicators within this pillar reflect the availability of structures and practitioners needed to operationalise artificial intelligence in business, government and communities. This pillar contains the sub-pillars of **talent, infrastructure and operating environment**.
- **Innovation.** Indicators within this pillar reflect technology breakthroughs and advancements in methodology that are indicative of greater capacity for artificial intelligence in the future. This pillar contains the sub-pillars of **research and development**.
- **Investment.** Indicators within this pillar reflect financial and procedural commitments to artificial intelligence. This pillar contains the sub-pillars of **commercial ecosystem and government strategy**.

Why measure AI capacity?

Artificial intelligence still holds enormous power to transform business, government and society. Measuring countries' AI capacity – from access to computing infrastructure to cutting-edge technology development, talent retention and capital investment – means understanding the extent to which they are set to harness such power.

Capacity – the amount of something that a system can contain or produce – is the organising concept of the Global AI Index. It is an appropriate means of considering the relationship between the different relevant factors that co-exist within a given nation. Increased capacity, in this case, can be understood as an increased ability to generate and sustain artificial intelligence solutions, now and in the future.

At a national level, greater capacity for artificial intelligence means that more systems, initiatives and personnel are becoming active in the field, and the quality of these factors is also improving. In this way, capacity for artificial intelligence expresses both

the breadth and depth of adoption as well as improvements in a given nation's ability to manage and sustain artificial intelligence systems in a productive, safe and fair way.

Within the Global AI Index, capacity is measured through composite indicators which – through aggregation – consolidate a large amount of data into a set of simplified numbers that encompass and reflect the underlying complexity of information.

Guiding principles

The key methodological principles that underpin the Global AI Index are detailed below:

1. **Relevant.** Each of our variables speaks to a contemporary policy area, or ongoing conversation in business in the field of artificial intelligence. For example, 'Number of Notable AI Models ' is a factor that features regularly in contemporary discussion.
2. **Relatable.** Many of our variables are selected to be accessible to specialists and non-specialists alike. This accessibility makes the Index more transparent, allowing users to question inclusions and the relationships that they show. The phrasing of each indicator should be clear and understandable.
3. **Sizable contribution.** Finally, our indicators are selected based on the sizable contribution that they make to the overall level of capacity in a given nation. In this sense, we have aimed to include indicators that are widely referenced and considered on the basis of their significance. For example, the 'Number of Data Scientists/ Engineers' is widely regarded in commentary as not only relevant and relatable as a means of measuring some nations' capacity, but it is also seen as making a significant contribution to that capacity.

The Global AI Index includes mainly quantitative data (e.g. the number of data scientists, artificial intelligence startups or GitHub commits). In a small number of cases, qualitative data is included (e.g. response data from the IPSOS survey question "I trust AI companies as much as I trust other companies") and is packaged as quantitative for comparability purposes.

Pillars and Sub-pillars

This section shows the organisation of the sub-pillars and offers a justification for their inclusion in the Global AI Index, along with their constituent indicators. These justifications reflect our understanding of the interrelated factors that contribute to capacity on a national scale, knowing that the fast-changing processes of innovation and implementation in artificial intelligence will require constant re-examination.

Implementation | Talent

Artificial intelligence is implemented by people. This refers to the practitioners of artificial intelligence who are employed by the public and private sector to apply technology to specific problems. Capacity, therefore, is based substantially on the personnel able to deploy, manage and implement technology systems.

The geographical concentration of AI specialists and developers, their movements and career level, as well as the changing supply and demand for them across industry sectors, is the focus of the 'Talent' sub-pillar. The purpose of measuring talent is to define the level of capacity offered by human capital within a given nation.

Implementation | Infrastructure

Reliable digital infrastructure, computing capabilities and chip manufacturing are required to sustain the operationalisation of different artificial intelligence solutions, and increase AI adoption.

Today, measuring infrastructure involves looking at baseline levels of internet access and connectivity, the availability of high-performance computing resources, and the ability to manufacture or acquire advanced semiconductors.

Implementation | Operating Environment

Technologies thrive when the wider society approves of them and creates a conducive operating environment for capacity growth. In the Global AI Index, the operating environment stands for the legislative, economic and cultural factors that significantly affect the implementation of AI technologies.

The 'Operating Environment' sub-pillar focuses on survey data indicating trust in artificial intelligence, the diversity of practitioners, and AI in legislative proceedings as facilitating factors.

Innovation | Research

Research and researchers generate new ideas in artificial intelligence. Capacity as a result of research is substantially based upon the level of activity amongst research communities in both academia and industry, and the extent to which they share and propagate ideas.

Measuring the level of research includes an assessment of the volume and impact of AI research publications, attendance at established AI research conferences, the quality of education institutions and contributions to novel architectures and techniques in producing large AI models that currently represent the cutting edge of AI capability. The 'Research' sub-pillar is indicative of the advances in capability that contribute to capacity through new innovations.

Innovation | Development

While research is focused on generating and expanding knowledge, development involves the application of that knowledge towards the creation of new AI products and capabilities.

The 'Development' sub-pillar focuses on the development of new AI models and datasets, mostly at the open-source level, and the application of AI technology in patents across other fields.

Investment | Commercial Ecosystem

Commercial ventures - businesses that are providing goods and services through the combination of financial and industrial aspects - are responsible for a large proportion of the implementation of artificial intelligence around the world. The scale, funding and volume of these businesses is a contributor to capacity.

The increases in productivity, efficiency and reliability that machine learning can provide are all significant enhancements to business performance in many sectors. The 'Commercial Ecosystem' sub-pillar is focused on the industrial environment surrounding artificial intelligence in a given country, including generative AI, analysing the number, scale, acquisitions and funding of AI companies.

Investment | Government Strategy

Government strategies - often publications outlining approaches to digital transformation, innovation and artificial intelligence - detail commitments to invest in R&D, talent, infrastructure and business development.

The 'Government Strategy' sub-pillar evaluates the comprehensiveness, timeliness, and degree of ambition of countries' national AI strategies, and measures government spending commitments towards AI and public computing infrastructure.[1]

1. Data collected on AI government spending includes both planned and actualised spending specific for AI. It does not take into consideration AI-related spending included in broader innovation/ICT/digitalisation budgets. It is only based on publicly-available verified information.

Calculating the Index

Geographical scope

The rapid transformation of public and private sector activities by artificial intelligence is a global phenomenon. With the aim of including as many nations as possible whilst maintaining the robustness and relevance of the underlying dataset, the fifth edition of the Index includes 83 countries. These are:

> Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Benin, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Czech Republic, Denmark, Egypt, Estonia, Ethiopia, Finland, France, Germany, Ghana, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kenya, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mauritius, Mexico, Morocco, New Zealand, Nigeria, Norway, Oman, Pakistan, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, The Netherlands, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Vietnam.

We validated the list of nations included in the Index in discussion with experts, as well as through literature review. Beginning with countries that published national AI strategies provided a basis for selecting countries with sufficient data available for ranking.

Temporal scope

The Global AI Index uses the most recent available values when possible. Where updated values are not available, data is carried forward from no earlier than 2019, and a data-collection cut off from 2019 onwards was also enforced.

For some indicators we take a snapshot of the data in its most up-to-date state (e.g. the most capable models currently represented in the OpenLLM benchmark leaderboard). For other indicators, we aggregate across a five-year window, going back from the year of the most recent index. For the fifth edition of the index, we therefore measure output from 2019 to 2024 and disregard data before that period.

Scoring and weighting

A country's total score is made up of the weighted sum of its sub-pillar scores, which in turn are the weighted sum of indicator 'categories' within each sub pillar. Each indicator therefore contributes to an overall category score.

This allows us to compare indicators within a given sub-pillar or category, such as Talent, rather than comparing all individual indicators separately. In the final presentation of the index, the overall score and the score for each sub-pillar are normalised between 100 and the minimum original score. We have chosen to keep the minimum normalised score as the minimum original score rather than normalising to 0, as giving a country 0 in the overall or sub-pillar scores may inaccurately imply that there is no AI capacity or activity taking place in the country at all.

The table below shows the weighting for each category. When added together, these produce the following overall sub-pillar weights:

Talent 15%
Operating Environment 4%
Infrastructure 11%
Research 22%
Development 18%
Government Strategy 8%
Commercial Ecosystem 22%

And the following overall pillar weights:

Implementation 30%
Innovation 40%
Investment 30%

Pillar	Sub-pillar	Category	Category weight
Implementation	Talent	Developers	5.00%
Implementation	Talent	Scientists	6.00%
Implementation	Talent	Professionals	4.00%
Implementation	Operating Environment	Labour	0.50%
Implementation	Operating Environment	Diversity	1.00%
Implementation	Operating Environment	Legislation	2.00%
Implementation	Operating Environment	Trust	0.50%
Implementation	Infrastructure	GPU access	1.00%
Implementation	Infrastructure	Computing	5.00%
Implementation	Infrastructure	Semiconductors	3.00%
Implementation	Infrastructure	Connectivity	2.00%
Innovation	Research	STEM	1.00%
Innovation	Research	Model research	8.00%
Innovation	Research	Foundational AI research	6.00%
Innovation	Research	Applied AI research	5.00%
Innovation	Research	Educational institutions	2.00%
Innovation	Development	Open-source models	9.00%
Innovation	Development	Patents	9.00%
Investment	Government Strategy	AI strategy	4.00%
Investment	Government Strategy	Government spend	4.00%
Investment	Commercial	Companies	8.00%
Investment	Commercial	Funding	10.00%
Investment	Commercial	Acquisitions	4.00%

Each individual indicator is given a 'base weight' that determines how much it will contribute to the overall category in which it sits. This base weight is calculated according to three specific considerations: 1) relevance to artificial intelligence, 2) contribution to artificial intelligence capacity, and 3) data quality.

For each consideration, we score the indicator between 1 and 5. These three considerations are then summed to reach a final 'base weight' between 3 and 15.

Weighting for relevance

Each indicator has been considered according to its relevance to the investment, innovation and implementation specific to artificial intelligence. Whilst we maintain that all inclusions in the index can be justified by this relevance, it is important to reflect in the weightings that some factors are more closely related than others.

Our assessment of relevance is based on the apparent connections between the indicator itself, and the overall change in artificial intelligence capacity. For example, we consider 'Number of AI Professionals' to be a highly relevant factor in contributing to capacity - and therefore the indicator is heavily weighted in the 'Talent' sub-pillar of the index. Whereas 'Proportion of Population with Access to Electricity' is considered a less relevant factor, whilst still being clearly connected to capacity. It is, therefore, less heavily weighted in the 'Infrastructure' sub-pillar of the index.

Weighting for contribution

Each indicator has also been considered according to its contribution to overall capacity through investment, innovation and implementation. Again, we maintain that all inclusions make a contribution towards capacity in some way, but it is important to reflect that some factors contribute more heavily. For example, we consider 'Total funding of AI startups' to be a significant contributor to capacity – and therefore weigh this indicator more heavily than others. Whereas 'Proportion of Total Integrated Circuits Exports' is an indicator that highlights an important and relevant factor, but is not as great a contribution to capacity.

Weighting for comprehensiveness

Finally, each indicator is considered on the basis of the comprehensiveness of the source dataset from which it is drawn. Some sources are more complete than others – alongside the process of imputation for missing values, it is also necessary to account for the completeness of the data in the weighting system. In the case where data availability is limited, we have reduced the relative weight of the indicator. The degree of confidence that we have in the representativeness of the data means that we can weigh this factor more heavily.

Weighting for scale and intensity

Once we have calculated the base weight, for the majority of indicators, we take two types of measurements: one based on total or 'absolute' output which contributes to AI scale, and one based on output relative to the country's population or economy size, which contributes to AI intensity. We weight each 'relative' indicator at ⅓ the weight of its associated absolute indicators. The overall index is therefore broadly weighted 75 per cent for AI scale and 25 per cent for AI intensity.

What is the effect of the weightings?

Each layer of the weighting system for the Global AI Index adds to the accuracy, completeness and explanatory value of the comparative rankings. It is intended to account for the fact that contributions to a country's capacity for artificial intelligence take many different forms, and have varying degrees of impact at present and future levels.

We recognise, however, that our weightings are based on subjective assumptions, and judgements applied in order to improve the coherence of the data. These subjective judgements affect the composite scoring for each country and in turn their position in the rankings.

Methodology updates for 2024

The past year has been transformative for artificial intelligence, with new developments in policy and legislation, and breakthroughs in AI technologies. Greater government activity, large-scale capital investment in generative AI and access to computing power have become increasingly central to national AI capacity.

This year, we have made some significant changes to what the index measures, adding new indicators using data that has only recently become available, removing old indicators that are no longer relevant to AI or reliable, and updating existing indicators to ensure they are still relevant to the current AI landscape.

We have retained the overall pillar and sub-pillar framework, the underlying weighting and scoring methodology of the index, and the scope of what constitutes AI, which we define broadly as technology that enables computers and machines to simulate human intelligence, rather than a narrower definition that might only encompass generative AI, for example.

Below is a summary of updates from the fourth to fifth edition of the index.

- **Geographic Scope:** We have included 21 new countries to reflect their government's efforts towards publishing a national AI strategy;
- **Temporal Scope:** We have updated the earliest data collection date cutoff for all indicators from 2017 to 2019, so the index now covers a 5-year period from the current date. This gives greater advantage to countries that have made substantial progress in AI capabilities within recent years;
- **Sub-pillar focus:** Within each sub-pillar, we have made the following overall changes:
  - **Talent:** We have expanded the breadth of what we measure to look at three different though overlapping categories of talent: AI scientists, AI developers and AI professionals. This has reduced the overall weight given to AI professionals derived from LinkedIn data, which previously made up the majority of the pillar;
  - **Infrastructure:** We have added indicators related to computing capabilities/ access and semiconductor manufacturing, and increased their weighting;
  - **Operating Environment:** We have updated the source of the indicator related to AI trust and added new indicators related to AI legislations. We have changed the indicators related to labour mobility to include more AI-specific measurements;
  - **Government Strategy:** We have added indicators related to considerations of AI ethics in AI strategy reports, public investment in AI computing infrastructure, and government plans for backing AI foundational models and public dataset platforms for AI training. We have adjusted the scoring to penalise AI strategy reports that are out of date or do not explicitly cover the current year. We have also significantly increased the weighting given to government spending commitments on AI;
  - **Commercial Ecosystem:** We have included a new group of indicators that measure the acquisition of AI startups by larger companies;
  - **Research:** We have introduced a distinction between 'foundational' and 'applied' AI research, with the former concerning the development of fundamental algorithms, models, and methodologies within computer science and AI, and the latter concerning the use of existing AI techniques to solve problems in other domains. We have removed indicators that measured

computer science research that was not necessarily specific to AI;
  - **Development:** We have included a group of new indicators that focus on measuring open-source AI model development, while reducing the weighting of AI-related patents;
- **Sub-pillar weights:** As a result of the above changes, we made the following overall updates to pillar weights:
  - **Talent:** Remains at 15 per cent;
  - **Infrastructure:** Remains at 11 per cent;
  - **Operating Environment:** Decrease from 6 to 4 per cent as a result of removing indicators that are no longer relevant or reliable;
  - **Government Strategy:** Increased from 4 to 8 per cent, as a result of governments dedicating more resources to AI than ever before;
  - **Commercial Ecosystem:** Decreased from 24 to 22 per cent to compensate for the increased weighting of Government Strategy in the Investment pillar;
  - **Research:** Decreased from 26 to 22 per cent to compensate for the increased weighting of Development in the Innovation pillar;
  - **Development:** Increased from 14 to 18 per cent as a result of the increasing importance of developing large-scale AI models that represent the cutting edge of AI capabilities.
- **Scale and intensity:** We have adjusted the ratio of the 'scale' and 'intensity' indicators in the overall index from 67:33 per cent to 75:25 per cent, increasing the weighting for 'scale'. This is to reflect the current direction of AI development and deployment which is increasingly dictated by factors of scale e.g. access to computing power and capital investment.

FAQs

Why have we built the Index?
Tortoise is fundamentally committed to data-driven journalism, understanding and explaining complex processes in our editorial output. We are also responding to the need amongst policy-makers, journalists, business leaders and society for a more comprehensive tool for understanding these processes. The Global AI Index is part of our investigation of artificial intelligence, recognising that it is one of the defining - and most complex - forces shaping our world today.

Why is it an index then? And not just a set of presentations of data?
At Tortoise we believe in the agenda setting power of indices. Not only do they allow for tracking important processes through carefully selected metrics, but they also invoke repeated comparison. In future editions, and by refining our methodology in open discussion with our members and experts, we hope to base stories and observations about artificial intelligence on relevant data. Comparison is key to this end, and is often a driver of positive change.

We see this journalistic intent as complementary to a further set of strengths of the index format, following a framework provided in the OECD review 'Composite Indicators – A review' by Michaela Saisana Group of Applied Statistics Joint Research Centre European Commission.

– To summarise complex or multi-dimensional issues;
– To place countries' performance at the centre of the policy arena;
– To offer a rounded assessment of countries' performance;
– To enable judgments to be made on countries' efficiency;
– To facilitate communication with ordinary citizens;
– To be used for benchmarking countries of best performance;
– To indicate which countries represent the priority for improvement efforts;
– To stimulate the search for better data and better analytical efforts;
– To set local priorities, and to seek out improvements along dimensions of performance where gains are most readily secured.

How did you select your metrics?
We selected our metrics through consultation with expert advisors, who helped us build an understanding of the development of artificial intelligence. Next, we conducted a careful investigation of available national strategies and datasets, highlighting the common features and deriving a list of indicators.

Why have you presented an index ranking on capacity?
Capacity is a conceptual framework that brings together the many interconnected factors involved in developing and deploying artificial intelligence. It refers to the amount of artificial intelligence-related factors in a given nation. Capacity is also suitable given that the index measures a range of inputs, outputs and outcomes - this is because capacity refers both to the present and potential level of development in the future.

How does it make sense to measure the level of capacity within a given nation when many of the factors involved are highly mobile and transnational?
As with many other indices that measure national performance, the Global AI Index does so with the consideration that factors are mobile. Many factors are linked to national environments through systems of taxation, regulation, language and

governance. These boundaries are permeable, in a globalised economy, but we believe that the 'state of the nation' on artificial intelligence is a salient topic.

Where are the ethical considerations in this index?
The conversation surrounding regulation and ethical concerns in the use of artificial intelligence has matured in some ways since the Global AI Index was last published. But in many ways it has remained stagnant. Tortoise is engaged in a broad conversation through our networks and events about the implementation and measurement of 'ethical AI'. The reality is that these conversations must go further. Tortoise is determined to investigate what is defining the relationship between ethics and artificial intelligence in future.

How have you kept this specific and relevant? Why not just include everything?
The index is framed so it can become a useful platform. Observing changes and learning will yield better insight, which is why we wanted to open up the conversation. Expert advisors have offered criticism and comment on the relevance of the factors included in the Global AI Index. This is something that we will continue to take advice and welcome comments on.

How are you distinguishing between practitioners and researchers?
It has been difficult to perfectly define the differences between the various types of personnel considered in the index. This is because people move, reskill, learn and adapt over time. In this sense, the distinction between practitioners and researchers is imperfect. Some individuals will show up in various metrics across the full range multiple times. For example, a single person may make commits to open source Artificial Intelligence platforms on GitHub as well as being a PhD graduate working for a company with a large valuation that is intensively using artificial intelligence. This essentially means that they are contributing to capacity across several different pathways and legitimately represent both categories of talent and researcher. For the purposes of constructing our measurement of the multi-dimensional concept of capacity, we have enforced some strict definitions on the otherwise blurred distinction between practitioners and researchers.

Don't the weightings of the index define the rankings, making this a subjective exercise?
The weightings have an effect on the proportional impact of each indicator on the total score, and therefore the rankings. We have endeavoured to include weightings that reflect not only our own biases, but also the consensus of the academic and business community on issues of importance in the current AI landscape. Our weighting methodology is described in more detail in this report, and we welcome any comments or recommendations. We have also conducted sensitivity analyses to determine the impact of the weights on the overall rank pairings, finding them to account for only a small variation in the scores.
Indicators

Indicators

Indicator Name	Pillar	Sub-pillar	Category	Relevance	Contribution	Reliability	Overall weight	Source
Number of Early Career AI scientists	Implementation	Talent	Scientists	5	3	4	1.38	Zeki Data
Number of Early Career AI scientists per capita	Implementation	Talent	Scientists	5	3	4	0.46	Zeki Data
Number of Mid Career AI scientists	Implementation	Talent	Scientists	5	4	4	1.50	Zeki Data
Number of Mid Career AI scientists per capita	Implementation	Talent	Scientists	5	4	4	0.50	Zeki Data
Number of Late Career AI scientists	Implementation	Talent	Scientists	5	5	4	1.62	Zeki Data
Number of Late Career AI scientists per capita	Implementation	Talent	Scientists	5	5	4	0.54	Zeki Data
Number of Data Scientists and Engineers on Employment Platforms	Implementation	Talent	Professionals	3	3	3	1.35	LinkedIn
Number of Data Scientists and Engineers on Employment Platforms per capita	Implementation	Talent	Professionals	3	3	3	0.45	LinkedIn
Number of AI Researchers and Engineers on Employment Platforms	Implementation	Talent	Professionals	4	4	3	1.65	LinkedIn
Number of AI Researchers and Engineers on Employment Platforms per capita	Implementation	Talent	Professionals	4	4	3	0.55	LinkedIn
Number of Developers Contributing to AI projects on GitHub	Implementation	Talent	Developers	5	4	4	1.73	GitHub Innovation Graph
Number of Developers Contributing to AI projects on GitHub per capita	Implementation	Talent	Developers	5	4	4	0.58	GitHub Innovation Graph
Coursera Data Science skill index	Implementation	Talent	Developers	2	1	2	0.66	Coursera Global Skills Index
Stack Overflow Questions related to AI	Implementation	Talent	Developers	3	1	2	0.80	Stack Exchange
Stack Overflow Questions related to AI per capita	Implementation	Talent	Developers	2	1	2	0.22	Stack Exchange
Stack Overflow Answers to AI-related Questions	Implementation	Talent	Developers	3	1	2	0.80	Stack Exchange
Stack Overflow Answers to AI-related Questions per capita	Implementation	Talent	Developers	2	1	2	0.22	Stack Exchange
National Retention rate of AI Scientists	Implementation	Operating Environment	Labour	5	3	3	0.50	Zeki Data
Gender representation of AI scientists	Implementation	Operating Environment	Diversity	4	3	3	1.00	Zeki Data
Presence of Right to Explanation	Implementation	Operating Environment	Legislation	3	2	2	0.33	Various government sources
Open Data Charter	Implementation	Operating Environment	Legislation	3	2	3	0.38	The International Open Data Charter
Number of Mentions of AI in Legislative Proceedings	Implementation	Operating Environment	Legislation	2	2	3	0.33	Stanford AI Index 2024
Number of AI-related Bills Passed into Law	Implementation	Operating Environment	Legislation	4	2	4	0.48	Stanford AI Index 2024
Level of Participation of ISO AI Committee	Implementation	Operating Environment	Legislation	4	3	3	0.48	ISO

Indicator Name	Pillar	Sub-pillar	Category	Relevance	Contribution	Reliability	Overall weight	Source
Proportion of Population that Trusts AI	Implementation	Operating Environment	Trust	2	2	2	0.50	Ipsos MORI poll
Proportion of Population with Access to Electricity	Implementation	Infrastructure	Connectivity	1	2	4	0.61	World Bank
Proportion of Population using Internet	Implementation	Infrastructure	Connectivity	1	2	4	0.61	World Bank
Average Download Speed	Implementation	Infrastructure	Connectivity	3	3	3	0.78	Speedtest
Number of Large Non-Distributed Super Computers	Implementation	Infrastructure	Computing	4	4	4	1.96	Top500
Number of Large Non-Distributed Supercomputers per capita	Implementation	Infrastructure	Computing	4	4	4	0.65	Top500
Total compute power in petaflops of Large Non-Distributed Supercomputers	Implementation	Infrastructure	Computing	4	3	4	1.79	Top500
Total compute power in petaflops of Large Non-Distributed Supercomputers per capita	Implementation	Infrastructure	Computing	4	3	4	0.60	Top500
Imports of Integrated Circuits	Implementation	Infrastructure	Semiconductors	1	2	3	0.38	OEC
Imports of Integrated Circuits as a proportion of GDP	Implementation	Infrastructure	Semiconductors	1	2	3	0.12	OEC
Exports of Integrated Circuits	Implementation	Infrastructure	Semiconductors	2	3	4	0.56	OEC
Exports of Integrated Circuits as a proportion of GDP	Implementation	Infrastructure	Semiconductors	2	3	4	0.19	OEC
Imports of Semiconductor Manufacturing Machines	Implementation	Infrastructure	Semiconductors	3	3	3	0.56	OEC
Imports of Semiconductor Manufacturing Machines as a proportion of GDP	Implementation	Infrastructure	Semiconductors	3	3	3	0.19	OEC
Exports of Semiconductor Manufacturing Machines	Implementation	Infrastructure	Semiconductors	4	4	4	0.75	OEC
Exports of Semiconductor Manufacturing Machines as a proportion of GDP	Implementation	Infrastructure	Semiconductors	4	4	4	0.25	OEC
Cited usage of A100, H100 NVIDIA GPUs and Google TPUs in AI papers	Implementation	Infrastructure	GPU Access	5	4	3	0.41	OpenAlex
Cited usage of A100, H100 NVIDIA GPUs and Google TPUs in AI papers per capita	Implementation	Infrastructure	GPU Access	5	4	3	0.14	OpenAlex
Cited usage of V100 and RTX series NVIDIA GPUs in AI papers	Implementation	Infrastructure	GPU Access	5	3	2	0.34	OpenAlex
Cited usage of V100 and RTX series NVIDIA GPUs in AI papers per capita	Implementation	Infrastructure	GPU Access	5	3	2	0.11	OpenAlex
Number of Universities represented in Times Higher Education Top 100 Computer Science Universities	Innovation	Research	Educational Institutions	2	3	3	1.50	The Times Higher Education Rankings
Number of Universities represented in Times Higher Education Top 100 Computer Science Universities per capita	Innovation	Research	Educational Institutions	2	3	3	0.50	The Times Higher Education Rankings
Annual R&D Spend	Innovation	Research	STEM	1	2	2	0.75	World Bank

Indicator Name	Pillar	Sub-pillar	Category	Relevance	Contribution	Reliability	Overall weight	Source
Annual R&D Spend as a proportion of GDP	Innovation	Research	STEM	1	2	2	0.25	World Bank
Contributions to Foundational AI research Publications by publication count	Innovation	Research	Foundational AI research	5	3	4	1.38	Open Alex
Contributions to Foundational AI research Publications by publication count per capita	Innovation	Research	Foundational AI research	5	3	4	0.46	Open Alex
Contributions to Foundational AI research Publications by citation count	Innovation	Research	Foundational AI research	5	4	4	1.50	Open Alex
Contributions to Foundational AI research Publications by citation count per capita	Innovation	Research	Foundational AI research	5	4	4	0.50	Open Alex
Number of Submissions to AI Conferences	Innovation	Research	Foundational AI research	5	5	4	1.62	Various conference publications
Number of Submissions to AI Conferences per capita	Innovation	Research	Foundational AI research	5	5	4	0.54	Various conference publications
Contributions to Applied AI research Publications by publication count	Innovation	Research	Applied AI research	5	4	4	1.95	Open Alex
Contributions to Applied AI research Publications by publication count per capita	Innovation	Research	Applied AI research	5	4	4	0.65	Open Alex
Contributions to Applied AI research Publications by citation count	Innovation	Research	Applied AI research	5	3	4	1.80	Open Alex
Contributions to Applied AI research Publications by citation count per capita	Innovation	Research	Applied AI research	5	3	4	0.60	Open Alex
Number of Notable AI models	Innovation	Research	Model research	5	3	4	3.00	Epoch AI
Number of Notable AI models per capita	Innovation	Research	Model research	5	3	4	1.00	Epoch AI
Estimated total Training Compute of Notable AI Models	Innovation	Research	Model research	5	4	3	3.00	Epoch AI
Estimated total Training Compute of Notable AI Models per capita	Innovation	Research	Model research	5	4	3	1.00	Epoch AI
Contributions to Granted AI patents by inventor	Innovation	Development	Patents	4	4	4	1.08	IFI CLAIMS Patent Services
Contributions to Granted AI patents by inventor per capita	Innovation	Development	Patents	4	4	4	0.36	IFI CLAIMS Patent Services
Contributions to Granted AI patents by applicant	Innovation	Development	Patents	4	4	4	1.08	IFI CLAIMS Patent Services
Contributions to Granted AI patents by applicant per capita	Innovation	Development	Patents	4	4	4	0.36	IFI CLAIMS Patent Services
Number of Filed AI Patents by inventor	Innovation	Development	Patents	4	2	3	0.81	IFI CLAIMS Patent Services
Number of Filed AI Patents by inventor per capita	Innovation	Development	Patents	4	2	3	0.27	IFI CLAIMS Patent Services

Indicator Name	Pillar	Sub-pillar	Category	Relevance	Contribution	Reliability	Overall weight	Source
Number of Filed AI Patents by applicant	Innovation	Development	Patents	4	2	3	0.81	IFI CLAIMS Patent Services
Number of Filed AI Patents by applicant per capita	Innovation	Development	Patents	4	2	3	0.27	IFI CLAIMS Patent Services
Proportion of all Granted Patents that are AI-related by inventor	Innovation	Development	Patents	4	3	3	0.90	IFI CLAIMS Patent Services
Proportion of all Granted Patents that are AI-related by applicant	Innovation	Development	Patents	4	3	3	0.90	IFI CLAIMS Patent Services
Proportion of Filed AI Patents by inventor	Innovation	Development	Patents	4	2	3	0.81	IFI CLAIMS Patent Services
Proportion of Filed AI Patents by applicant	Innovation	Development	Patents	4	2	3	0.81	IFI CLAIMS Patent Services
Average Days taken for Approval by patent office	Innovation	Development	Patents	2	1	3	0.54	IFI CLAIMS Patent Services
Contribution to pre-trained Models represented in Top 100 of openLLM Leaderboard	Innovation	Development	Open source models	5	5	4	1.29	Hugging Face
Contribution to pre-trained Models represented in Top 100 of openLLM Leaderboard per capita	Innovation	Development	Open source models	5	5	4	0.43	Hugging Face
Contribution to all Models represented in top 200 of openLLM Leaderboard	Innovation	Development	Open source models	5	4	4	1.20	Hugging Face
Contribution to all Models represented in top 200 of openLLM Leaderboard per capita	Innovation	Development	Open source models	5	4	4	0.40	Hugging Face
Contribution to Most Downloaded Models on Huggingface by model count	Innovation	Development	Open source models	4	4	4	1.11	Hugging Face
Contribution to Most Downloaded Models on Huggingface by model count per capita	Innovation	Development	Open source models	4	4	4	0.37	Hugging Face
Contribution to Most Downloaded Models on Huggingface by download count	Innovation	Development	Open source models	4	4	3	1.02	Hugging Face
Contribution to Most Downloaded Models on Huggingface by download count per capita	Innovation	Development	Open source models	4	4	3	0.34	Hugging Face
Contribution to Most Downloaded Datasets on Huggingface by download count	Innovation	Development	Open source models	4	4	3	1.02	Hugging Face
Contribution to Most Downloaded Datasets on Huggingface by download count per capita	Innovation	Development	Open source models	4	4	3	0.34	Hugging Face
Contribution to Most Downloaded Datasets on Huggingface by dataset count	Innovation	Development	Open source models	4	4	4	1.11	Hugging Face
Contribution to Most Downloaded Datasets on Huggingface by dataset count per capita	Innovation	Development	Open source models	4	4	4	0.37	Hugging Face

Indicator Name	Pillar	Sub-pillar	Category	Relevance	Contribution	Reliability	Overall weight	Source
Number of AI Companies	Investment	Commercial	Companies	4	4	3	1.48	Crunchbase
Number of AI Companies per capita	Investment	Commercial	Companies	4	4	3	0.49	Crunchbase
Number of AI Startups	Investment	Commercial	Companies	4	4	3	1.48	Crunchbase
Number of AI Startups per capita	Investment	Commercial	Companies	4	4	3	0.49	Crunchbase
Number of AI Companies on Country's Stock Exchange	Investment	Commercial	Companies	4	3	3	1.35	Crunchbase
Number of AI Unicorns	Investment	Commercial	Companies	3	3	4	1.35	Crunchbase
Number of Listed AI Companies	Investment	Commercial	Companies	4	3	3	1.35	Crunchbase
Total Funding of AI Companies	Investment	Commercial	Funding	4	4	4	2.37	Crunchbase
Total Funding of AI Companies proportional to GDP	Investment	Commercial	Funding	4	4	4	0.79	Crunchbase
Total Funding of AI Startups	Investment	Commercial	Funding	4	3	4	2.17	Crunchbase
Total Funding of AI Startups proportional to GDP	Investment	Commercial	Funding	4	3	4	0.72	Crunchbase
Average Funding of AI company	Investment	Commercial	Funding	4	2	4	1.97	Crunchbase
Average Startup Funding	Investment	Commercial	Funding	4	2	4	1.97	Crunchbase
Number of AI Companies Acquired	Investment	Commercial	Acquisitions	3	3	3	1.42	Crunchbase
Number of AI Companies Acquired per capita	Investment	Commercial	Acquisitions	3	3	3	0.47	Crunchbase
Value of AI Companies Acquired	Investment	Commercial	Acquisitions	3	4	3	1.58	Crunchbase
Value of AI Companies Acquired proportional to GDP	Investment	Commercial	Acquisitions	3	4	3	0.53	Crunchbase
Government has Dedicated AI Strategy	Investment	Government Strategy	AI Strategy	5	5	5	0.29	Various national strategy documents
Time Scale of Dedicated AI Strategy	Investment	Government Strategy	AI Strategy	5	3	5	0.26	Various national strategy documents
Dedicated AI Strategy tracks Previous Years efforts on AI	Investment	Government Strategy	AI Strategy	5	3	3	0.22	Various national strategy documents
Dedicated AI Strategy has Measurable AI Targets	Investment	Government Strategy	AI Strategy	5	4	5	0.27	Various national strategy documents
Dedicated AI Strategy mentions Training or Upskilling	Investment	Government Strategy	AI Strategy	5	5	5	0.29	Various national strategy documents
Dedicated AI Strategy was Signed by Senior Member of Government	Investment	Government Strategy	AI Strategy	4	4	5	0.26	Various national strategy documents
Government has Dedicated AI Minister	Investment	Government Strategy	AI Strategy	5	2	5	0.24	Various national strategy documents

Indicator Name	Pillar	Sub-pillar	Category	Relevance	Contribution	Reliability	Overall weight	Source
Government has Dedicated AI Governmental body	Investment	Government Strategy	AI Strategy	5	3	5	0.26	Various national strategy documents
Dedicated AI Strategy received External Consultation	Investment	Government Strategy	AI Strategy	5	3	4	0.24	Various national strategy documents
Dedicated AI Strategy considers AI Ethics	Investment	Government Strategy	AI Strategy	5	5	5	0.29	Various national strategy documents
Government invests in Public AI Compute Infrastructure	Investment	Government Strategy	AI Strategy	4	5	5	0.27	Various national strategy documents
Dedicated Spending on Public AI Compute Infrastructure	Investment	Government Strategy	AI Strategy	4	5	5	0.27	Various national strategy documents
Dedicated Spending on Public AI Compute Infrastructure per capita	Investment	Government Strategy	AI Strategy	4	5	5	0.09	Various national strategy documents
Government invests in the Training of a National AI Foundational Model	Investment	Government Strategy	AI Strategy	5	3	4	0.24	Various national strategy documents
Government is making national public Datasets available for AI Training	Investment	Government Strategy	AI Strategy	4	4	4	0.24	Various national strategy documents
Spend Period of Dedicated AI Budgets	Investment	Government Strategy	AI Strategy	5	4	5	0.27	Various national strategy documents
Dedicated Spending on Artificial Intelligence	Investment	Government Strategy	Government Spend	5	5	5	3.10	Various national strategy documents
Dedicated Spending on Artificial Intelligence proportional to GDP	Investment	Government Strategy	Government Spend	5	5	3	0.90	Various national strategy documents